

**Implementing The National Energy Policy (KEN) : A Study of Energy Security  
and Interrelation Among The Actors, Case Study : The Province of Jambi  
(Indonesia)**

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## **Abstract**

Managing natural resources is facing dilemmas in most of energy sources producer countries. The conflict between political interest and socio-economic has been the major problem that caused the dilemmas, option to sell (export) rather than to use for the domestic fulfillment seems to be the most choice that been undertaken by the producer states. Therefore, energy policy is considered the best instrument in energy management. However, effective implementation of the policy becomes the critical point beyond the policy on paper. The Province of Jambi (Indonesia) is taken as a case study, with aims to analyze the implementation process of the National Energy Policy (KEN) in the province. The Contextual Interaction Theory (CIT) is used as the theoretical framework to explain the interaction among the actors based on their characteristics and the contextual factors that influence the implementation process. The primary data of this research were derived from semi-structured interviews and a working group with the key informants of energy authorities: the policy makers and the national utility company. The secondary data supporting the primary data were derived from preliminary study of energy in Jambi Province, policy documents, energy statistical data, and sources from media. The qualitative methods with the case study approach applied to explain condition in Jambi Province by comparing the impact of the policy in the urban and rural areas. This study has found that the electrification ratio was increased significantly (82%) in 2016, proving that the KEN (policy) influenced the electricity services supply in the province. However, the delay of several projects of power generation has been identified as the barrier in the KEN implementation, which has influenced the secure supply of electricity services in the province. These factors have been discovered in the analysis of the internal and external contexts that influence the implementation of the KEN policy. Moreover, recommendations and evaluations of the study have been discussed to confirm the contribution of the research to the existing body of knowledge with suggestions for advanced research.

**Keywords :** *Energy Security, The National Energy Policy (KEN), Energy Efficiency, Contextual Interaction Theory, Implementation Process.*

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## List of abbreviations

APBN	: <i>Anggaran Pendapatan Belanja Negara</i> (national expenditure revenue budget)
APBD	: <i>Anggaran Pendapatan Belanja Daerah</i> (local expenditure revenue budget)
BOE	: Barrel Oil Equivalent
BIG	: <i>Badan Informasi Geospasial</i> (geospatial information agency)
BSCF	: Billion Cubic Feet
BAKOREN	: <i>Badan Koordinasi Perencanaan Energi</i> (energy planning coordination agency)
BPS	: <i>Badan Pusat Statistik</i> (statistic central agency)
CIT	: Contextual Interaction Theory
DESDM	: <i>Dinas Energy Sumber Daya Mineral</i> (mineral resources energy agency)
DEN	: <i>Dewan Energy Nasional</i> (national energy council)
FTP	: Fast Track Programme
GDP	: Gross Domestic Product
GRDP	: Gross Regional Domestic Product
GW	: Giga Watts
HSD	: High Speed Diesel
IMF	: International Monetary Fund
IDR	: <i>Indonesia Rupiah</i> (Indonesian currency)
IEA	: International Energy Agency
IPP	: Independent Power Producer



KEN	: <i>Kebijakan Energi Nasional</i> (national energy policy)
KESDM	: <i>Kementrian Energi Sumber Daya Mineral</i> (mineral resources energy ministry)
KUBE	: <i>Kebijakan Umum Bidang Energi</i> (energy sector general policy)
KV	: Kilo Volt
kWh	: kilo Watt hours
Mtoe	: Million Tonnes Oil Equivalent
MW	: Mega Watts
PT. PLN	: <i>Perusahaan Terbatas. Perusahaan Listrik Negara</i> (state-owned utility company)
PLTU	: <i>Pembangkit Listrik Tenaga Uap</i> (steam power generation)
PLTMH	: <i>Pembangkit Listrik Tenaga Mikro Hidro</i> (micro-hydro power generation)
PLTP	: <i>Pembangkit Listrik Tenaga Panas Bumi</i> (geothermal power generation)
RUED	: <i>Rencana Umum Energi Daerah</i> (local energy general plan)
RUEN	: <i>Rencana Umum Energi Nasional</i> (national energy general plan)
RUKN	: <i>Rencana Umum Kelistrikan Nasional</i> (national electricity general plan)
RUKD	: <i>Rencana Umum Kelistrikan Daerah</i> (local electricity general plan)
RIKEN	: <i>Rencana Induk Konservasi Energi Nasional</i> (national energy conservation plan)
Tcf	: Trillion Cubic Feet
UN	: United Nation
UNCSD	: United Nation Commission Sustainable Development

## **Chapter 1 : Introduction**

### **1.1. Background**

The world energy consumption is dominated by non-renewable energy. Approximately 80% of fossil fuel is dominating the world consumption, which means only 20% of renewable energy is being used in total as reported by IEA in 2011 (World Energy Outlook, 2013). The dependency on fossil fuel leads to the global energy crisis because the reserves of fossil fuel are finite. This situation consequences to the five big problems of the world as stated by Thomas Friedman (2008), such as energy supply and demand, petro-dictatorship, climate change, energy poverty, and biodiversity loss. Moreover, energy is one of the key indicators of sustainable development measurement.

Energy supply is critical in supporting the economic growth of nations. Previous studies showed that the prosperity of a nation can be determined by the growth of its GDP, whereas the GDP would be linear with the needs of energy per capita (IMF, 2011). This indicated that energy access is one of the factors to bring prosperity. Nevertheless, the people who live in rural areas are the group which have lack of access to energy.

Access to energy is one of the keys to reduce poverty (Pye and Dobbins, 2015). Creating energy access with affordable price to the communities will improve their lives, enables to generate income, increasing agricultural productivity, and supporting economic activity (UN-Energy, 2005). Hence, many programmes from the government and development agencies are based on this circumstances, to create the viability of energy supply by using productive energy, especially when subsidies are limited (Kooijman, 2008). Moreover, one of typical forms of basic energy is electricity. Creating affordable electricity services may contribute to increase socio-economic status, GDP and reducing poverty for the societies (DFID, 2002; Sanchez, 2006).

Indonesia as a developing country is facing the problem in providing electricity access. On one hand, the non-renewable energy uses were dominated by the power

generation, with the shares : coal (52%), gas (24%), oil (13%), and small portion of renewable energy, such as hydro (8%) and geothermal (4%) (Outlook Energy Indonesia, 2014). On the other hand, the electricity transmission has not been interconnected to the entire regions. The national utility company (PT. PLN) that is responsible on providing electricity services for the citizens only can fulfill about 70% of the transmissions (DEN, 2014). This situation mostly affected the local areas due to their geography.<sup>1</sup> For instance, the electrification ratio of Jambi Province is only 80% (DESDM Jambi, 2016). It is surprising that it is not balanced considering the province is one of the energy producer sources. The energy resources potential in Jambi Province reported : oil (395.445.680 Barrels, Lifting : 6.403.411 Barrels), gas (15.672,87 BSCF, Lifting : 16.001.213BOE), coal (2,2 Billions Ton, Production : 3,32 Million Tonnes/year), (KESDM, 2015). This is the reason why Jambi Province is taken as the case study for this thesis (see Section 4.1 for description of Jambi Province).

Energy policy has been considered as an instrument to solve the energy (electricity) issue. Previous studies recommended that energy policy should be established to create energy security (Martins, 1999; Winzer, 2011; Poggi; Firmino; Amado, 2015; Teles; Silva; Gaudêncio; Torres, 2015; Radovanovic; Filipovic; Pavlovic, 2016). Energy security has been part of the national issue in many countries in the world. An integrated energy management is needed to achieve security of supplies, therefore, a reliable energy policy is the answer. Furthermore, not only policy on paper, but the implementation of the policy is critical to obtain the policy goals (e.g. energy security). The government of Indonesia has been implementing the energy policy since 1981. However, the evidence indicated that the existing energy policies do not much lead to improvement (Hartono and Resosudarmo, 2007). Evaluations (by the government) have been conducted to the existing policies and create some policy changes. Recently, the national energy policies have been released (UU No. 30/2007; PP No. 79/2014)<sup>2</sup> namely KEN in order to achieve

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<sup>1</sup> Indonesia is an archipelago with lots of islands (almost 14.000), (Indonesian Statistic).

<sup>2</sup> UU No. 30/2007; PP No. 79/2014 are the national regulations which known as the national energy policy called by KEN. All the acronyms in this thesis will use as it origins (see list of abbreviations).

energy security and sustainable energy in Indonesia. Thus, I would like to study the implementation process of The National Energy Policy (KEN) in Jambi Province (Indonesia).

## **1.2. Problem statement**

The Province of Jambi is one of energy sources (e.g. oil, natural gas, coal, and geothermal) producer in Indonesia which located in Sumatera Island (figure 1).<sup>3</sup> In contrast, the blessing does not guarantee the province to fulfill its energy demand. The report said that the electrification ratio of Jambi Province was 80%, means 20% citizens of Jambi cannot access the electricity services (DESDM Jambi, 2016). The data refer to the households living in rural areas. Several projects such as micro-hydro, biogas and geothermal are being developed by the different levels of governments (national, provincial, and regency/municipality) as a reaction to the implementation of KEN to provide electricity services in the province. There are various actors/stakeholders that are involved in funding and organizing the programmes, vary from the government, non-government organizations and private sector organizations. The main problem that leads to this study is that the provincial government shows a slow progress in implementing KEN policy to provide access to the electricity services to the households in rural areas. Therefore, the focus of the research is to analyze the dynamic interaction among actors based on their characteristics that involved in the implementation of KEN in the Province of Jambi.

Considering the energy sources potential in Jambi Province, the security supply and distribution of electricity services are critical in terms of energy sustainability. As well as internal factors, the effort to provide electricity services is also influenced by external factors. Due to the fact, the second purpose of this research is to explain the contextual factors that influence the implementation process of KEN.

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<sup>3</sup> See chapter 4 for more detailed description of Jambi Province.

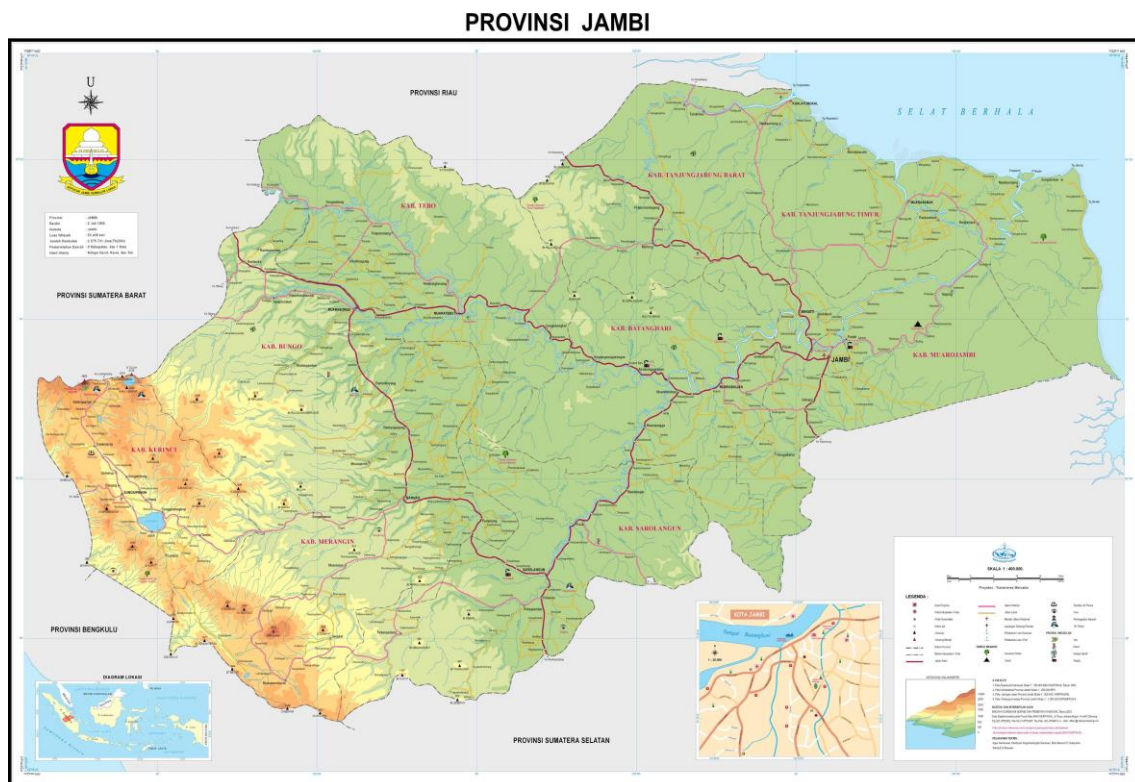


Figure 1. The map of Jambi Province in Indonesia (*source, BIG, 2017*)

### 1.3. Research objective

This research wants to explain the implementation process of KEN and its impact to the security supplies of electricity services in the Province of Jambi. Hence, the objectives of the study are:

- To explain the implementation of KEN policy and the contextual factors that influence the implementation process in Jambi Province.
- To find out the actors' characteristics that influence the KEN implementation process.
- To explain the actors' roles in the implementation process of KEN.
- To identify the barriers in KEN policy implementation.

#### **1.4. Research questions**

The overall research objective is to carry out the impact of KEN implementation to the security supplies of electricity services in Jambi Province. Therefore, the main questions of the research are:

1. How does the implementation of KEN policy impact on the electricity services security in Jambi Province?
2. How do actor's characteristics as stated in CIT, influence the KEN policy implementation process?

#### **1.5. Purpose of the study**

The Indonesian national energy management blueprint (2005-2025) states that the critical aspects on shaping the welfare of economies and society are production growth, diversification, supply, fiscal and monetary policy in the energy sector. The research attempts to enlarge scientific and social relevance on KEN implementation. Some of the gaps in the existing body of knowledge will be filled in from this study. The research done until now does not adequately address the research questions of this study (in Indonesian context). Thus, the research conducted would help in understanding the issue and provide fresh insight for the topics of informality, energy security and policy implementation process.

#### **1.6. Structure of thesis**

Firstly, chapter 2 is started with the topic by exploration of the literature. It is started by the brief history of energy policy in Indonesia, followed by the broad perspective of the global energy policy. Then, the descriptions on how to measure the energy security and energy efficiency are given. This chapter also presents the Contextual Interaction Theory (CIT) as the essential part of the Theoretical Framework.

Secondly, chapter 3 explains the research design. It starts with the research method which explains the strategy of the data gathering, and its validity and reliability. followed by giving the research boundary to get picture of research focus. The chapter also presents the application of the model framework of the CIT in the

study. Then, this chapter is ended by the definition of concepts being used in the study.

Thirdly, chapter 4 explains the impact of KEN policy to the energy security in Jambi Province. It brings the result from the desk research and data analysis for the existing power generation projects in Jambi Province, the findings and results from the previous research. It brings the operational explanation of the KEN implementation process influence the security supply of electricity services in the province.

Then, chapter 5 explains the output arena and the characteristic of KEN policy, the actors' role in KEN implementation and a stakeholder analysis that influences the KEN implementation process.

Lastly, chapter 6 comprises the deductions, starting with the restatement of the research questions and revelation of the main factors that influence the implementation process of KEN policy and its impacts to the energy security followed by a discussion. This is the important part of the thesis as it concludes all the results and findings in one frame. Then, the chapter is closed by the contribution of the study to the available knowledge and recommendations together with suggestions for further studies.

## **Chapter 2 : Literature review and theoretical framework**

This chapter gives a brief history about energy policy changes in Indonesia as well as an illustration of energy policies' implementation and implications in the two selected countries, namely Malaysia and Saudi Arabia. Then, it gives explanation about the concept of energy, security, sustainability, and energy efficiency measurement through its indicators. Moreover, this chapter also comprises the theoretical frameworks as the base for the study. An outline of the CIT which consists of internal and external contexts are given, followed by its application in the study.

### **2.1. The national energy policy (KEN) in Indonesia**

In 1970, the main concern of the government was to maximize the production of oil through contract sharing<sup>4</sup>. Because the national income relied on oil production, it followed by the raising up of the national budget revenue considerably.

In 1976, the first idea to set up the Indonesian national energy policy came up. The aim of the policy was to maximize the utilization of energy resources. The government established The National Energy Coordination Agency (BAKOREN)<sup>5</sup> that was responsible to formulate the policy and as coordinator of policy implementation. The first national energy policy (KUBE) was launched in 1981, thereafter the policy has been renewed periodically according to the strategic development and environment.

The national energy policy (KUBE) was revised in 1987, and in 1991 the policy focus was on intensification, diversification and energy conservation. Intensification meant to optimize the exploration and survey activities to find out economic potential of the resources. Diversification aimed to reduce oil consumption and displace it with coal as the primary energy for power generation. Conservation focused on technology for electric equipment to obtain efficiency. In

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<sup>4</sup> Contract sharing is mechanism in oil production between government and private companies with the biggest proportion of shares for the government. Due to limited budget, private companies will invest in all cost of exploration through this contract.

<sup>5</sup> All the information is extracted from Jambi Province energy plan (RUED) document.



the beginning of 1990's, the government initiated to use (energy) resources for the development. The decision to transform the export commodity into industrial manufacturer has boosted the industrialization which impacted on the environment. Therefore, the environmental aspect should takes into account in formulating energy policy and considering to use renewable energy.

In 1998, BAKOREN set up a new KUBE replacing the 1991 KUBE. This policy aimed to create investment to support development strategy in energy sector, such as procurement, provision and energy use. This new policy has indicated the limitation of energy resources, especially oil. The oil consumption implicitly targeted for the domestic uses and industries to produce added value of products. Thus, the critical targets on supply side were added to the policy, such as; investment, giving incentive and disincentive, standardization and certification, infrastructure development, empowerment, information system management, institutional capacity, research and development.

In the late 2003, The National Energy Department (ministry) released The National Energy Policy (KEN) and Green Energy Policy. These were renewed from 1998 KUBE policy that composed by the government together with stakeholders in energy sector to be a basic legal instrument for energy policy in Indonesia. In general, the main target was to reduce oil consumption through diversification and intensification. However, efficiency and energy conservation were failed to achieve due to contradiction between energy conservation policy and fuel subsidy policy. This indicated that the existing policies were partial without any specific targets in sequence, such as short, middle and long terms target.

In order to implement KEN holistically, The National Energy Management Blueprint (2005-2025) was set. In this blueprint, the aspects such as production growth, diversification, demand, monetary, fiscal policy and multi-governance were covered to optimize the energy resources management. Moreover, this

blueprint became a legal instrument namely PERPRES No. 5/2006<sup>6</sup>. The aim of this policy was to fulfill domestic demand, with the specific target:

- To achieve energy elasticity less than one by 2025<sup>7</sup>;
- To achieve energy mix by 2025;
  - Oil less than 20%
  - Natural gas more than 30%
  - Coal more than 33%
  - Biofuel more than 5%
  - Geothermal more than 5%
  - Other renewable energy 7%

These were big challenges according to the current primary energy mix which indicated a high dependency on the oil. Therefore, the government formulated the recent national policies (UU No. 30/2007 and PP no. 79/2014) namely The National Energy Policy (KEN) to guide the energy management in Indonesia.

Based on the policy document, the government expected to meet energy demand in the country for the next forty years (starting in 2010). The critical point of the policy (article 6) is paradigm changes from selling the energy resources as commodity (export) to utilize them as a development capital. In addition, the policy also point out the target of energy efficiency in all sectors and energy access for its citizen. Furthermore, the energy development priorities are (article 11 points (1) and (2), PP No. 79/2014) as follow :

- Energy development is considering the balance of economic growth, security of supply, and environmental protection;
  - a. By optimizing the use of renewable energy which considered the economic level;
  - b. Reducing oil consumption;
  - c. Optimizing the use of natural gas and new energy;

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<sup>6</sup> Ibid.

<sup>7</sup> Energy elasticity is used to measure energy efficiency, comparison of energy consumption with economic growth. Indonesian energy elasticity was 1,36 in 2012, while the efficient energy is indicated by energy elasticity < 1 (DEN, 2014).

- d. The usage of coal as the national primary energy supply.
- Energy provision includes access to the electricity, gas for cooking, energy for transportation, industry, and agriculture.
- Energy development priority is to optimize the use of local resources.
- Energy resources and development priority is to fulfill the domestic use.
- Industries which need higher energy should be developed in the area that enrich of energy sources.

## **2.2. An overview of energy policies in oil producing states**

One of the keys to solve problems in energy security is the energy policy. The policy is formulated by the authorities (the government) as a response to problems perceived in society. The policy consists of certain goals, certain means and actions undertaken in certain sequence with focuses on ameliorating or preventing problems. Furthermore, several studies showed that energy policy plays an important role in energy management to obtain security of supplies in some countries. In this section, two examples of energy producer states will be described (Malaysia and Saudi Arabia). Malaysia is chosen because the country has succeeded to reduce dependency on fossil fuel and accelerating the use of alternative energy through its energy policy. The similarity in the roots of culture with Indonesia made the country suitable example on how the energy policy implemented properly. Meanwhile, the status of Saudi Arabia as oil exporter is similar with Indonesia currently. The fluctuation of oil prices affected the government (Indonesia) efforts in energy provision. Therefore, it is necessary to have overlook on how Saudi Arabia treats the resources through its energy policy.

Malaysia is the second largest producer of fossil fuel after Indonesia in Southeast Asia (IMF, 2015). The government of Malaysia realizes that they have to reduce the dependency on fossil fuel, even though they have reserves in order to sustain in energy provision. Hence, the energy policy is being developed through time, such as The National Energy Policy (1979), The Oil Limitation Policy (1980), and The Diversification Policy (1981) (Mohamed and Lee, 2006). The Diversification Policy has succeeded to reduce oil consumption from 71,4% (1990) to 53,1%

(2000), and 6% in 2003 (Mohamed and Lee, 2006). On the other hand, they attained the use of alternative energy from 13,3% (1990) to 82,9% in 2003 (Mohamed and Lee, 2006). Moreover, Small Renewable Energy Power (SREP) was the government's program in 2001 that aimed to provide electricity services from the renewable resources and has attained capacity of 352 MW (Mohamed and Lee, 2006). In spite of those, the government also gives incentive to promote renewable energy utilization, such as Investment Tax Allowance (Jaafar et.al, 2003; in Mohamed and Lee, 2006). Although, Malaysia is still depend on fossil fuel as their energy sources, they have succeeded to accelerate the use of alternative energy. In addition, the recent data showed that Malaysia was remaining a net exporter of fossil fuel with exports of 240.000 bb/d of oil and 1,2 Tcf of gas in 2013 (IMF, 2015)<sup>8</sup>. The domestic consumption of oil and gas was being controlled below the production by the energy policies (IMF, 2015).

Saudi Arabia is the largest producer and dominated oil market globally. The government thinks that energy as valuable resources for both economic and strategic. The country gained 80% of its national budget revenue from the sale of crude oil and natural liquid gas (CIA, 2011). The country's position as the largest exporter (oil and gas) has put Saudi Arabia as a dynamic player and a stabilizer in the oil market (Akhonbay, 2012). With regards to the political instability in the Middle-East, Saudi Arabia is the biggest producer of crude oil among the other members of OPEC that influenced the oil market globally (Luciani, 2004). The fluctuation of oil prices could affected the country's economic growth, therefore, the government thinks to develop and diversify a manufacturing-based economy in order to promote the small and medium-sized enterprises (SME) to create employment (Akhonbay, 2012). In contrast, domestic energy demand within the country tend to increase higher than its economic growth (7% annually) due to recent economic crisis and population growth, in which forced the government to spend about \$ 33 billion a year to subsidize the cost of electricity and desalination (Akhonbay, 2012). With regards to prevent this scheme become worst, the

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<sup>8</sup> Data is available on IMF report, Malaysia Selected Issues, <http://www.imf.org>

government launched programme called “Tarsheed” (rationalization) to encourage rational use of power in residential and commercial sectors (Akhonbay, 2012). Moreover, the utilization of alternative energy is being developed, such as the establishment of King Abdullah City for Atomic and Renewable Energy (KA-CARE), with aims to develop energy strategy and energy mix for Saudi Arabia. The government recognizes that its ability to displace oil and gas from domestic consumption will have a positive impact on the revenue of oil production for export. In addition, the government also encourages several programmes to reduce energy intensity by 2030 and integrated them with G7 countries programmes. For instance, The National Energy Efficiency Programme (NEEP) aimed to achieve energy efficiency and to prevent excessive energy consumption (IMF, 2015).

Nevertheless, a different scheme is found in Indonesia. Since 1981, the government has implemented the energy policy with several scenarios, but the clash between economic and social interest created problems in the provision of domestic energy services. For instance, the policy to subsidy fuel and electricity has brought problem to the state budget. This policy made conflict between the availability of energy, the amount of subsidies per year and the intense effort to raise the GDP. The increasing of fuel and electricity consumption caused the government to have to pay subsidies in large amount (300 trillion IDR in APBN 2013, Rahmadi, 2013). This affected to the effort of growing the GDP. Therefore, the consequence is to reduce the amount of subsidies in order to save budget. However, the recent national energy policy (KEN) is released to fulfill domestic energy demand, to intensify the use of local resources, and to accelerate the use of renewable energy. The priorities in the KEN policy have the same emphasis with the two examples of selected energy producer states, as such to reduce oil consumption, energy efficiency, and to accelerate the use of renewable energy. Moreover, it seems that the local areas that have resources (e.g. Jambi) are given wider opportunity to optimize their resources to meet energy demand in their region.

### 2.3. Energy, security and sustainability

Access to energy can be considered as a contributing factor to reduce poverty. In this context, energy access to households is considered to be critical for securing the supplies, because energy access for households is access to basic form of energy such as electricity, fuel, and gas for cooking. In other words, household energy security is about how to provide physical infrastructure in energy access with the affordable price to the communities (IEA, 2001). This also in line with the target that has been set up by UN Secretary-General's Advisory Group on Energy and Climate Change (AGECC) 2010 until 2030, to create energy access with the procurement of physical infrastructure of electricity and modern energy products (fuel and LPG/gas) with the affordable price. Further, The UN Secretary General initiated sustainable energy for all (SEforAll) in 2011, which is a multi-stakeholder partnership between government, private sector, and civil society in order to achieve three objectives by 2030 (SEforAll, 2016) :

1. *Ensure universal access to modern energy services.*
2. *Double the global rate of improvement in energy efficiency.*
3. *Double the share of renewable energy in the global energy mix.*

According to Winzer (2011), the concept of energy security can be viewed from three aspects, such as;

- i. product supply,
- ii. the stability of the price, and
- iii. product services

The sustainability of the energy supply product can be achieved by minimizing the risk and reliability of the distribution system (Department of Energy & Climate Change (DECC), 2009; Scheepers et al., 2007; Lieb-Dóczy, Börner, dan MacKerron, 2003; Ölz, Sims, and Kirchner, 2007; Wright, 2005; Hoogeveen dan Perlot, 2007; Winzer, 2011). Hence, in order to meet reliability of energy supply, the distribution system should have two sub-concepts of adequacy, such as the ability of the system to meet the aggregate power and energy requirement of consumers at all times and system security, and the ability of a system to withstand

disturbances (Makarov, Member and Moharari, 1999; Roy Billinton and Allan, 1996; Winzer, 2011).

The three main pillars of energy policy are efficiency, sustainability and security of energy supplies (European Commission; 2006; 2008). Therefore, the concept of energy security is reviewed from supply as well as demand sides. Thus, supply side management means a necessary action to keep energy supply for the next generation, in which transmission and distribution is being done efficiently. On the other hand, demand side management is about monitoring the implementation of all action and programme on the use of energy that could affected the supplies, whereas technology modification is important in order to achieve efficiency. In other words, demand side is triggered by the economic interest. Therefore, demand side has relation with societal impact, such as a “win-win situation” for the consumers that beneficial for them due to the low cost. Furthermore, demand side management is the integration among actors to form a framework to achieve energy efficiency as well as to protect the environment.

Energy access, energy security and energy efficiency are the indicators of the sustainable development (UNCSD, 2007). A few researchers from the Asia Pacific Energy Research Centre made a definition of energy security in relation with economic aspect and sustainability, as quoted by Winzer (2011, p.6) : *“This study defines energy security as the ability of an economy to guarantee the availability of energy resource supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy”* (Intharak et al., 2007; Krut et al., 2009; Verrastro and Ladislaw, 2007; European Commission (EC), 2000). With the sustainability aspect as a component of supply security, the concept may have preferences and key indicators for the energy security measurement. Hence, nature and human are considered as the variables of energy security due to their interconnection in economic activity. Moreover, the scope of energy security measurement can be categorized into three perspectives (Winzer, 2011), such as:

- Private Utility
- End Consumers
- Public Servant

In the private utility perspective, the scope of the impact is measured from continuity of commodity supply, whereas in the end, consumer's perspective weights on continuity of service supply, while public servant perspective despite looking at continuity of service supply, it also looks at continuity of the economy.

## 2.4. Energy efficiency

The target of demand side management is efficiency. One of possible way to endorse energy efficiency is through energy conservation. Energy conservation is a campaign being conducted (by most the government, including Indonesia) to promote the use of energy efficiently to the citizens. Therefore, energy efficiently by the consumers is one way to achieve sustainable energy that can contribute to sustainable development (SDG 7; SEforAll, 2016). So that, it is necessary to have a balance supply-demand chain by applying Integrated Resource Planning (SSM and DSM Policies) with aims to operate the system efficiently. To obtain this, the measuring indicators are displayed in the figure 2 (IEA, 2014). In this research, the focus is on the residential sector by looking towards the total consumption of energy use for the households in Jambi Province.

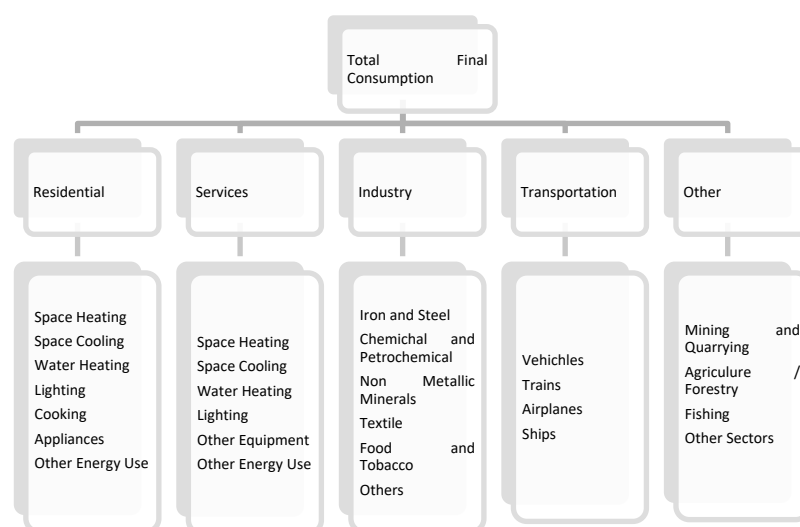


Figure 2. Energy efficiency indicator (IEA, 2014)



## 2.5. Contextual Interaction Theory (CIT)

In this section, the theoretical framework is given, declaring the use of the theory in the study. The theory (CIT) tends to explain the dynamic interaction between two or more actors based on their characteristics and contextual factors in which influenced the process (Bressers, 2004). In attempt to find answer of the research questions, the CIT is chosen to explain influencing factors in the implementation process of KEN policy, and link them with the empirical findings from literature.

### 2.5.1. Internal context

Policy implementation is a complex and dynamic process, whereas implementation process is a part of management. Therefore, an analysis of multi-governance is needed to explain the implementation process of a policy. To understand the condition of energy security in Jambi Province, the interrelation among actors in energy fields in the context of implementing the policy should be reviewed. The Contextual Interaction Theory (CIT) is a theoretical framework that is used in this research, because the theory is a suitable instrument to explain the process of policy implementation (Bressers, 2004). The implementation process of a policy is referred to as “context” in which its operation can be divided into “internal and external contexts”. Both contexts influence the social interaction process that is a focus in the implementation process (Bressers, 1983, De Boer, 2012).

The social interaction in the energy policy implementation, can be described as follows : a policy can be means as an input in the social interaction process, as quoted by De Boer (2012), *“Contextual Interaction Theory (CIT) view policy implementation as “the process(es) that concern the application of relevant policy instruments” (Bressers, 2004: 284). “The implementation process as “the whole of all activities that are connected to the employment of a preconceived set of policy measures” (Dinica and Bressers, 2003: 2). The energy policy is made with the target to individual or community (organization). In this context, the social interaction (not physical process) defined as the interaction of individual or communities (organizations) in implementing the KEN policy. The result of the*

social interaction is what it called by “output”. In other words, the result of the KEN policy implementation process (implication) is identified as an output.

A place where the interaction process appears is called the “arena”. In this arena, where issue, actor, regulation, space (location) and time become a boundary that has to be well understood either explicitly or implicitly by the whom are involved. According to Owens (2008), even though the interaction processes and the issues are plenty, the categorizing of issue and group of actor is still divided into two categories, namely implementer and target group to simply the analysis. However, the presence of actor behind the scene whom indirectly involved in the interaction and providing support to the actor who directly involved in the interaction processes also considered.

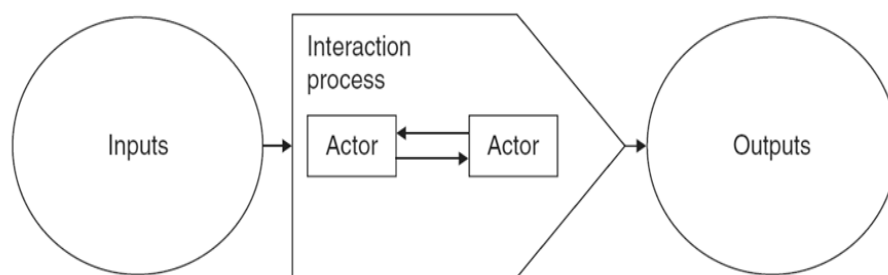


Figure 3. Simple model of interaction process as conversion of inputs into outputs.

*(Source : Bressers and Lulofs, 2010)*

The policy implementation process can be defined as an interaction process or combination of sub parallel process from input and output, and is often called by system-element (Bressers, 2004). In this research, the implementation process is the national energy policy (KEN) in the local level (Jambi Province), while the output is the result of implementation process to the existing condition of the province (the implication) to the delivery of electricity services. Furthermore, one of the goals in KEN is optimizing the local resources in order to fulfill the energy demand. At this point, this research wants to find out how local resources are utilized to fulfill energy demand in the province as the action to the KEN implementation. In spite of looking the interaction process internally, it is also

considered to view the supporting actors behind the scene as an external factor that influence (direct-indirect) the implementation process.

An implementation process is a social interaction process by the actors. Therefore, a description of the interplay among actors is the focus on the analysis. A further explanation as a result of interaction process constructed from this perspective. Thus, describing the actors' interaction in the internal context considered as a first step in the analysis. The involvement of the actor in an interaction process can be conceptualized as a motive . Resources is assumed as the capacity in acting and the power of the actors in interacting. Cognition is assumed as the knowledge that leads actors to take action in the process. Motivation and cognition are important in creating productivity in the process setting. Those three characteristics of the actor would give a different perspective in the social interaction process and can be used to explain a dynamic interaction process (De Boer, 2012). The actors in the interaction process are reflected by an organization, group or individual who represent an organization or group. It can be assumed that the individual can change the setting of a process, depend on his/her capability and creativity, such as the ability of diplomacy and educational level (De Boer, 2012).

### **2.5.2. External context**

The other factors that influence an implementation process also come from outside or called by external context. The external context consists of three layers. Firstly : specific context, is a part of the context where phenomenon take place, such as geography (research location), demography, previous research, etc, (Kotzebue, Bressers and Yousif, 2010). This setting is called the institutional arena, which determined by the actors who involved, place where phenomenon applied (issue). Second layer is structural context, which consists of system and element (governance) and relevant property (use and rights) (Bressers and Kuks, 2004). The last one is wider context, which includes the culture, economic, technology and political system (Bressers, 2009; De Boer, 2012).The layers of CIT are depicted in figure 5.

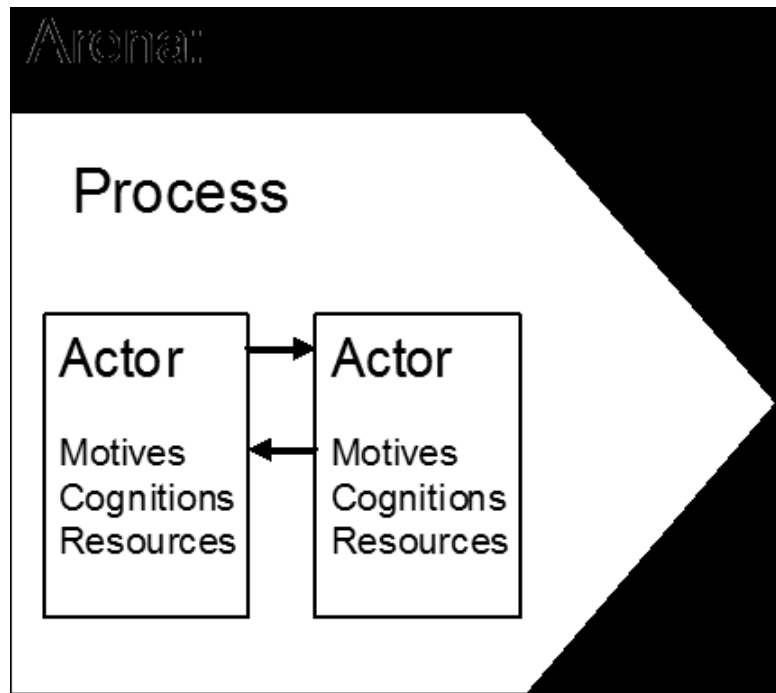


Figure 4. Process model with the actor characteristics used in Contextual Interaction Theory. (Source : Bressers, 2004).

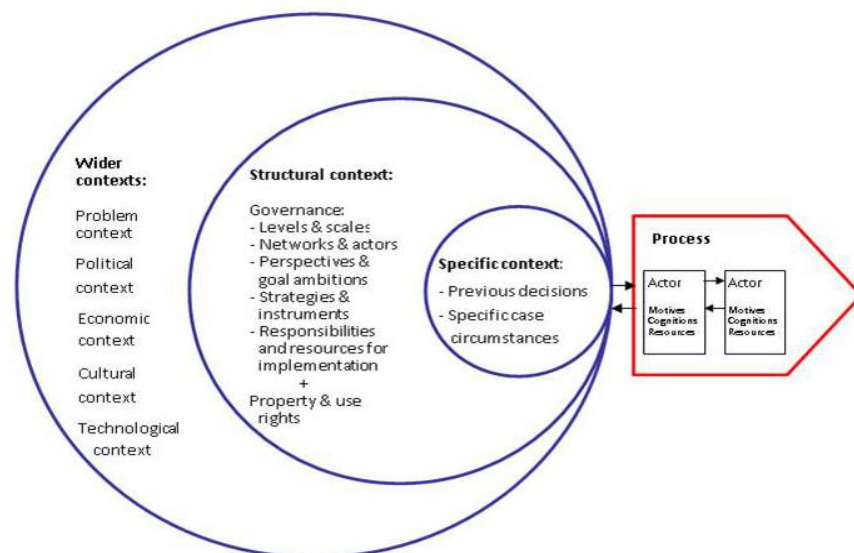


Figure 5. Layers of contextual factors for actor characteristics. (Source : Bressers, 2004).

### **2.5.3. Using CIT framework for this study**

The theory will be applied in a modified manner taking into account the importance of the elements under study and the scope of the research. Theory will focus on the input, process arena and the output result (Bressers, 2004). In the modified version, output arena is added after the process arena and it comes as the result of actors interaction in the arena, whereas policies will be added as an input in the context. Moreover, specific context framework is the focus in this research as an impact on policy implementation in the process arena. If the CIT is applied it can be said that the possible factors of motivation, cognition and resources of actors influenced by deep-rooted informality and regulatory framework of (energy) policy together with its political system in the implementation. One actor in the arena is government with its agencies and institutions while the other actors are policy targets or the private companies and communities (households) (Bressers & Lulofs, 2010). Three factors in the action arena influence mutual interaction and determine the outcome. Those are : motivations, cognitions and resources of the government, private company and community.

Motivation of the government is indicated by their interest in providing the programmes or projects for electricity services provision. The cognitions are expressed through the policy makers' knowledge, while the resources are showed by the existence capacities in money, people, services, support and facilities which they may have or not. With regards, the capacities and resources of the government seem to be the critical part of implementation process, due to the top down mechanism applied here. Hence, it appears that all the projects in energy (electricity) provision depend on the government's willingness without considering other initiatives from the other actors. Furthermore, assuming the cognitions governments have in the energy management, it is possible that governments do not realize the potential that the other actors have as their initiatives.

On the other hand, the motivation of the private companies and/or households refers to the benefit they get. The low motivation of private companies possibly caused by the low profit they get towards the programmes/projects in electricity provision, as well as the expensive price of electricity services for the households. Furthermore, their low level of awareness regarding the regulatory system and policies may influence their cognitions. The resources are often marked by the lack of possibilities to access existing services and facilitation offered by the government. The analytical framework is depicted in the figure 7 (chapter 3) and will be examined in the following chapters (4 and 5).

## **2.6. Conclusion**

This chapter has illustrated the implementation of energy policies in Indonesia and oil producing states. The energy policies played crucial part in the energy management, supply side as well as demand side. In the supply side, the measured indicators are availability and accessibility, while in the demand side, the indicators are affordability and acceptability. In order to explain sustainability, the indicators of energy security will be elaborated with the aspects such as economy, social, and environment. The core perspective driving the analysis presented in this research is policy instrument. According to Bressers and O'Toole (2005), instruments are best regarded not as initial shapers of behaviour in policy settings but as potential shifters of ongoing processes of policy action over time.

Furthermore, this chapter has also given the explanation of the theoretical framework that is used in this study. The chapter prefers the CIT as the best suitable framework for the study of the implementation process. Besides serving as the theoretical lens for the study, the CIT has given the opportunity to link the empirical findings of the research with the statements from the literature.

## **Chapter 3 : Research design**

This chapter explains the research strategy and how data was collected. It is also explained the reliability and validity of the data collection. The scope of the study is determined by research boundary. Then, it is followed by declaring application and modification of the theoretical model framework for this study. Lastly, the chapter is finished with the definitions of concepts used in this study with the aim of giving clarification of the used terms and concepts.

### **3.1. Research method**

#### **3.1.1. Research strategy**

The research used a case study approach as its strategy. Case study analysis focuses on small number of cases that are expected to explain a causal relationship in the larger population of cases (Gerring, 2007). Therefore, the research used comparison approach as well, in which compared situation between urban and rural areas. It aimed to get comprehensive explanation of the policy implementation process in Jambi Province.

This study used qualitative methods for the data collection. The primary data were collected through interviews and a working group. A working group was used to collect information from diverse actors taking part in policy implementation. This research used secondary data that were obtained through a desk study. The data resources were mainly statistical/quantitative data derived from previous studies.

#### **3.1.2. Interviews**

Since the unit of analysis of this research was the Province of Jambi's energy management, particularly the different actors of management which implementing the policy were involved in the interviews and used as an observation unit.

Selection of key informants based on the following criteria:

- The manager and authorities that responsible in providing electricity services in Jambi Province.

- The manager of PT. PLN (Jambi area) which has the responsibility to provide access to the grid.

Informants were selected by the criteria of the sector where they work, and their responsibility due to the competency or function at their institution. However, to prevent the collected information was not sufficient, the researcher contacted other informants using snowball techniques (purposive). Moreover, the selected informants were whom recommended by previous informants. In total two people were interviewed, face to face, through email and telephone. Before conducting the interviews, interviewees got the information about the interviewer, study purposes, consent form and interview questions (Bryman, 2012; Pavlovic, 2016). Interviews were conducted in Indonesian language (Bahasa) and the result translated into English. The attitude of the interviewees was positive and their willingness to answer were expressed, even though interviewee from PT. PLN slightly reserved when answering the questions.

### **3.1.3. Working group**

A working group was held on 27 April 2017 in Pekanbaru (Riau Province) with the topic “Problem Monitoring of The Energy Sector in Sumatera Region”, organized by the Provincial Government of Riau. The researcher was contacted by a colleague who works at Energy and Mineral Resources Agency of Jambi Province regarding the event and considered to attend due to the relevancy to the research. The working group was attended by the government and private sector in regional Sumatera, namely The Ministry of Energy; Energy Agencies of Provincial Government in Sumatera; Provincial Planning Agencies in Sumatera; and the Manager of PT. PLN for regional Sumatera. This working group aimed to coordinate the multi governance in energy sector in order to monitor and evaluate



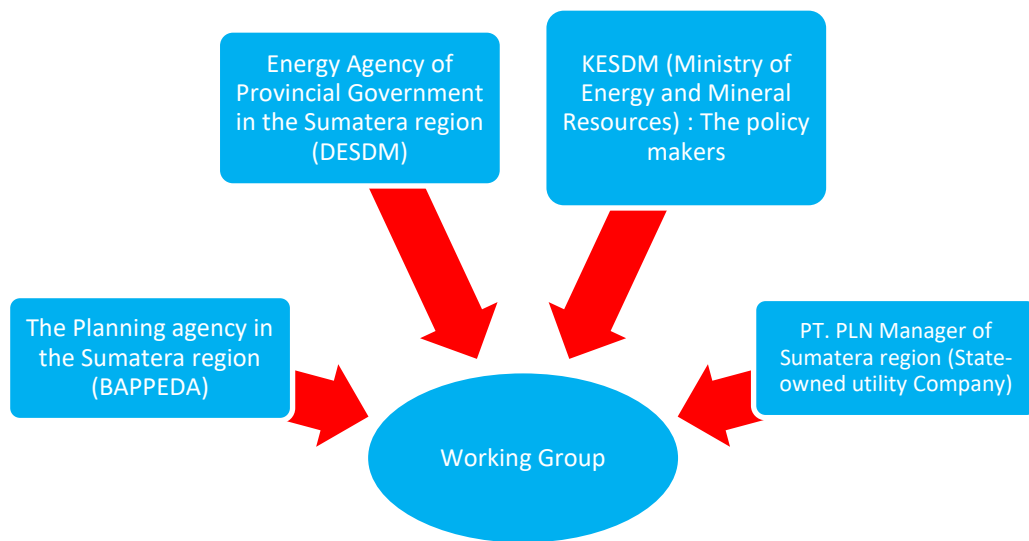


Figure 6. The key informants relationship in the working group.

the development of electric generation for the Sumatera region. It aimed also to socialize the recent regulation (UU No. 23/2014)<sup>9</sup> which consist of autonomy changes from regency/municipality governments to the provincial government regarding administrative duties and its capacity (e.g. permits granted, budgeting) in every sectors including energy.

The researcher attended the working group with a colleague who was participant. The researcher was part of the discussion to observe the working group and collect data and relevant issues with the study. Moreover, during the working group, the researcher also conducted an interview with the key informants from ministry of energy as policy maker and the manager of PT. PLN of Sumatera region. The interviews were set as stated in section 3.1.2. In total two informants are interviewed in the working group.

#### 3.1.4. Use of research data

The document analysis was conducted by reading through the policy document (KEN) and assessing documents on its history and legal basic, literature on energy

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<sup>9</sup> Ibid.

management and website of the Ministry of Energy, in order to get perspective of implementation process, energy, security, and sustainability.

The data statistics of energy sources (availability) and consumption pattern in the Province of Jambi, including renewable energy sources were used to explain the influence of (policy) implementation process to the electricity services security supply system. Since the qualitative data which supports quantitative data, the result of data interpretation was presented in a narration which supported by graph, table and chart. The next analysis focused on key factors that affected the sustainability aspect of electricity services distribution in Jambi Province. The key factors were identified through energy security aspects, such as product supply, the stability of price, and product services (Winzer, 2011).

The external context considered as the independent variable in this research. The dependent variable in this research was the internal context (the adaptive implementation actions of energy managers).

### **3.1.5. Validity and reliability**

The case study as a methodology requires some tests in order to have a certain level of reliability and validity. One of the possible threats from interview is reliability, since the informants' answers depend on their intention in providing the answers as well as their knowledge about the research topic (Babbie, 2004). The additional threat to reliability could come from the information crosschecking. Interviews were conducted only once without sending the results to interviewees and re-interviewing them again.

Possible risk to validity could be sourced from the interpretation of the wording from questions due to the cultural differences and blurriness. Another possible threat was linguistic validation. The interviews were conducted in "Bahasa"<sup>10</sup>, thus it could be questioned how accurately terms were translated without losing the meaning in the original language. One of the ways to avoid the threat was give questions as clear as possible and/or open-ended questions (Creswell, 2003). On

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<sup>10</sup> Bahasa is Indonesian language.

the other hand, the level of validity could be determined by assessing to what extent the methodology methods were followed through the process of data collection. The triangulation method was used to produce validated data by comparing primary data with observations and vice versa. The collected data were reduced and verified by confronting each other until reached saturation point, and to have analysis in different levels to be inserted in the case study (Yin, 2014).

In addition, there were certain factors that could limit the scope of the research such as time. The data gathering for the research was supposed to be completed in sufficient time to allow for the thesis to be submitted before 31<sup>st</sup> August 2017. Therefore that time constraint was needed to be taken into account when designing the plan of accomplishing the thesis. There are limited resources which was the reason for conducting email and telephone interviews.

#### **3.1.6. Operationalization**

This study was carried out using the semi-structured interviews as well as a working group as set in section 3.1.2 and 3.1.3, which represented a qualitative research and allowed the interviewees be independent and flexible for answering questions. The unit of analysis was individual, thus four experts from institutions that were currently part of the energy sector were interviewed as the key informants. The interviews consisted of open questions in order to offer informants more space to answer the questions suitably.

The questions were from three topic areas that related in energy sector, the socio-economic, institutional and technical. The list of questions was initially written in English and then translated into “Bahasa”.

### **3.2. Research boundary**

Research boundary used to limit the scope of study in order to obtain a realistic assessment of the research goals within specific time, using the available resources, and to determine the consistency. The following boundaries use in this research:

- The research focused on the security supplies of electricity services to the households as a basic form of energy. However, the others form of energy and

### 3.3. Analytical framework

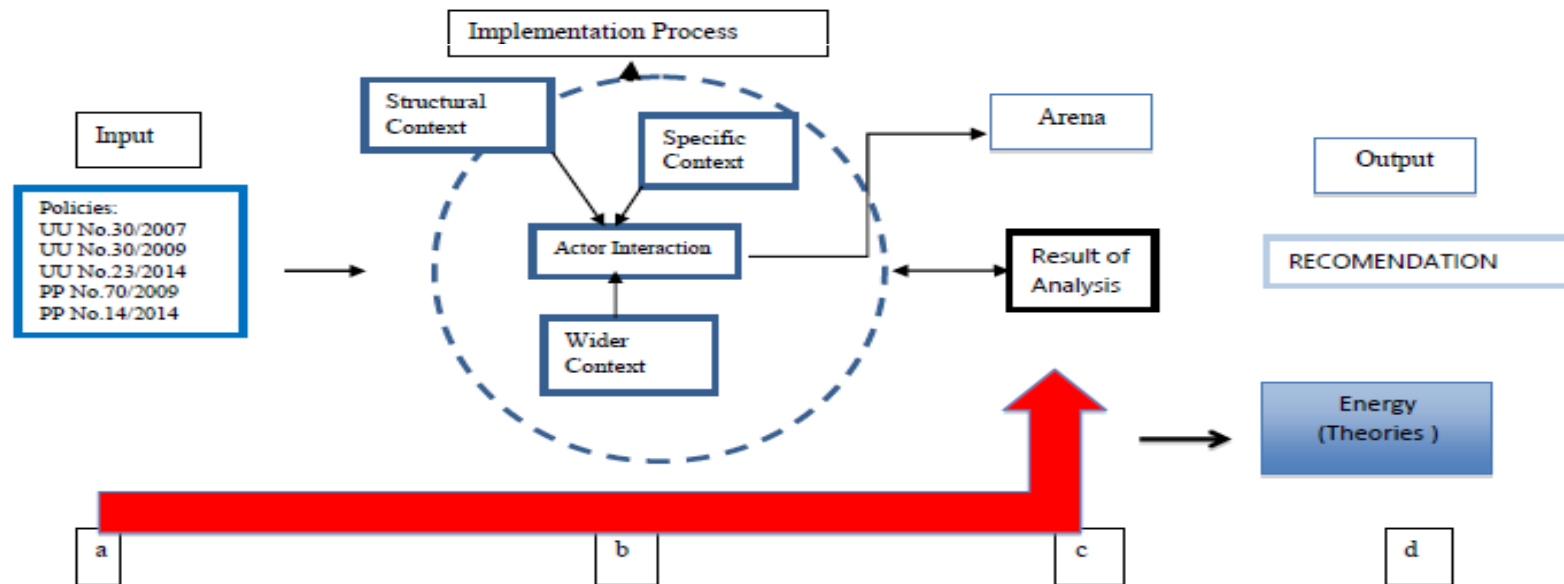


Figure 7. A schematic presentation of analytical framework

sectors that might affected to the energy security (e.g. oil, gas, industries, transportation, etc.) could form the focus of other research.

- The number of informant and respondent were only focused on supply side.

### 3.4. Definition of concepts

For the purpose of this research, the following key concepts are defined:

Table 1. Operational definitions for variables and concepts used in this thesis and adopted from the CIT framework

<b>Variables and Concepts</b>	<b>Operational Definition (with goal of clarification)</b>
Energy Security	The activities and strategies in order to create supply to the energy services (electricity) to meet demand.
Energy Efficiency	Consumption of energy in which conserve the resources, or in the context of the households can be achieved with the affordable price.
Motivation	What are the reasons behind an actors participation in a social interaction; With the sources from : own (internal, personal) goals and values which contributes to the realisation of the actors goals, external pressure (as the responsibility to respond to the expectations), and self-effectiveness assessment (an actor believes that it is within its capacity to participate in the social interaction process).
Cognition	Refers to the information processing capacity held by an actor and how this contributes to the interaction process; How does the actors interpretation of reality influence the interaction process; and how information and knowledge about other actors and the given context influence the interaction process.
Resources	Access to that enable actors can participate in the interaction process; How

	do these resources influence the interaction process and affect the other actor characteristics; How do resources influence the power relations between actors; How does one actor attribution of power to another influence the interaction process and how do resources contribute to this attribution of power.
Actors	Stakeholder (government, NGO, private, organization, community) that being involved in energy sector.

*Sources: Bressers (2009); Mohlakoana (2014)*

### 3.5. Conclusion

This chapter has given explanation about the research method and framework. The case study is chosen as research strategy and qualitative method is used to collect data. Research boundary is used to determine the focus of the study. Research framework is using CIT in the modified manner in order to be applied in the analytical framework. Apart from that, the chapter has given the definition of concepts being used in the study and their operational explanations.

## Chapter 4 : KEN impacts to the energy security

This chapter explains the actual KEN implementation in Jambi Province by looking inside the implementation in urban and rural areas as the specific context. It starts with explanation of the province's resources and existing projects that have been done as the implementation process to bring perspective about the policy stance to the energy security in Jambi Province which determined by contextual factors (Bressers, 2009). Therefore, this explains the impact of KEN implementation to the security supplies of electricity services whereas the province is an energy sources producer.

### 4.1. The profile of Jambi Province

The Province of Jambi is located in Sumatera Island with total area is 50.160,05 km<sup>2</sup> that is divided into mainland (46.885,1 km<sup>2</sup>) and coastal (3.274,95 km<sup>2</sup>) (BPS, 2016).<sup>11</sup> As it reported by the Government Bureau of Region Secretary of Jambi Province (2013), there are one provincial government and eleven regencies/municipalities administrative government with 138 districts, 163 sub-districts, and 1.553 urban/rural villages which scattered on the entire region of the province, which depicted in the following table.

Table 2. Total area by Regency/Municipality in 2013

		Desa/			
Kabupaten/Kota		Jumlah	Kelurahan	Luas	Persentase
Regency/Municipality		Kecamatan	Rural/	Area	Percentage
		District	Urban	(km2)	(%)
			Village		
(1)		(2)	(3)	(4)	(5)
1	Kerinci	16	287	3 355.27	6.69
2	Merangin	24	217	7 679.00	15.31
3	Sarolangun	10	158	6 184.00	12.33
4	Batang Hari	8	114	5 804.00	11.57
5	Muaro Jambi	11	153	5 326.00	10.62
6	Tanjab Timur	11	93	5 445.00	10.86
7	Tanjab Barat	13	134	4 649.85	9.27
8	Tebo	12	112	6 461.00	12.88

<sup>11</sup> BPS is a statistical agency.





The potential of energy sources in Jambi Province were reported 35 million m<sup>3</sup> oil, natural gas 1,3 Tcf and coal approximately 400 million ton (DESDM Jambi, 2016). In spite of those, the province was also reported renewable sources that are being developed, such as geothermal (358 MW) and hydro power (370 MW) (DESDM Jambi, 2016). Below are the descriptions of the existing energy potential resources in Jambi Province which have been used as energy sources.

#### 1. Coal

Coal is used to generate electricity through the steam power plant (PLTU) by the national utility company (PT. PLN). In contrast, the steam power plant does not exist in Jambi Province. The coal production is mostly as export commodity. As the feedback, the provincial government earns revenue that contribute to the GRDP. The existing coal mining companies in the Jambi Province reported by DESDM Jambi (2017), 119 numbered of active companies spread in six regencies in the Province (Bungo, Tebo, Sarolangun, Tanjung Jabung Barat, Batanghari and Muaro Jambi). The fluctuation of oil prices influence the production of coal, which means also influence the government revenues.

Table 3. Coal production in Jambi Province

Amount Of Coal Production In Jambi Province	
Year	Coal (Ton)
2009	2.690.971
2010	4.175.424
2011	7.760.173
2012	7.118.038
2013	7.737.549
2014	7.797.959
2015	3.563.994

Source : Energy and Mineral Resources Agency of Jambi Province (2017)

## 2. Oil and Natural Gas

The oil and natural gas are used to generate electricity through gas and diesel power plants. These sources were the most used by PT. PLN to supply electricity for the remote areas in Jambi province. The report said, there were ten active oil and gas companies in Jambi Province. Declining of the oil price influenced the production of oil and gas as depicted in the following table.

Table 4. Oil and gas lifting in Jambi Province (*DESDM, 2017*)

Year	Oil (Barells)	Natural Gas (BOE)	Total
2010	6.588.052	17.410.599	23.998.651
2011	6.403.411	16.001.213	22.404.624
2012	6.245.962	17.044.213	23.290.175
2013	5.705.833	16.731.991	22.437.824
2014	5.318.080	16.806.643	22.124.723
2015	1.754.533	9.367.824	11.122.357

## 3. Hydro Power

The hydro power is used to generate electricity through hydro power plant which is under construction in Kerinci Regency as the part of the national programme (FTP1/10.000 MW) that will supply electricity services for Sumatera Interconnection System (DESDM Jambi, 2017). Nevertheless, the provincial government has identified other potential resources which might be developed in the future as depicted in the following table.

Table 5. Hydro power potential in Jambi Province

No	Location	Water Debit	Power
		M2/S	Kva
1.	Tuo village, Lembah Masurai, Merangin District	1.67	550
2.	Nilau Dingin village, Lembah Masurai, Merangin District	3,24	1.000

3.	Tanjung Kasri village, Jangkat, Merangin District	15,3	20
4.	Rantau Suli village, Sungai Tenang, Merangin District	5,64	3,6
5.	Telentam village, Tabir Barat, Merangin District	0,57	150
6.	Berkun village, Limun, Sarolangun District	0,3	20
7.	Pulau Teluk village, Sarolangun District	0,16	15
8.	Muara Pemuat village, Batang Asai, Sarolangun District	0,8	30
9.	Keliling Danau village, Kerinci District		8,2
10.	Gunung Tujuh village, Kerinci District		7,45
11.	Gunung Kerinci village, Kerinci District		3,59
12.	Napal Melintang village, Kerinci District		1,85
13.	Gunung Raya village, Kerinci District		0,314
14.	Batu Kerbau village, Pelepat, Bungo District	2,81	20

Source : Energy and Mineral Resources Agency of Jambi Province (2017)

#### 4. Geothermal

Geothermal is used to generate electricity through geothermal power plant. Similar to hydro power, this power plant is also being under construction for the (FTP2/35.000 MW) programme (DESDM, 2017). It has same function to supply the interconnection system in Sumatera. DESDM of Jambi Province has identified other potential geothermal resources in the province for future development. The following table illustrates the location and the capacity of the resources.

Table 6. Geothermal potential in Jambi Province

No	Location	Resource (MWe)		Reserves (MWe)	
		Speculative	Predicted	Possible	Proven
1.	Gunung Kapur, Kerinci	25			
2.	Gunung Kaca, Kerinci	25			

3.	Sungai Betung, Kerinci	200			
4.	Semurup, Kerinci		208		
5.	Lempur, Kerinci		250	25	40
6.	Air Dikit, Merangin	25			
7.	Graha Nyabu, Merangin		285		
8.	Sungai Tenang, Merangin		74		

*Source : Energy and Mineral Resources Agency of Jambi Province (2017)*

#### 4.2. Current electrification

The electricity services supply for Jambi Province transmitted from Sumatera Interconnection System and Isolated System which has peak load above 50 MW and 10 MW (PT. PLN, 2017). These grid systems are under control of the national utility company (PT. PLN) which divided into several distribution areas in order to supply electricity to the all provinces in Sumatera Island, whereas Jambi Province is supplied by PT. PLN area S2JB.<sup>12</sup> The existing capacity of the Sumatera System reported by PT. PLN (2017) was 7.613 MW with the number of peak load in December 2015 approximately 4.850 MW. Moreover, this system was often deficit during its operational due to few circumstances, such as problem in the transmission line and climate change (PT. PLN, 2017). Most of the sources used as the energy carrier is water whereas becomes problem in the dry season<sup>13</sup>. The delay of several new power generation projects that were estimated can be operated in 2014/2015 also influenced the continuity of electricity supply. These circumstances sometimes cause the forced outage which affected the delivery of electricity services. In attempt to tackle this problem for the short terms, PT. PLN do such scenarios as “excess power” and “power wheeling”<sup>14</sup> to buy electricity or rent the power sources from the industries (IPP) that are available (PT. PLN, 2017).

<sup>12</sup> PLN S2JB is responsible to supply electricity services to three provinces, such as South Sumatera, Jambi and Bengkulu.

<sup>13</sup> The dry season usually on March-August, rain season September-February. Due to climate change, the usual patterns is shifting into unpredictable.

<sup>14</sup> Scenario run by the national utility company for the short terms to handle electricity services deficit.

On the other hand, the Province of Jambi has six isolated system which are not connected to the grid system to assist electricity supply in the remote areas. These systems are using HSD as their source of energy to generate electricity, which five of the power plants are owned by PT. PLN and one is owned by the Independent Power Producer (IPP). The existing capacities of electricity systems to deliver services in Jambi Province are 1186,8 MW (interconnection) and 22,5 MW (isolated) which distributed from the interconnection system Middle-South Sumatera through transmission line 150 kV and 275 kV with six terminal transmissions, which are: Aur Duri, Payo Selincih, Muara Bulian, Muara Bungo, Bangko, and Sei Gelam (PT. PLN, 2017), as such depicted by the map and tables below.

Table 7. Power plants capacity which connected to the Sumateran Interconnection System in Jambi Province

No	Power Plants	Type	Source of Energy	Owner	Capacity Available (MW)
1	Sungai Gelam	PLTMG	Gas	PLN	116.7
2	Payo Selincih (1)	PLTMG	Gas	PLN	164.8
3	Payo Selincih (2)	PLTG	Gas	PLN	164.8
4	Batang Hari	PLTG	Gas	PLN	60.0
5	Sungai Gelam (1)	PLTG	Gas	PLN	116.7
6	Sungai Gelam (2)	PLTMG	Gas	IPP	116.7
7	Payo Selincih (1)	PLTG	Gas	IPP	164.8
8	Payo Selincih (2)	PLTMG	Gas	IPP	164.8
9	Sungai Gelam (3)	PLTG	Gas	IPP	116.7
10	Spread in S2JB areas	PLTD	IDO	PLN	0.9
11	BOT Payo Selincih (1)	Gas	Gas	PLN	50.00
	<b>Total Capacity</b>				<b>1186.8</b>

Source : PT. PLN (Persero) Jambi (2017)

Table 8. The capacity of Isolated System in Jambi Province

No	Power Plant	Type	Capacity (MW)	Owner
1.	Pelabuhan Dagang	PLTD	6.4	PLN
2.	Sungai Lokan	PLTD	1.2	PLN
3.	Mendahara Tengah	PLTD	0.4	PLN
4.	Kuala Tungkal	PLTD	3.5	PLN
5.	Batang Asai	PLTD	0.8	PLN
6.	Sarolangun	PLTD	3.0	PLN
7.	Tanjung Jabung Power	PLTG/MG	7.2	IPP
	<b>TOTAL</b>		<b>22.5</b>	

Source : PT. PLN (2017)

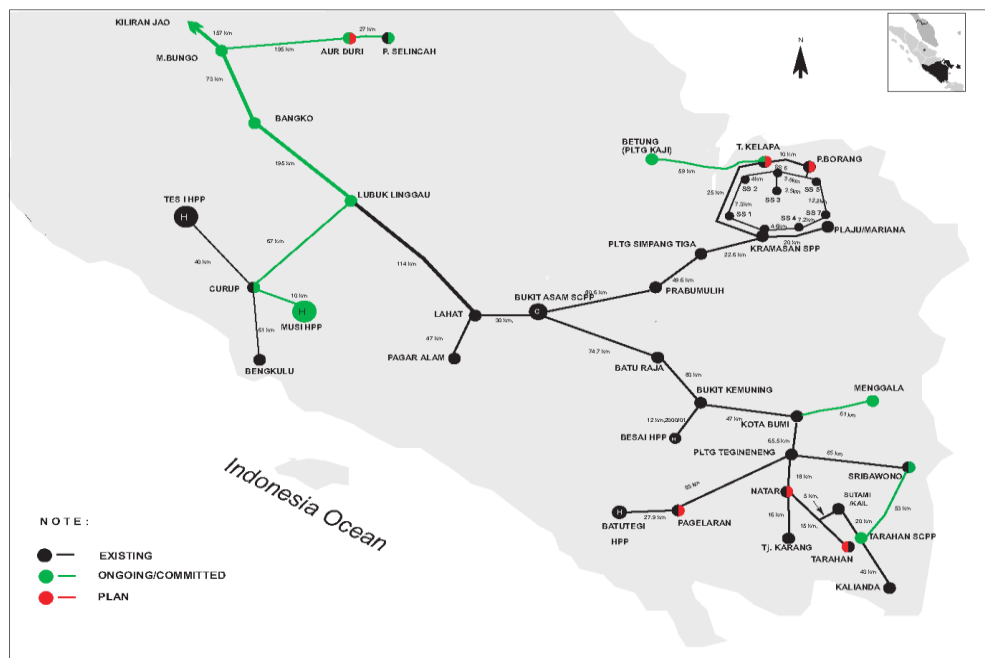


Figure 9. Map of electric transmission in Jambi Province (KESDM, 2003)

Table 9. Transmission in Jambi Province

Type	Location	Regency/City	Location	Regency/City	Distant (km)
1	2	3	4	5	6
Transmisi 150 kV	Muaro Bungo Aur Duri	Bungo Jambi	Aur Duri Payo Selincih	Jambi Jambi	195,0 27,0
Transmisi 275 kV	Muaro Bungo Muaro Bungo	Bungo Bungo	Kiliranjao Bangko	Sijunjung Merangin	135,0 78,0

Source : KESDM (2003)

Furthermore, the electrification ratio of Jambi Province continue to increase significantly, whereas in 2016 was reported 83,5% (DESDM Jambi, 2017). Although, this figure was still under the national electrification ratio whereas the national RE reported 88,30% in 2015 (KESDM, 2017), but it showed improvement. With regards, PT. PLN could not provide the transmission to all areas in the province, especially in the isolated and remote areas because “the national utility company is responsible to build up such as big projects which need big investments and have long lead time”, as reported by informant who works at the company.<sup>15</sup> Hence, to deliver electricity services in the isolated and remote areas, the governments (national and local) are built up micro-hydro and solar power with the grid to deliver services to the households.

Table 10. Electrification ratio of Jambi Province

Year	2010	2011	2012	2013	2014	2016
Electrification Ratio	49.59%	53.44%	67.11%	72.57%	79.07%	83,5%

Source : Energy and Mineral Resources Agency of Jambi Province (2017)

PT. PLN is responsible to provide access to the grid to deliver electricity services to the citizen as stated in the policy document. However, access to the grid only reach urban areas, while in the remote area is depend on the local government to provide the access. Moreover, as the implementation of KEN, the company must

<sup>15</sup> Interview conducted via telephone on June, 21, 2017, the interviewee wish to stay under anonymity.

set up electrification plan (RUPTL)<sup>16</sup> during the following ten years. This is mandated by the regulation (PP No. 14/2012)<sup>17</sup> which regulates the stages in the electricity services provision in order to achieve KEN target.

Table 11. Electricity consumption in Jambi Province

No	User	Power Sold (GWh)	Percentage (%)
1.	Residential	966	65,9
2.	Commercial	287	19,6
3.	Public	103	7,0
4.	Industry	111	7,5
<b>TOTAL</b>		1.467	100

Source : PT. PLN (2017)

The biggest consumer of electricity services in Jambi Province is household (65,9%), followed by commercial (19,6%), industry (7,5%), and public (7%). The report said, from 1.553 villages in the province, only 1.039 villages which have been electrified (BPS, 2017). This figure will be used by the government to maintain the programmes in the electricity services provision. In order to provide access (grid), the government needs third parties (e.g. Independent Power Producer (IPP)) to assist PT. PLN in the electricity services provision and/or to install the system to deliver the services. According to the regulation (UU No.30/2009; PP No. 14/2012)<sup>18</sup>, the government regulated that PT. PLN as the off-taker, which means the IPP could sold or rented the system they had to PT. PLN through several scenarios, such as power wheeling, permit granted in the PT. PLN business area, and excess power. In other words, the company is no longer being the single player in the electricity services provision. Moreover, the government also regulates ‘feed in tariff’ for the projects to extend the capacity of existing power generation. For instance, the coal price for the steam power plant (PLTU) in the front mines will be subsidy and out of the market control.

<sup>16</sup> RUPTL is electricity plan provision which is responsibility of the national utility company to set up as stated in the policy. This plan has sequence for ten years.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.



In addition, to implement the KEN in rural areas, the government collaborated with the private sector to build projects (systems) to deliver the electricity services. These projects were funded both from national budget (APBN) as well as local budget (APBD). The following table highlighted the projects which have been installed as the implementation of KEN.

Table 12. Micro-Hydro power projects in Jambi Province

No	Districts	Location	Capacity (KVA)	Source of Fund	Year
1.	Merangin	Tuo Village, Lembah Masurai	50	APBN	1997
2.	Bungo	Renah Village, Limbur Lubuk Mingkuang	50	APBN	1999
3.	Merangin	Talang Tembago, Jangkat	50	APBN	2001
4.	Merangin	Rantau Suli, Jangkat	50	APBN	2003
5.	Merangin	Baru Village, Jangkat	20	APBN	2004
6.	Merangin	Gedang Village, Jangkat	50	APBN	2005
7.	Bungo	Sungai Ipuh, Limbur Lubuk Mingkuang	50	APBD	2006
8.	Merangin	Koto Rami, Lembah Masurai	60	APBD	2009
9.	Bungo	Batu Kerbau Village	43	APBD	2011
10.	Sarolangun	Raden Anom	18	APBD	2012
11.	Bungo	Senamat Ulu, Bathin III	27	APBD	2013
12.	Sarolangun	Tangkui Village, Batang Asai	24	APBD	2013
13.	Tanjabbar	Lubuk Lawas, Sungai Asam	24	APBD	2013
14.	Sarolangun	Berkun Village, Limun		APBD	2015
15.	Sarolangun	Muara Pemuat, Batang Asai		APBD	2015

Source : Energy and Mineral Resources Agency of Jambi Province (2017)

Table 13. Solar power projects in Jambi Province

No	Districts	Location	Capacity (KW)	Source of Fund	Year
1.	Sarolangun	Pematang Kolim, Pelawan	15	APBN	2012
2.	Batanghari	Batu Sawar, Maro Sebo Ulu	15	APBN	2012
3.	Tanjabtim	Rawa Sari, Berbak	15	APBN	2012
4.	Bungo	Rantau Tipu, Limbur Lubuk Mengkuang	15	APBN	2012
5.	Muaro Jambi	Tanjung Lanjut, Sekernan	15	APBN	2013
6.	Batanghari	Lubuk Ruso, Pelayung	15	APBN	2013
7.	Tanjabbar	Seberang Kota, Tungkal V	15	APBN	2013
8.	Tebo	Mangun Jaya, Tebo Tengah	15	APBN	2013

Source : Energy and Mineral Resources Agency of Jambi Province (2017)

#### 4.3. Analysis

PT. PLN is the national utility company which includes power generation provision, transmission system operational, and retail on its core of businesses.

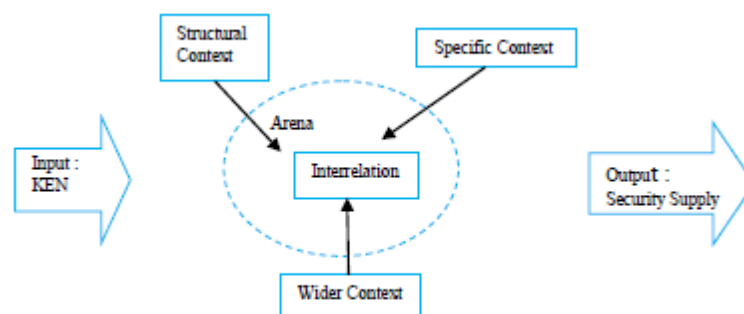


Figure 10. Applied CIT on the research framework.

In 2002, electricity sector has reformed into liberalization and privatization for the competitive electricity market through the policy. However, the policy was cancelled by The Constitution Court two years after its inauguration (DEN,

2014). This means that PT. PLN is continue to monopoly the grid, while the market for electric generation is widely open for others player (IPP and PPU). The main issue in electricity services delivery is electric deficiency during distribution. This is caused by the electric loading in the system increased due to high demand, while power supply is limited due to the delay of several electrification projects. The delay of those projects (FTP1 and FTP2) seem to be the biggest obstacle in achieving the KEN target. For instance, the project to build up steam power plant (PLTU) which started in 2006 was not finished by July 2014 (74%) (DEN, 2014). The following programmes (FTP2) which are planned to construct the power generation which based on renewable sources, coal and gas (started in 2010), there was only one that have been finished (PLTP Patuha 55 MW) on October 2014, while the others are predicted will be finished in 2022 (DEN, 2014).

The participation of other private companies in power supply is low which is indicated by success ratio of IPP approximately 30 percent (DEN, 2014). The main causes of this condition are :

- Permit granting, numbers of project which need permit with long line bureaucratic process.
- Land procurement, the long process of land clearing due to double ownership has caused displacement the location of the project and re-designing of the project based on the new area.
- Funding, the delayed of the funds transfered from loans, APBN, APBD or PT. PLN budget itself.
- Technology, relates to the technical quality and standardization of the equipment. On FTP1, a lot of equipment is the product from China which is below the international standard (ISO/ICS), whereas declining the reliability of the equipment.
- Procurement process, the bidding process is only targeted for the low cost without considering the quality of the power plant which is found in the operational as well as in commissioning.

- Employment, the crash programme construction with the big capacity needs a large number of workers in order to finish it on time.

In addition, several barriers have been identified in the electricity services provision through risk analysis (PT. PLN, 2016). The following table illustrates the risks that might occur during the operational system as well as influence the security of electricity services supply.

Table 14. Risks analysis of electricity services

Security of Supply Aspects	Operational Aspects
<ul style="list-style-type: none"> <li>• Risks in the pre-construction phase, such as funding, permission, land clearing, bidding process, imperfect design, environmental and societal issues.</li> <li>• Risks in the construction phase, such as technical performance and the contractor's financial capability.</li> <li>• Unconformity risk between power plant and transmission construction as it is constructed separately which causes operational delayed.</li> <li>• Risk in supplies of primary energy (fossil fuel) which have to 'compete' with the export market.</li> <li>• The growth of electricity demand is over estimated which causes deficit and forced outage. For example, the estimation of electricity growth is 8,4%, but the demands increased 10,17% in 2012 (PT. PLN, 2016).</li> </ul>	<ul style="list-style-type: none"> <li>• Risks in the performance depreciation of existing power plants.</li> <li>• Bottlenecking in the transmission lines.</li> <li>• The escalating of primary energy prices (especially oil) and the competition with the market demand.</li> <li>• Environmental and societal issues.</li> <li>• Geo-hazard risks.</li> </ul>

Source : RUPTL document (PT. PLN, 2016)

#### **4.4. Conclusion**

The chapter has illustrated the availability of resources and current electrification in Jambi Province. This availability relied on the system which has been installed whereas the province was lack of power generation. Moreover, the distribution system in the delivery services was controlled by regulation, which stated that the implementation process of KEN influenced the energy (supply) security in Jambi Province. It also explained that all the actions which were being taken by the target actor (PT. PLN) to provide electricity services was deliberately taken a top down approach in the implementation process. Hence, it clearly showed that the PT. PLN as the target actor was the most responsible actor in the electricity provision. However, the limited resources indicated that it needs another actor in the electricity services provision.

The existence of the third party (IPP) in the electricity provision is significant due to lack of resources of PT. PLN. Moreover, most of projects are funded by the national government. Therefore, the independency of provincial government is crucial in attempts to provide electricity access. This is considered as one factor that can contribute to achieve KEN target. This chapter also showed the actor's characteristics (in CIT) influence the implementation process, whereas the motivation and resources were represented by the government programmes and funds, while the cognition was represented by the knowledge of the target actors regarding the policy contents to take action in energy (electricity) infrastructure provision in Jambi Province. The lack of information regarding (KEN) policy contents of the private sectors influenced their cognition. Thus, it seemed to be an obstacle in the implementation process of KEN which was indicated by less contribution of the IPP to the electricity services provision in the Jambi Province.

## **Chapter 5 : Output arena**

In this chapter, the dependent variable of internal context will be explained and this is mentioned as the output arena in the Contextual Interaction Theory. It starts with explanation of the main characteristic of policy (KEN), actor's roles and stakeholder interaction in the policy implementation process. Then, the chapter ends with the analysis of different levels of government, particularly the national, provincial, and local that are relevant in the implementation of the KEN policy.

### **5.1. Main characteristic of KEN policy**

KEN is a public policy which guides the national energy management to achieve security and sustainability (energy) for supporting the sustainable development. As a public policy, KEN has three aspects of target, which are the government (as implementer), and target group (private sector and household). One characteristic of a policy is comprising the obligations and restrictions of what government tell to do or not to do, so that, it persuades people to obey as well as to force them. The objects of the policy are societies in general includes the private sectors. Therefore, the government composed KEN sufficiently by including multi-sectoral that are represented by The National Energy Council (DEN).

Furthermore, sequentially from 2014 to 2050, KEN targets the primary energy supply will attain 400 Mtoe in 2025, 480 Mtoe in 2030 and 1.000 Mtoe in 2050. KEN will accelerate the reduction of oil consumption and displace it with coal, natural gas and renewable energy with share 31% by 2050 (see figure 11). With regards, the target for the electricity services is to extend the capacity of power generations which is to obtain 115 GW in 2025 and to increase this to 430 GW in 2050. Thus, the use of electricity per capita in 2025 will reach 2.500 kWh and by 2050 will increase to 7.000 kWh. In order to achieve this target, the government formulates several programmes known as FTP1 (10.000 GW), and FTP2 (35.000 GW).<sup>19</sup> These programme are applicable for the national grid by extending the

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<sup>19</sup> Fast Track Programme (FTP) is government programme as KEN implementation.

power generation to supply the existing interconnection systems. As well as on grid programmes, the government also initiates another programme (off-grid) to provide electricity for rural area that are unreachable by the grid, named “*Desa Mandiri Energy*” (Energy Sustainable Villages). This programme aims to deliver electricity services by intensifying the local resources, with specific target is to utilize the renewable resources.

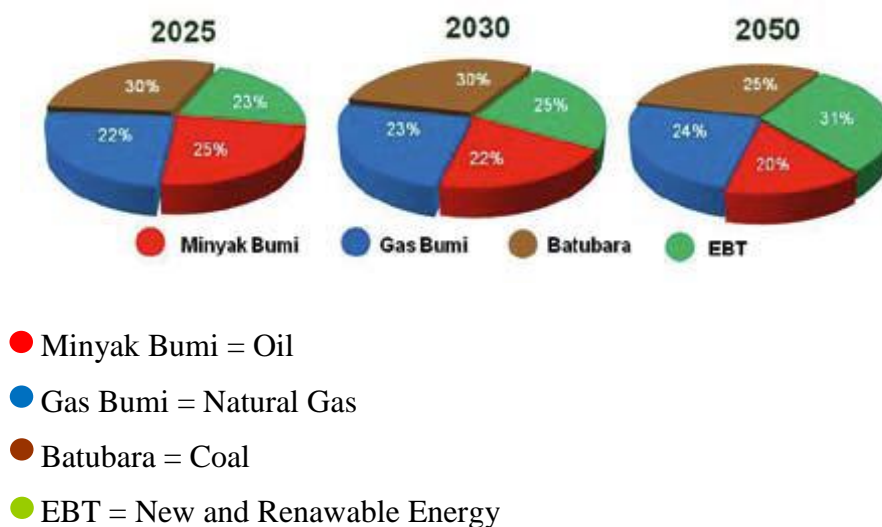


Figure 11. The national energy mix target in KEN  
Source : Ministry Of Energy and Mineral Resources (2017)

Hence, the implementation of KEN is driven by regulation. The government should set up an energy plan based on the level of authorization. The national government is in charge to set up RUEN, while the provincial government is in charge to set up RUED in its region (UU No.23/2014)<sup>20</sup>. The main target in the RUEN and RUED is to deliver services for rural areas with the emphasis for households. Thus, the main objectives in RUEN and RUED are :

- Stages to obtain KEN targets
- Allocation of energy projects in the (National, Province, Regency/Municipality)

<sup>20</sup> The policy which regulate the spheres of government autonomy per sector.

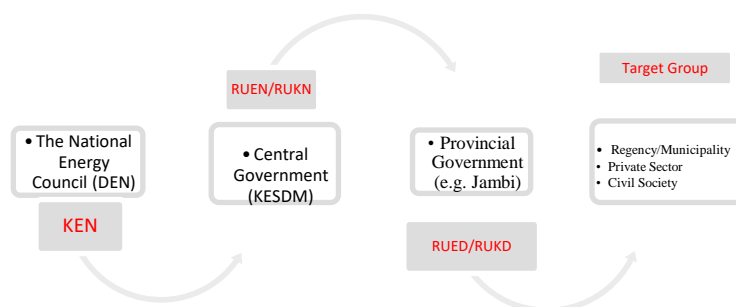


Figure 12. Schematic implementation of KEN  
*Source : RUED document (2016)*

On the other hand, the implementation of KEN in electricity services is according to the policy (UU 30/2009)<sup>21</sup> about electric generation. The policy said that the development of electric generation is based on the national electricity plan which is set by the national government (RUKN) and the local electricity plan which is set up by the provincial government (RUKD). At the operational stage, PT. PLN is mandated to set up the electrification plan for the following ten years (RUPTL). Moreover, the additional policies which has relation in the KEN implementation process are (PP 14/2012) about electricity services provision, (PP 42/2012) about electricity market in the country's borders, and (PP 62/2012) about supporting business for electricity services.

## 5.2. Actors' roles in KEN policy implementation

The responsibility of implementing the KEN policy is not only assigned to the local government. The national as well as the provincial government including the regency and municipality have important roles to play in ensuring delivery of electricity services through the implementation of this policy. Indonesia is a democratic parliamentary republic where representatives are chosen in the elections. This mechanism is applied at all levels of governments which are national, provincial and regency/municipality. Ministries and its general directors

<sup>21</sup> Ibid.



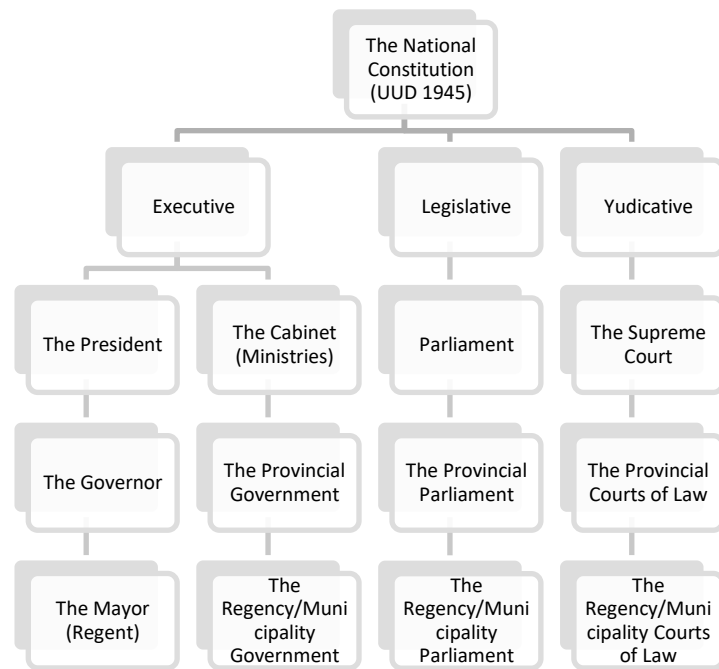


Figure 13. The three spheres of government of Indonesia  
*source : the national law (UU no. 32/2004)<sup>22</sup>.*

are representative of the national (central) government, while agencies are representing the government at the provincial as well as at local level (regencies or municipalities). There is also parliament which is responsible to approve all laws and policies that are proposed by the government at all levels. Ministries are responsible for setting up the laws and policies that proposed to the parliament for approval. After being approved, these ministries together with their general directors are responsible to implement these laws and policies at their administration. Furthermore, in this study, the relevant government institutions that are important in implementing KEN from national to local level are Ministry Of Energy And Mineral Resources (KESDM), and Energy And Mineral Resources Agency (DESDM-Province and Regency/Municipality). Another institution that is found and relevant for this study is The National Energy Council (DEN). DEN is an independent board with the members from academic, professional and the government that is responsible to propose energy policy together with the ministry of energy to the parliament as a political process in the policy making.

<sup>22</sup> The information extracted from the national constitution of Republic of Indonesia (UUD 1945; UU No. 32 Tahun 2004).

The specific target in KEN is rural areas at the local level, so that, the provincial and regency/municipality government have important roles in implementing the policy. In this study, the provincial government is responsible to provide programmes and budget for the local regencies or municipalities and/or directly to households. In accordance to the authorization policy, the provincial government acts as the top coordinator for implementing KEN. It means the regency/municipality should get permission first to enable the projects at their (rural) areas. The Jambi Province has eleven regencies/municipalities and one provincial government<sup>23</sup>, who co-ordinate with each other to develop and ensure service delivery in the whole region. The following section will explain actor's roles and level of authorization in the implementation process of KEN based on applied framework in figure 14.

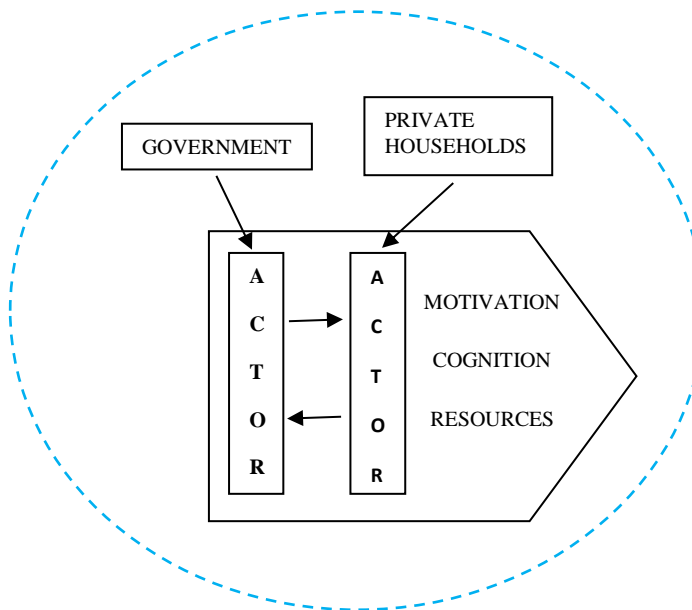


Figure 14. Applied CIT model framework showing the process arena

### 5.2.1. The roles of central (national) government in KEN policy implementation

Ministry of Energy and Mineral Resources (KESDM) and The National Energy Council (DEN) are responsible to implement the KEN at the national level. These institutions are embedded, but their roles can be distinguished from their

<sup>23</sup> See figure 12.

capacity. The ministry plays an administrative role, and the council acts as a manager. As the administrator, the ministry should provide programmes to ensure delivery services and funds' availability. Meanwhile, the council is responsible to set up the policy as a regulatory framework for the programmes based on the analysis and evaluation of current (energy) supply-demand. Moreover, the ministry is also responsible to set up the national (energy and/or electricity) plans (RUEN and/or RUKN) as the main programmes and a guideline on KEN implementation for the local governments. Thereafter, all the responsibilities for KEN implementation are handed to the provincial governments. Then, the provincial governments set up the local (energy) plan which refers to RUEN/RUKN to be applied in their regencies and/or municipalities. Therefore, in this case, the ministry (KESDM) has two main roles: (i) to set up RUEN and/or RUKN and (ii) to provide funds for the projects/programmes.

On the other hand, DEN is responsible for proposing (the policy) and monitoring the government programmes as the KEN implementation process. This council is assigned directly by The President and it is embedded with the ministry (KESDM). As it found in the policy document, the council has responsibilities :

- To propose the national energy policy (KEN);
- To set up the mitigation plan for energy crisis circumstance;
- To monitor the implementation of KEN.

This council works with its counterparts in the local areas to monitor the ground level implementation of various policies and programmes. During the interview session, it is revealed that this council should be available in all provinces (in Indonesia)<sup>24</sup> to monitor KEN implementation. However, due to limited budget, this council only established in Jakarta<sup>25</sup>. As reported by former head of electric division of DESDM Jambi Province (Masril, June 22, 2017), "The energy council should be located in the province (Jambi) to monitor the implementation of KEN, and also to ease the close coordination with the provincial agency which in

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<sup>24</sup> There are thirty three provinces in Indonesia.

<sup>25</sup> Jakarta is the capital city of Indonesia where the central government located.

charge of monitoring the government programmes in the local area (regencies/municipalities)”.<sup>26</sup>

In addition, on the demand side, the ministry is responsible to develop programmes for energy conservation. Despite the target to reduce energy intensity and elasticity to achieve energy efficiency, the government also released a policy about energy conservation (PP 70/2009)<sup>27</sup> which regulated the acts of governments (national-local), private sector and civil society in the implementation of energy conservation in the stages of supplies, businesses, uses and resources conservation. Therefore, it is the national government obligation to set up the national conservation energy plan (RIKEN)<sup>28</sup>. Thereafter, the local governments (Provincials and Regencies/Municipalities) do monitoring and capacity building regarding the energy conservation programmes, such as energy management, energy audit, etc.

### **5.2.2. The roles of provincial government in KEN policy implementation**

As the implementer at the provincial level is the provincial government itself represented by an agency that in charge of monitoring and providing services programmes at the region. In this study, the responsibility belongs to the Energy and Mineral Resources Agency of Jambi Province (DESDM). This agency is responsible to provide systems including budget to deliver electricity services for the whole regions. It is important to note that before the policy (PP 23/2014)<sup>29</sup> being released, the regency/municipality governments are authorized to manage their own administrative duties based on their administrative boundaries. However, since the policy was being implemented in 2014, the authorization of administrative duties partially such as permits granted and projects budgeting are given back to the provincial government. It means that the provincial government is the highest authority in the region and the top coordinator for any kind of

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<sup>26</sup> Interview conducted on June 22, 2017, Masril is the former head of electric division at Energy and Mineral Resources of Jambi Province. He agreed to be cited.

<sup>27</sup> PP 70/2009 is national policy which regulate energy conservation.

<sup>28</sup> RIKEN is the national energy conservation plan as a guideline in demand side management.

<sup>29</sup> Ibid.

projects in electricity services delivery. Moreover, the responsibility of provincial government is added to significantly. During the working group, it revealed that “the responsibility of Energy and Mineral Resources Agency (DESDM) in the provinces is significant since the policy (UU No.23/2014)<sup>30</sup> was being implemented, because the authority to manage the energy and mining sectors are transferred to the provincial government from the regencies/municipalities government” as stated by the Provincial Secretary of Riau Province (Ahmad Hijazi, April 27, 2017).<sup>31</sup> Hence, it needs coordination and synchronization from the government at all levels to implement KEN due to limited resources (funds) to monitor and controlling the programmes and projects for electricity services.

Furthermore, the local governments (regency and municipality) should reported regarding rural areas and villages including households that have not been electrified and the local resources that can be utilized to generate electricity. These figures are used by the provincial agency to account the budget needed to install a system to deliver electricity services in the area and/or to the households. Moreover, this agency is also responsible to recommend the villages which are suitable to receive funds from the national government in the programme “energy sustainable villages (*Desa Mandiri Energy*)”<sup>32</sup>. This programme is a platform created by the national government to enhance rural areas to receive electricity services based on the sources (especially renewable) that is available in the villages in order to reach the KEN targets.

Nevertheless, to implement the programme/project, the provincial government conducted a bidding process as part of its administrative function and encouraged the local community participation. According to the interviewee, “to build up such projects for the rural areas (e.g. micro-hydro), the agency (DESDM) needs third parties from private companies to make a bid based on the budget of projects that available. Once the project is running, the local communities will

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<sup>30</sup> Ibid.

<sup>31</sup> See section 3.1.2. The informant agreed to be cited.

<sup>32</sup> *Desa Mandiri Energy* is a national programme which aims to make rurals (villages) can provide electricity services by themselves based on local resources.

operate and maintain the project by themselves under the government supervision” (Masril, June 22, 2017). At this point, the local community can learn about the government’s energy policy implementation plans and the role they are expected to play in the services delivery. The agency works together with the local governments (regency/municipality) that are in charge of monitoring and providing support to that deliver electricity services in the regional of Jambi Province.

Furthermore, this agency also acts as energy manager since the energy council is not available in the province. It means that the agency has to monitor the implementation of the programmes by itself and do an internal evaluation and recommendation before reporting it to the ministry (KESDM) regarding electricity (energy) services delivery. To recommend the suitable villages to the national government, this provincial agency encourages local regencies/municipalities to update their reports annually in order to secure funding from the ministry, and also as progress report for delivery services to qualifying beneficiaries that have been received.

### **5.2.3. The roles of regency/municipality governments in KEN policy implementation**

The governments of regency and municipality are responsible for operating and maintaining the electricity services within their local communities. Coupled with other responsibilities, these local governments are in charge in registering the beneficiaries who are recommended receiving funds from the national or provincial governments. The regency/municipality governments are responsible to conduct data collection from villages and households in order to verify the qualified receiver for electricity services. Then, together with the potential data of local resources that can be utilized to generate electricity, they will recommend it to the provincial government. This is part of endorsement to the provincial government in the setting of local energy plan proposal. In addition, due to the authorization policy, these local governments have a high dependency to the provincial government. It differs from the past whereas the local governments can

manage their own administration, which means they are enable to grant permits and provide the funds by themselves regarding delivery services based on their administrative boundaries. Since it gives back these power to the provincial government, these can stop cronyism considerably.

Nevertheless, as a part of the monitoring process, the local governments must take charge of verifying the register of villages and/or households regularly and submit the report to the provincial agency. Moreover, to indicate the intentions to implement the KEN policy, the governments of regency/municipality can formulate additional policies which are not covered in the KEN. For instance, the policy on how the community's roles in operating the projects (e.g. micro-hydro) and maintaining the system properly. This is part of future plan for sustainable development within these areas which unreachable from the grid. In addition, the local governments are responsible to implement the regional plans to give an overall development framework. The programmes or projects (in RUED/RUKD) are planned for the following ten years and need coordination from the regency/municipality governments on the evaluation. The coordination also includes local communities who will be impacted or get benefit from the plans. It aims to develop future work for the areas and to ensure better quality of life for people living within these areas.

#### **5.2.4. The roles of local community in KEN policy implementation**

The communities as target actors are guided by the rules and regulations within government to implement KEN. The local governments are expected to ensure that villages (households) get benefit from the implementation of KEN policy through a clear and transparent process. In the policy document (UU No. 30/2009)<sup>33</sup> article 4 section 3, stated that the governments are responsible to provide programmes and funds for electricity services to the poor, develop the infrastructure regarding electricity provision in the rural areas, and deliver electricity services to the villages which are unreachable from the grid. This also in line with the procedures that should be followed by the local governments in

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<sup>33</sup> UU No. 30/2009 regulates about electricity services provision.

identifying areas that are supposed to get benefit. The beneficiaries are those villages (households) which are located far from the electricity grid, as it stated in the government policy (PP No. 3/2005, article 2A)<sup>34</sup> about utilizing and providing the electricity services. During the interview found that, “the governments are supposed to select suitable resources to be funded and delivered to rural areas based on the resources that those areas have, especially renewable resources. Then, the government will develop the infrastructure/system (e.g. micro-hydro) to deliver the electricity services” (Masril, June 22, 2017). The responsibilities of operating and maintaining the system are given to the local governments to inform the beneficiaries on how to apply them properly. Moreover, the government will appoint third parties (service provider companies) to install the system through bidding process. “As a matter of fact, this was responsibility of PT. PLN to provide the access to the grid to the communities. However, the grid never reach the rural areas since it depends on business to business calculation, whether its profitable or not to install the system in rural areas”, as said by (Masril, June 22, 2017). Therefore, it needs another player to deliver electricity services for the rural areas.

On the other hand, the local community plays important role to operate and maintain the installed system. According to interviewed by email, “the governments will ask the chief of the village to form an organization (small and non-profit) to manage micro-hydro power plant (PLTMH)<sup>35</sup> and appoint two operators which will be trained on operating the power plant. Moreover, these operators also responsible to collect electricity bills from the houses, and the money will be used as maintenance and service cost, also for the operators wages. Moreover, in order to receive the electricity services, each households should pay installation fee in order to get connection to their houses. The price of connection

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<sup>34</sup> Ibid.

<sup>35</sup> PLTMH (mycro hydro power) is the most provincial project at the moment due to most rural areas in the province have hydro potentials which needed to be developed.



cost is depend on the capacity installed which only for basic lighting, so that affordable by households“(Ade, June 1, 2017).<sup>36</sup>.

### **5.3. Stakeholders interaction in implementing KEN policy**

The implementation of KEN is an interaction process that depends on several actors. Although this thesis concentrates on two core actors (implementer and target actors), it is necessary to acknowledge the other actors that contribute to the implementation process. The government as the implementer actor often needs suggestion and feedback from stakeholders that benefited from the services delivered. Table 15., highlighted the stakeholders that play different roles in the KEN implementation process.

The Ministry of Energy and Mineral Resources together with the Energy Council are in charge to formulate a policy and proposed an energy plan which would be a guideline for development framework to the local governments. The ministry facilitates and provides the financing in the implementation process through its general director. The provincial government has roles to set up a local energy plan and monitoring the local governments’ performance in electricity services provision. The provincial government is represented by the agency which works together with the governments of regency/municipality to determine the available resources to make the provision of electricity services possible.

The Provincial Agency plays a crucial role by coordinating the local governments (regency/municipality) in the policy implementation process. This agency concentrates on setting up a local energy plan that is implemented in the local region and as a guideline for the local governments in providing electricity services. It has been the top coordinator for the national programme to select and recommend the location of the electricity services system installation in the rural areas. This agency is also responsible for facilitating the KEN implementation process by providing funds for electricity projects and optimizing the use of local resources in the regions.

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<sup>36</sup> Ade is DESDM staff in the division of electricity services, she responded the interview session through email and agreed to be cited.

Table 15. Stakeholders interrelation on KEN implementation process

<b>Stakeholders</b>	<b>Roles</b>
Ministry Of Energy And Mineral Resources – National Government	Providing funds for energy projects, set up national energy plans or programmes (RUEN/RUKN), composting additional policy to support the implementation of KEN, give subsidies and incentive regarding electricity services.
The National Energy Council – National Government	Proposing and monitoring the implementation of KEN, composting the mitigation plans for energy crisis circumstance.
Agency Of Energy And Mineral Resources – Local Government (Provincial Government)	Setting up the local energy plans or programmes (RUED/RUKD) based on RUEN/RUKN, providing funds for projects to deliver electricity services, recommend the rural area to receive funds from the national government, give subsidies and incentive to ensure delivery of electricity services.
Local Government (Regency/Municipality Government)	Providing data regarding households/villages whom have not been electrified in rural areas, proposed areas (villages) to receive the projects to the provincial government, setting up additional policy to support implementation process when it needed.
Private Sector – PT. PLN (The National Utility Company)	Install the grid for electricity services delivery. Set up an electricity services provision plan (RUPTL) for the entire country.
Local Community – Rural Area	Established organization (non-profit) to operate the electricity projects (e.g. micro-hydro) and appoint the operator to run it.

The governments of regency/municipality provide administrative support to the provincial government during the KEN policy implementation process. This support includes providing and verifying the villages/households data collection and determining the qualified villages to receive (electricity) services. PT. PLN works closely with these spheres of government by informing the grid electrification plan (RUPTL). It is mandated by the regulation (UU No. 30/2009 and PP No. 14/2012)<sup>37</sup> in order to achieve KEN target. This enables the government to set up plans regarding electricity services provision to areas that unreached by the grid for the future development. The local communities take a part in the implementation process as the operator to run the project or the system

<sup>37</sup> The laws that regulate about electric generation.

that is being installed. They have to establish a non-profit organization to operate and maintain the project/system.

#### **5.4. Conclusion**

This chapter has illustrated how the multi-governances influence the policy implementation process through the different roles on the electricity services provision. This chapter only deals with electricity as it stated in sub chapter 3.2. (Research boundary).

The analysis showed a top-down approach, in which the provincial government has the biggest responsibility in the implementation process of KEN policy. This chapter has also made it clear that each layer of government is important in the implementation process because the actions they take affect the KEN implementation process. This chapter has also revealed the other actors who influence on the implementation process based on their contribution. There are significant changes in the level of authority. Since the policy (UU No. 23/2014)<sup>38</sup> is being implemented, the provincial government is responsible in coordinating the projects for electricity provision. All the projects should get permits granted by the provincial government to enable them from being implemented in the regencies or municipalities. However, it does not mean the local governments have no responsibility in the implementation process regarding the electricity services provision. In fact, the regencies/municipalities government are critical to support the KEN implementation process by providing data collection of the households and villages, so that, the provincial government enables to integrate them in the local energy plan in order to develop a sufficient plan for electricity services delivery.

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<sup>38</sup> Ibid.

## Chapter 6 : Discussion and conclusions

The study was set up to explore the implementation process of national energy policy in Indonesia with particular insight of Jambi Province. It also investigated the nature and form of the main factors that influenced to the implementation process as well as their impacts on communities. This study also sought to know the concept of energy security and the policy stance to the energy security in the Province of Jambi due to its capacity as one of energy sources producer in Indonesia. The general literature on this subject and precisely in the setting of Jambi Province is lacking answers on several fundamental questions within the policy discourse. The importance of contextual factors and actor's characteristics that influenced the implementation process of energy policy are crucial elements that can foster prosperity and can be beneficial for electricity services provision in rural areas considerably. Then, knowing the reality from policy implementation process inspires further identification of barriers and supporting aspects which might help on the evaluation of the existing programmes and projects for the future development.

### 6.1. Restatement of research questions

The main empirical results were analyzed in *Chapter 4 KEN impacts to the energy security and Chapter 5 Output arena*. Hereafter a look back is given to the empirical findings with the aim of answering the research question of this study:

1. *How does the implementation of the energy policy (KEN) impact on the energy security in Jambi Province?*
2. *How do actor characteristics as stated in CIT, influence the energy policy (KEN) implementation process?*

With these questions the study strived to explain the policy stances to the energy security in the energy sources producer area, to identify contextual factors that influence the policy implementation process, to explain actor's characteristics that influence the implementation process of KEN. In doing so, the CIT framework has been used as a starting position when identifying the impact and second, in

organization of findings. Data were gathered from two energy policies and three related policies, interviews, working group and data from the documents of energy programmes. Four participants were chosen according to their availability, responsiveness and involvement in the energy sector. Thus, data used from the energy programmes were collected from the Energy and Mineral Resources Agency of Jambi Province and from the Ministry of Energy and Mineral Resources.

## 6.2. Discussion

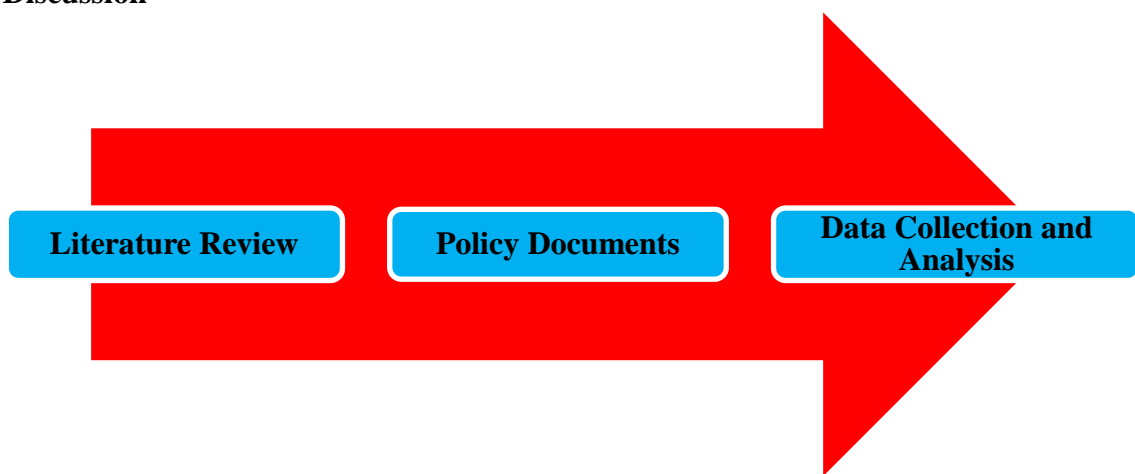


Figure 15. Research process

Literature review gave information about the energy policies and its impact at global as well as national context, and the perspective of energy security. This was labeled as input arena that leads actors in their behaving, and impact of the policy implementation as output. The analysis of policy documents bring perspective in the process arena to give deduction regarding actor's contributions. The analysis is supported by data collection to explain actor's characteristics and contextual factors which influence the implementation process.

According to multi-governance analysis (chapter 5), the implementation process is a dynamic interaction. The actors behaving in the context are controlled by the policy. It is reflected whether there is policy changes, then followed by the roles of actors in implementing the policy. In order to conclude whether the actor's characteristics influence the implementation process, it was necessary to analyze

through data collection. It could be said that actor's characteristics did influence the implementation process. It could be seen from motivation, cognition and resources of actors that drove their action in the process arena as stated in sub chapter 2.5.3, and explained in Chapter 5. The analysis focused on two actors, which were the implementer represented by the government and target group represented by private companies and households. The motivation and resources from the government have high control to the implementation process. It is clearly seen through the government programmes which were delayed due to financial problem have caused deficiency in the electricity services delivery. Moreover, the government's cognition also influence the implementation process showed by the paradigm changes to use resources for the development. It is important to note that as an energy sources producer state (Indonesia) has been realized that resources are limited, therefore, it is important to utilize the resources for the domestic consumption rather than for selling it for economic reason.

Furthermore, the implementation process also influenced by the target group. The research revealed that low level of participatory from private companies affected the electricity services supply. It illustrated by IPP success ratio (30%) as stated in Chapter 4. It can be said that the acknowledgement of private companies regarding policy contents (KEN) affected their actions in implementation process. The lack of projects financing can be assisted through private sector's participation. With regards, finishing the projects on time is required in order to secure the electricity supplies to the citizens of Jambi Province. Since the interview was not conduct to the households, it is hard to state that they influence the implementation process and be the weakness point of this study. However, with the roles they play, it is considered that the communities also influence the KEN implementation process. Since the projects are operated by the communities, they have to find the best way to ensure the continuity of electricity supply from the system based on their initiatives (Pitoy, 2011).

Investigating the factors that are influencing the implementation process to the energy security, this study found that several factors influenced the phenomenon. Hence, these factors are categorized as wider context. As quoted from article (april 5, 2012), “Indonesia now has the lowest domestic fuel price in all of Asia and is out of step with the rest of the world, which is trying to reduce its addiction to fossil fuels, protect the environment, and mitigate climate change. Moreover, Indonesia is now a net energy importer—and a low domestic fuel price makes it more dependent on imported energy and more vulnerable to energy price shocks from abroad” (Nehru, 2012)<sup>39</sup>. This condition affected directly to the citizens as multiplier effect whereas the price of food, transportation and services increased significantly (Rahmadi, 2013). On one hand, subsidy is impacted the social welfare. The budgetary savings should take into account to enable energy infrastructure’s development. On the other hand, the political system is another wider context which was found in the literature assessment that influenced the energy security at macro level (Friedman, 2008). Since the fossil fuel is the primary energy sources, the volatile price of oil will affect the security supplies of electricity services.

Finally, it has been confirmed that the two actors are inducing each other’s actions and engagements in their interaction in the process arena. By using the CIT, actors’ characteristics and contextual factors in process arena are perceived and conceptualized to understand the main elements triggering the treatment of KEN policy.

### **6.3. Conclusions**

The study started with the literature assessment, to get picture of phenomenon how an energy sources producer area manage it resources through energy policy. Then, the data analysis were done to understand the factors that influenced the KEN implementation process. The analysis revealed that the actor’s actions are driven by the policies in the implementation process. In that process, the three actor’s

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<sup>39</sup> Quoted from article, April 5, 2012 <http://carnegieendowment.org/2012/04/05/adding-fuel-to-fire-in-indonesia>, last accessed on 6 June 2017.

characteristics such as motivation, cognitions and resources of private sector, household and government have been identified and explained. The results of analysis gave rise to the observations and policy implications for further research and by linking its findings to previous studies contributed to the general body of knowledge. This study showed the importance of private sectors, general communities, and policies created for them. By all means, the impact of the results showed the importance of informality in between implementer and target group regarding achievement in the policies to show their contribution in the implementation process. The lack of private sectors contribution in the implementation process seems being caused by the lack of information they have regarding KEN policy content which has facilitated them to be involved in the energy and electricity services provision. It is considered as a strong point of the research findings.

In addition, previous studies have been conducted regarding energy sector in Indonesia, such as; Hartono and Resosudarmo (2007) studied the impact of economy to the energy consumption in Indonesia; Pitoy (2011) studied the sustainability of micro-hydro power in Subang Regency, West Java; Kotarumalos (2012) conducted a comparative analysis of energy policies among Malaysia, Germany, and Indonesia; Rahmadi (2013) studied sustainable energy of Indonesia. According to the available knowledge, this is the first study to deal with the implementation process of energy policy and energy security in the level of provincial and as such it offers an overview of the situation and a screenshot of the phenomenon. Even though, the research time frame was insufficient to draw any conclusions about the exact level of energy security apart from identifying it. The results provide confirmatory evidence that it is possible to state that policy (energy) is influencing the energy security. Hence, more research into the area of energy policies and energy security is still necessary.



### **6.3.1. Evaluations and limitations of study**

- Research was limited by time and resources, it was difficult to get information from the respondents in remote area.
- FGD was not conducted with the target of end users (rural communities), due to limited access and resources (funds). Therefore, it was influence the findings in measuring the energy security. One of aspects in measuring energy security is the continuity of services supply with the scope of end users (Winzer, 2011).
- Re-interviewing was not done since the study was limited by time.
- More interviews would be conducted if there were more positive reactions for cooperation.
- There was insufficient information available about the initiatives to achieve the sustainability of electricity services from end users.

### **6.3.2. Theoretical implications**

This study was using the Contextual Interaction Theory framework to explain the purposes of the study in the best manner. The CIT framework is dynamic structure tailored for interaction process that includes two actors. This model gave the opportunity to study two actors, the government and general communities (including private sector), while examining their characteristics individually and afterwards jointly. The applied CIT is only explained the specific and structural contexts deeply. Thus, adding a deep analysis in the wider context was crucial to get a comprehensive outcome of process explanation in the study.

### **6.4. Recommendations**

The study has explained the internal as well as external contexts influenced the KEN implementation process. Several recommendations are given to reduce problems perceived in the KEN implementation, such as;

- The study revealed that all the actions that being undertaken by the actors are driven by the policies. Therefore, it is critical for the governments to deliver

information in the KEN policy to the targets (group) in the communicative way in order to achieve all KEN objectives.

- The low level of IPP ratio showed a less contribution of private sectors in the electricity services provision. Meanwhile, the private sectors have resources (financial) to enhance the electrification. Therefore, it is crucial to encourage the private sectors (especially small-medium enterprises) participation by set up a policy and or/giving incentive for them. By giving advantages, such as PT. PLN is obliged to buy electricity from SME with the certain amount of capacity.
- The additional policies are needed regarding local communities participation and initiation in the electricity services provision. These policies can be design by the local governments (provincial/regency/municipality).
- The current projects (micro-hydro) are enable to increase the electrification ratio significantly. These small projects (mini-grid) can help to bridge the gap between supply and demand. Designing a clear and transparent framework would be helpful to prevent problem that might raised in the system management.
- The financial problem in the current projects perhaps can be resolved since the UN has programme “Sustainable Energy for All (SEforAll)”. It is important to notice by the (national) government that SEforAll has strategic frameworks that aims to help countries to achieve their energy policy objectives.
- An integrated planning on the supply and demand side is needed. Since it seems that the current plans are partially, only focused on supply. A multi-disciplinary approach should establishes among stakeholders in the energy sector to get overview of such integrated plans.

## **6.5. Suggestions for further research**

This study tried to give answer for the phenomenon of energy sources producer area, but lack of electricity (energy) services through policy implementation process in the Province of Jambi. The study revealed that even though phenomenon

does exist, however, the policy implementation process in proper way showed improvement. The study can give implications for further research:

- Wider context is needed to explore the electricity issues comprehensively. Therefore, studies locus in national and local (regency/municipality) levels should be conducted.
- Deep understanding on various basic form of energy can be reached by exploring them separately.
- This study aimed to find factors that caused the phenomenon but excluding the wider context deeply and their evaluation, what can be inspirational for further studies.
- Exploration on various types of intentions and initiatives have by local communities who operating the installed system can reveal deeply sustainability aspect on its operation.
- Analysis of the changing market is needed as it affects security of supply.

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## **Appendix A**

### **Interview Questions**

#### Socio-Economic Criteria

1. Do you have any data available on the share of households/population without electricity in Jambi city?
2. Do you have any data available on electricity consumption in Jambi city?
3. Is there any subsidy from the government particularly for individual consumers (households)?

#### Institutional Criteria

1. Does Jambi city have energy master plan and/or electricity master plan?
2. Does the government have plans or programs to develop renewable energy for electricity generation in Jambi city?
3. Are there any efforts being made to build or finance power plants from renewable energy resources? If so, what type?
4. Are there any government funding supports from provincial and national governments for promoting renewable energy in Jambi city? If so, how much? (as percentage of total budget)
5. Are there any barriers for constructing or financing local power plants in Jambi city? If so, what are they?

#### Technical Criteria

1. Do you have any data available on electricity disruption in Jambi city?
2. What kind of electricity disruptions does occur in Jambi city?
3. What kind of non-renewable resources that can be utilized for electricity production does Jambi city have?
4. Do you have any data available on the share of non-renewable resources locally produced for electricity generation in Jambi city?
5. What type of power plants does Jambi city have?
6. Do you have any data available on installed capacity and production capacity of power generation in Jambi city?



7. Do you have any data available on electricity supply and demand (energy balance) in Jambi city?
8. Is the capacity sufficient to serve electricity demand in Jambi city?