The Role of Renewable Energy to Reduce Climate Change: Perspective of Policy Content and Context

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Abstract. Energy needs have increased each year along with economic growth and increasing population number. Indonesia still relies on fossil fuels as an energy source that dominates the national energy mix. Fossil energy has an impact on greenhouse gas emissions that threatens climate change. The role of the government through energy diversification policies has not provided maximum contribution to fulfil energy needs. This study aims to analyze the policy of developing renewable energy in reducing greenhouse gas emissions based on content and context policy, using qualitative method to explain and describe implementation of the renewable energy policy. Data were derived from primary and secondary sources which are conducted in the period of October – December 2018. The result shows that there were several factors from the content and context of policy that have a significant correlation in the renewable energy policy implementation. The political environment has a role in the implementation of policy content related to the benefits that will be perceived by the community. Other policies that influence renewable energy consumption like fuel and electricity subsidy and allocation of resources are needed to implement the policy.

Keywords: Renewable Energy, Carbon Emission, policy content, policy context

1. Introduction

Economic growth in Indonesia that shows positive development has a correlation with the increase of energy consumption. Based on the data from the Ministry of Energy and Mineral Resources in 2017, Indonesia encountered an increase in energy consumption of 115,054 million BOE, where the energy consumption in 2016 of 815,692 million BOE is compared with the final energy consumption in 2017 of 927,746 million BOE [1]. This phenomenon indicated that energy consumption will be directly proportional to the level of public welfare. Energy use was carried out in accordance with the principle of "the better of you are, the more energy you use" [2]. The more prosperous the community, the greater and more frequent the energy consumption will be.

Unfortunately, until now, Indonesia still depends on coal and petroleum energy sources to fulfill the needs of the transportation sector, industry sector, households sector, and other sectors. The largest energy source used is petroleum which comprises 41.83%, followed by coal as much as 30.48%, gases by 23.37%, and the rest consists of various renewable energy sources of 4.425%. Exploitation of fossil energy sources will lead to the reduction of existing resource reserves which can result to energy crisis in the future. The projection of oil reserves in Indonesia will be exhausted within 23 years, while gas will be so within 62 years, and coal will run out within 146 years [3].
The use of fossil energy as the backbone of national energy supply also threatens as well as endangers the environmental ecosystems with the presence of CO$_2$ gas produced by burning fossil fuels which can have a bad effect on greenhouse gases. This has an impact on infrared radiation which will increase the Earth's temperature. The use of fossil power plants also results in acid deposition that endangers vegetation, building structures, and also living things [4]. Energy consumption has consequences for the occurrence of climate change with an increase in greenhouse gas (GHG) emissions and climate change [5].

During 2006 - 2016 the GHG emissions in Indonesia increased by 507,219 GgCO2e compared to GHG emissions in 2002. It increased 2.9% per year during that period. In 2016, the total greenhouse gas emission was 1,514,949.8 GgCO2e which 3.28% of it came from energy sector. The energy sector became the second largest emission producer after forestry and peat fires with total emissions of 618,581 GgCO2e [6].

![Figure 1. GHG emission profile 2000-2016](image1)

Source: Compilation of Ministry of Environment and Forestry data, 2017

Emissions from the energy sector have increased annually along with the increase of energy consumption. From 2000 to 2015 there was an increase of 354.04 tons of CO2 of emission. The biggest emission came from the electricity generation sector which was still dominated by coal as its energy source (33%), then the industrial sector amounted to 30%, transportation sector by 29%, and other sectors amounted to 8%. In 2018, there was a decrease in carbon emissions of 43.8 million tons of CO2 [7]. Emissions from fossil fuels are 19%. Sources of emissions from the energy sector came from fuel combustion, including emissions from energy industries, manufacturing industries, transportation industries, and other sources such as households and commercials. Fugitive emissions from fuel production also generate emissions during fuel and gasses production, distillation, and distribution process.

![Figure 2. Emission from energy sector](image2)

Source: Compilation from Data from Ministry of Energy and Mineral Resources, 2016

These emissions have a negative impact on global warming that threatens climate change. Indonesia has recorded an increase in air temperature by an average of 0.3°C since 2010. In addition,
there are predictions of increasing rainfall by 2-3% per year which can threaten food security due to crop failure caused by reduced soil fertility [8].

The government faces a dilemma to fulfill the demand for energy needs. On one hand, raw materials for fossil fuel have affordable economic price, but have negative effects on the environment. While on the other hand, the government is also obliged to reduce greenhouse gas emissions by 26%, which is equal to 0.767 Gton CO2e in 2020 without international funding. In the national action plan, the greenhouse movement is one of the policies taken by the government in reducing emissions through energy diversification. Energy diversification as an effort to reduce the rate of emissions is carried out through the constructions of PLTMH, PLTM, PLTS, PLT Biomass, and PLT Hybrid.

1.1 Conceptual background

1.1.1 Renewable energy policy

In national development, the government has a role in actualizing a prosperous and evenly materialized society. The government plays a role in maintaining the stability and balance of energy management through policies made as guidelines for implementing activities. Energy policy is made based on the adequacy of quantity, quality, and fairness of prices. Public policy is the government's response to various existing problems that are carried out through the relations between various parties involved to solve existing problems [9]. Looking at these definitions, the elements of public policy include administrative and political authorities, namely involved actors who have the authority in making decisions.

The policy contained in the Presidential Regulation on national energy policy mandates the use of renewable energy sources to ensure the availability of energy and encourage sustainable development. The energy mix target from renewable energy sources of 23% in 2025 is a manifestation of the government's commitment to encourage the use of renewable energy. The amount of renewable energy sources such as geothermal energy which is the largest in the world and the abundance of sunlight are the driving factors for the exploration of renewable energy sources. In addition, the use of renewable energy will bring its own advantages in the absence of environmental emissions which can make the society to live a healthy and clean life and can also promote economic growths and new jobs [10].

Public policy as a policy cycle goes by involving a agenda setting process, policy formulation, decision making, policy implementation, and policy evaluation [11]. Policy implementation is an important phase in a policy because it involves the success of a policy. Besides that, the implementation phase involves the interaction of various elements that have influence in tugging the interests and allocation of resources where conflicts are prone to occur [12].

1.1.2 Content of policy implementation

Policy implementation is influenced by policy content factors which include the existence of interest affected, where the interests of the target group will be directly affected by the policy, type of benefit that will be felt by beneficiaries, extent of change envisioned, site of decision making, program implementor, and resources committed [13].

1.1.3 Context of policy implementation

Context policy implementation relates to power interests and strategies of actors involved where each actor involved has certain political affiliations through the provisions made. Institution and regime characteristics in policy implementation are the result of competition through interactions between institutions to obtain allocation of resources.

2. Methods

This study used post-positivism approach through qualitative method. The locus of the study is the Directorate Generale of New Renewable Energy and Energy Conservation (DGNRE), Ministry Of Energy And Mineral Resources (MEMR) where the process was conducted between October to
December 2018. The descriptive analysis was derived using document analysis and interview to gain comprehensive information about renewable energy policy implementations to support climate change. The interviews were conducted on two public servants from Division of Legal Affair and Division of Plan and Report, DGNRE. While the documents were obtained from the annual reports of institutes, books, journals, and other available documents. This study focused on the analysis of the content and context of renewable energy implementations that have a role in reducing climate change.

The analysis used to determine policy implementation are content and context of public policy that consist of interests affected of the target groups, power interests, and strategies by actors involved, and resources committed.

3. Results and Discussions

3.1 Content of renewable energy implementation

Looking at the development of renewable energy power plants, the government's efforts through deregulation and harmonization of energy sector regulations are carried out to create an investment climate and cooperation with various stakeholders to attract developers. However, the renewable energy development policy is full of political interest where the law has not been issued as a juridical foundation on renewable energy sector in its policy implementation process. Renewable energy sector is still underestimated in contributing beneficial financial impact compared to oil and gas industries, in terms of aspects such as investment profits and foreign exchange.

Reviewed from the target group interest, there are several regulations from MEMR about the utilization of renewable energy sources for power plants that are seen controversial in terms of selling prices and the Built Own Operate Transfer (BOOT) scheme offered by the developer who feels disadvantaged by the mechanism. This obstacle complicated the construction of power plants that use renewable energy sources, where in 2017, out of seventy contracts as much as 64.28% have not been able to construct.

Seeing the dominance of coal energy as the backbone of electricity power plant that brings environmental pollution, this policy is considered to be less in favor of government targets in reducing greenhouse gas emissions. The government is seen as being unable to accommodate fractions of various interests in the renewable energy development policies with its lack of involvement in policy making. In the 35000 MW project, the government only pegged the position of renewable energy at 25% (8,750 MW) even though on the other hand, the government was trying to increase the renewable energy mix [3].

3.2 Context of renewable energy implementation

Problematics with the administration and politics of the actors involved in the implementation of the policy can be seen from government subsidies that continue to be allocated for fossil fuels, both for transportation purposes through oil subsidies and electricity subsidies where the government has provided subsidies in the amount of Rp. 2,182 Trillion in the period 2004-2015. However, these subsidies were not carried out for renewable energy sources, therefore unable to reach the appropriate economic price. In the political level, the subsidy was used as a politicization tool to gain public sympathy by providing affordable energy sources. The absence of these subsidies made it difficult to develop renewable energy where the basic costs are more expensive than fossil energy sources. As an illustration, the cost to provide solar cell energy is Rp. 8,785/Kwh compared with cost when providing from coal energy of Rp. 661/Kwh. This made renewable energy generation unable to reach economic prices [7].

The competition between actors involved in policy produced a constellation of powers that determines the allocation of resources to support the implementation of the policy. The DGNRE, which is the holder of the mandate in implementing policies, is not equipped with appropriate human resource capacity. At the beginning of its formation, the staff allocation was only 0.03% compared to the employees in the MEMR. This certainly aggravates the performance in achieving goals [14, 15].
The influence of the political and administrative environment has an impact on the dominance of steam power sourced from coal in power plants by 57.22% while the portion of renewable energy is only 12.15%.

Figure 3. Energy source composition on power plant electricity 2017
Source: Compiled data from the Directorate General of Electricity

3.3 Renewable energy development and climate change
Energy diversification as one of the action plans in an effort to overcome the government's climate change is contained in Presidential Regulation Number 61 concerning action plans for reducing greenhouse gas emissions. Indonesia's target is to reduce GHG emissions by 26% by 2020 based on the “business as usual” scenario. The term greenhouse gas refers to emissions that are a result of activities carried out in the forestry, peatland, agriculture, energy, industrial and transportation sectors. From the energy and transportation sector, the government targets an emission reduction of 0.038 Giga Ton CO2e through demand-side management, energy efficiency, and renewable energy development [16]. In 2019 the Ministry of Energy and Mineral Resources targets a reduction in CO2 emissions through energy diversification of 28.48 million tons.

In the period from 2010 to 2016, the achievement of reduced emissions from the energy sector amounted to 33.95 million tons of CO2. In 2017, the development of renewable energy sources through the construction of electricity generation using geothermal energy contributed the highest number with a capacity of 128 MW, followed by a plant from biomass of 138.6 MW, solar power of 24,745 MW, minihydro of 20 MW, Microhydro of 6.33 MW, and hybrid sources of 3,673 MW. This development showed a positive trend compared to the previous years [15].

Figure 4. Capacity progress on renewable energy (MW)
Source: Compiled data from the Directorate General of New, Renewable Energy, and Energy Conservation
Emission reduction from the construction of renewable energy sources also showed an increase where in 2017, the reduction of emissions from geothermal plants was 621,718.72 TonsCO2, followed by emissions reductions from microhydro plants of 88,529.44 TonsCO2. Likewise, the plants from the source of Minihydro, SolarCell, Biomass and Hybrid showed an increase in the amount of emission reduction [15].

Figure 5. Emission reduction from renewable energy sources (Tons CO2)
Source : Compiled data from the Directorate General of New, Renewable Energy, and Energy Conservation

4. Conclusions
The government plays a crucial role in the implementation of public policies to integrate various conflicting interests in order to create a harmonious policy of mutual supports. In the policy of developing renewable energy, the political influences of various parties can be seen in the allocation of resources which is the supporting factor for a policy's success. Besides that, the formulation of policy content has not reflected the accommodation of various interests of involved actors, showed by dissatisfaction of stakeholders. The dualism of energy development for sustainable development and emission reduction is faced with the price of renewable energy that does not get subsidies, which meant that it cannot compete with conventional energy sources. Thus, the government still seemed reluctant to leave fossil energy in the 35000 MW project. Consistency in implementing policies by the government needs political and administrative supports so that policy objectives can be achieved.

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