Renewable energy policy and governance in West Sumatera Province: an overview

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Abstract. West Sumatera Province is the province with the highest renewable energy mix target in Indonesia. To realize this target, the Province of West Sumatera has designed a policy and institutional or governance strategy. Therefore, the purpose of this paper is to see the policies and forms of governance in the development of renewable energy in West Sumatera Province descriptively. The research was conducted in a descriptive qualitative way using 2 (two) data collection techniques: Interview and Documentation Review. Policy planning that targets 1) Formulation of the legal basis for development and utilization; 2) Development of utilization areas in the form of power plants (solar cell, garbage, wind, biomass, micro-hydro, mini-hydro, water, geothermal); and 3) Empowerment of local communities to support the success of energy sustainability in renewable energy installations. However, the wide-scale of energy development requires institutional forms that involve multi-stakeholders: government bodies and non-government bodies. However, unfortunately, in its implementation, the involvement of these stakeholders in an ideal collaboration forum never happened. Stakeholder involvement is limited to official formalities. We have again found the “magical word”: the tasks, principals, and functions that hinder the movement of the bureaucracy in Indonesia.

1. Introduction
Attention to the importance of governance in Renewable Energy (RE) development has become a new academic and practical focus [1,2,3,4,5]. Even so, there is still a long way to go to get the ideal model in Renewable Energy governance. Several approaches were then tried to be developed by scholars to build the model, namely network governance [1], adaptive management [6,7], democratic governance [8,5], multiscalar governance [9,10], integrated governance [11], multi-level governance [12,13,14,15,16], and collaborative governance [17,18,19,20].

However, some literature states that the success of governance is influenced by stakeholders’ preferences such as their interests, influence, and capacity. Moreover, from this approach, only collaborative governance pays special attention to the importance of stakeholder involvement in renewable energy governance. Unfortunately, the collaborative governance approach, as described by
Ansell and Gash, "... can be fragile, time-consuming, and risky and can lead to the least common denominator outcomes; when it fails, it can accentuate skepticism and conflict" [21]. In addition, our previous research found that the collaborative governance approach is also prone to failure due to sectoral egos, lack of shared understanding, and low involvement of non-state stakeholders.

The Province of West Sumatera, which is the location of this research, has issued Regional Regulation 11/2019 concerning the General Plan of Regional Energy (Abbreviation in Indonesian: REUD) 2019-2050, the direction of policy and governance of Renewable Energy by the local government. This policy is a follow-up to the policy at the national level, which regulates the National Energy General Plan, one of which aims to increase the renewable energy mix in the future, with milestones in 2025 and 2050.

The relationship between collaborative governance and the general regional energy plan is the similarity in the importance of stakeholder involvement because the West Sumatera regional general energy plan makes the involvement and synergy of stakeholders in energy governance – especially renewable energy – one of the goals to be achieved in the regional energy available program. In addition, stakeholder involvement in collaborative forums can increase public acceptance of renewable energy development. Moreover, the development of renewable energy in West Sumatra Province is experiencing rejection [22,23,24].

Therefore, this paper aims to describe the policies and forms of governance descriptively in developing renewable energy in West Sumatera Province. This paper starts with an overview of existing policies. It then discusses institutions or governance in developing renewable energy in West Sumatera Province theoretically and practically from stakeholder involvement in the constellation of collaborative governance theory.

2. Methodology
Our research was carried out from June 28 to July 19, 2021. This type of research was designed qualitatively. Because qualitative research can be used to uncover and understand something behind the phenomenon [25] [26]. The qualitative design that we use is descriptive qualitative because it aims to overview the conditions or phenomena. This study uses 2 (two) data collection techniques, namely: Interview and Documentation Review. The interviews we conducted were in the form of semi-structured in-depth interviews with parties that fall into the categories identified. This choice was made because it is an appropriate tool to collect information from an individual's perspective, which focuses on his experiences, beliefs, and perceptions in interpreting the situation [27].

Meanwhile, we collect documents related to policies, policies, and other energy and renewable energy regulations in West Sumatera Province. The data validation technique used in this research is the source triangulation technique. The analytical method in this study uses an interactive analysis model. The interactive analysis model consists of three activities streams that coincide: data reduction, data presentation, and drawing conclusions or verification.

3. Results and discussion
3.1. Renewable energy development plan policy in West Sumatera province: an overview
The renewable energy development policy in West Sumatera Province was regulating in Regional Regulation 11/2019 concerning the General Regional Energy Plan. The Regional Energy General Plan in the regulation defines the policy of the Province of West Sumatera regarding the provincial level energy management plan, which is the elaboration and implementation plan of the National Energy General Plan, which is cross-sectoral to achieve the targets of the National Energy General Plan. The relationship between the two in the policy document for the general regional energy plan of West Sumatera Province explaining as follows:

The Provincial General Energy Plan elaborates the National Energy General Plan, which accommodates the potential and energy problems at the provincial level. The General National Energy
Plan uses a top-down approach, where national energy programs and policies must be followed and elaborated by the Provincial Government and become a reference in regional development planning. Meanwhile, the Regional Energy General Plan was developed by involving the Bottom Up process regarding energy development proposals from the lower level (community), which is then follow up at the Provincial level, which in turn became the input for updating the National Energy General Plan (West Sumatera Provincial Regulation 11/2019, Appendix 1, Page 6).

So, it can be seen that the policy on general regional energy plans is a derivative of the central government's policy but still provides space for the regions to propose a regional energy development planning model based on the potential and prospects of existing energy development. However, our informant also explained that the direction of the regional energy development plan for West Sumatera Province is the transition from energy use to renewable energy. Because West Sumatera Province is an area that does not have much potential for fossil energy sources, so depending on regional energy to fossil energy is not an ideal step for the future (see table 1). This then makes the energy mix target of the province of West Sumatera the highest in Indonesia.

"So the target for energy development was first set, but with a note that the development must meet the target of the national mix. After that, the mix that has been determined at the national level will be divided into each province. The provincial government then calculates the possibility of increasing the energy mix following the potential in the area. We then formulated that West Sumatera should be more dominant in the development of renewable energy. Therefore, our target (West Sumatera) is very high in the development of renewable energy. We will maximize it as optimally as possible because this area is poor in fossil energy. So, if you look at national data, West Sumatera is an area that has the largest renewable energy mix target in Indonesia for 2025 and 2050" (Informant 1, July 14, 2021).

Table 1. The energy potential of West Sumatera Province.

| Energy Type               | Unit   | Potency |
|---------------------------|--------|---------|
| Hydro*                    | MW     | 3.607   |
| Geothermal                | MW     | 801     |
| (As a Reserve Resource)   | MW     | 1.035   |
| Micro Hydro               | MW     | 1.353   |
| Biomass                   | MW     | 923.1   |
| Solar                     | MW     | 5.898   |
| Wind                      | MW     | 428     |
| Coal                      | Million Ton | 795.52 |

*Potential together with Riau Province

Source: Regional Regulation 11/2019 concerning Regional Energy General Plans, pages 33-34

Table 2. Energy mix targets for provinces in Indonesia.

| Provinsi*                | Starting Point (%) | Mix Targets (%) | 2025 | 2050 |
|--------------------------|--------------------|-----------------|------|------|
| Central Java             | 8.88               |                 | 21.32| 28.82|
| West Java                | 10                 |                 | 22.94| 20.13|
| West Nusa Tenggara      | -                  |                 | 23   | 31.2 |
| North Kalimantan         | 19.6               |                 | 55.95| 76.55|
| East Java                | -                  |                 | 17.09| 19.56|
| Lampung                  | 11                 |                 | 36   | 47   |
| Bengkulu                 | 37                 |                 | 37   | 52   |
| Central Sulawesi         | 15.62              |                 | 30.51| 42.09|
| Gorontalo                | 1                  |                 | 15.4 | 37.9 |
Therefore, although the regional energy general plan policy explicitly regulates energy broadly, the main objective of the policy is to increase the renewable energy mix in the future to create regional energy security and improve people's welfare. The target for developing the renewable energy mix in West Sumatera can be seen in Article 4, paragraph 3, which states that the Province of West Sumatera has an energy mix target of 51.7% in 2025 and 70.9% in 2050.

![Primary energy sources of West Sumatera Province in 2015.](Source: Regional Regulation 11/2019 concerning Regional Energy General Plans, page 34)

**Figure 1.** Primary energy sources of West Sumatera Province in 2015.

(Source: Regional Regulation 11/2019 concerning Regional Energy General Plans, page 34)

**Table 3.** Primary energy mix scenario of the Regional General Energy Plan of West Sumatera Province.

| Energy Type       | Energy Mix Baseline (2015) | Energy Mix Target 2025 | Energy Mix Target 2050 |
|-------------------|-----------------------------|------------------------|------------------------|
| Coal              | 30.3%                       | 14.9%                  | 7.6%                   |
| Crude oil         | 46.6%                       | 24.0%                  | 12.2%                  |
| Natural gas       | 3.5%                        | 9.4%                   | 9.3%                   |
| Renewable Energy  | 19.6%                       | 51.7%                  | 70.9%                  |

Source: Regional Regulation 11/2019 concerning Regional Energy General Plans, pages 43-44
So that to achieve the target of developing the renewable energy mix in West Sumatera, it is necessary to have a policy and institutional strategies that can accelerate the growth of the use of renewable energy more quickly. In terms of policy, the West Sumatera regional government has formulated and designed the development strategy into program plans targeting 1) Formulation of the legal basis for development and utilization; 2) Development of utilization areas in the form of power plants (solar cell, garbage, wind, biomass, micro-hydro, mini-hydro, water, geothermal); and 3) Empowerment of local communities to support the success of energy sustainability in renewable energy installations. A more detailed form of policy strategy and program plan can see in table 4.

**Table 4. Policy strategies and plans for renewable energy development programs in West Sumatera province.**

| Renewable Energy Development Policy Strategy | Program Plan |
|---------------------------------------------|--------------|
| Prioritized development of energy and energy resources to meet domestic energy needs | Increased regional energy demand |
| Increase the utilization of solar energy | • Formulation of policies for the use of solar energy |
| Increase the utilization of municipal waste | • Construction of Solar Power Plants (PLTS) |
| Increase wind energy utilization | • Construction of a Waste Power Plant (PLTSa) |
| Increase the utilization of biomass energy | • Construction of Wind Power Plant (PLTB) |
| Increasing small-scale hydro energy utilization | • Construction of Biomass Power Plant (PLTBm) |
| Increasing large-scale utilization of hydro energy | • Construction of Micro-Hydro Power Plants (PLTMH) |
| Increase the utilization of geothermal energy | • Formulation of policies to accelerate the development of Geothermal Power Plants (PLTP). Construction of Geothermal Power Plant (PLTP) |
| Increase biogas utilization | Development of biogas as a substitute for kerosene/LPG for the household sector |
| The utilization of renewable energy sources from biofuel types is directed to replace fuel, especially for transportation and industry. | • Conversion of the use of fuel to biofuels for the transportation, industry, and power generation sectors |
| Community empowerment to support the sustainability of Renewable Energy installations | • Provision of the particular land for energy gardens. |
| | • Establishment of a Technical Service Unit (Local Support Center) that provides troubleshooting consulting services and the provision of spare parts for Solar Power Plants (PLTS) |
| | • Training on maintenance and operation of renewable energy installations (Communal/Centralized Solar Power Plants, Micro Hydro Power Plants, Biogas) for operators |
| | • Rural business training by utilizing local commodities for communities using renewable energy installations (Communal/Centralized |
Renewable Energy Development Policy Strategy

| Solar Power Plants, Micro Hydro Power Plants, Biogas |

Program Plan

Source: Regional Regulation 11/2019 concerning Regional Energy General Plans, pages 60-63

Tables 2 and 3 show that the local government of West Sumatera has provided enough perspective that renewable energy is a priority for energy development in the future. The plans made have also shown that local governments have a clear direction in developing renewable energy. However, that is only "on paper." Many practical examples show that many good plans fail to implement. One of the factors that often make these failures is governance/institutions that are not well organized. Therefore, the Regional Energy General Plan Policy and planning policy strategies and program plans also regulate governance or institutions capable of increasing energy development in the region, especially renewable energy. In the following sub-section, we will first discuss the theoretical model in renewable energy governance in West Sumatera Province before discussing the implementation of the governance/institution in the next sub-chapter.

3.2. Renewable energy institutions: theory and practice

Governance or institutional issues use as strategic issues in the West Sumatera Province General Plan for Regional Energy. This can see from the energy management vision of West Sumatera Province, which writes in the general plan document, namely "The Realization of Energy and Mineral Resources Governance for Community Welfare." Although the vision does not explicitly explain the governance model referred to, the explanation in section "Regional Energy Institutions" explains that in implementing policies, strategies, and programs related to regional energy, government agencies and relevant stakeholders will involve by their duties and responsibilities. Their respective functions. Stakeholder involvement is one of the goals of regional energy development. Stakeholders engaged in energy institutions in West Sumatera are as follows:

Table 5. Stakeholders' engagement in renewable energy governance.

| Government Body                                  | Non-Government Body                                                                 |
|-------------------------------------------------|---------------------------------------------------------------------------------------|
| Development Planning Agency at Sub-National Level - Province | University                                                                          |
| Department of Environmental Office – Province     | Private Sector                                                                        |
| Department Energy and Mineral Resources Office – Province | NGO                                                                                  |
| Department Plantation Office – Province           | Society Leaders                                                                       |
| Department of Transportation Office – Province     | State-owned enterprises (PLN, Pertamina)                                               |
| Department of Public Works and Spatial Planning Office – Province | Indonesian Palm Oil Association                                                    |
| Department of Industry and Commerce Office - Province | Banking                                                                             |
| Department Investment and One-Stop Integrated Services Office – Province |                                                                                     |
| Department of Education Office – Province          |                                                                                        |
| Ministry of Energy and Mineral Resources           |                                                                                        |

Source: Regional Regulation 11/2019 concerning Regional Energy General Plans, Page 63

Table 4 shows that the stakeholders appointed to be involved in the Regional Energy General Plan can group into two forms, namely government bodies and non-government bodies. The government
bodies that we mean in this paper are regional apparatus organizations (OPD), while those that are not organizations are either still in the form of government or those that are not but not in the form of regional apparatus organizations (OPD).

Form of governance with multi-stakeholder involvement from government bodies or those that do not can theoretically group into collaborative governance models. Collaborative governance is a form or model of governance that regulates public agencies (or, in this case, government bodies) to directly involve stakeholders from non-state stakeholders (or in this case non-government bodies) informal collective decision making, consensus-oriented, and deliberative and aimed at making or implementing public policies or managing public programs or assets [21]. So the critical principle of collaborative governance is that the work of the government in terms of policy formulation [28], implementation, and service delivery at various levels – global, national, or local – must take the form of an inclusive partnership between the government, the private sector, and civil society. Moreover, in the design of regional energy governance in West Sumatera Province, one of these principles has theoretically been fulfilled to be referred to as an institutional model or collaborative energy governance.

Unfortunately, reality always shows that theory is often different from practice. Our research shows that collaboration never takes place between stakeholders in renewable energy governance. We firmly state that collaboration has ceased to exist since the beginning of the drafting of the policy. The involvement of stakeholders is only procedural, such as requesting data and participating in official meetings several times (and not all stakeholders are listed in the Regional Energy General Plan policy document as shown in table 5). This description can understand from the following three excerpts from our interviews with informants from three different agencies.

We were assigned as the leading sector in the Formulation of the Regional Regulation of the General Plan because the ministry gave it that way. However, in the formulation of the policy draft, we act on behalf of the governor because the governor is in charge of energy development in the region. Our formulation and development work has involved cross-sectors, such as requesting data when drafting policies or inviting coordination meetings. However, the response from other parties was lacking, perhaps because it was not their duty, principle, and function (Informant 2, July 15, 2021).

We have been asked for data several times and have participated in draft discussion meetings, but we are generally not concerned with renewable energy. Our work plan from 2019 to 2022 is not a single word for renewable energy, so administratively, it is not our task, principal, and function. So our involvement in renewable energy development activities follows the existing procedures, principles, and processes because, of course, we cannot move outside the current tasks (Informant 3, July 19, 2021).

Policy The regional energy general plan was prepared and initiated by the Department of Energy and Mineral Resources of West Sumatera Province, the leading renewable energy governance sector, because it follows its duties, principles, and functions. However, our informants from the Department of Energy and Mineral Resources stated that they had tried to involve other stakeholders, especially those in the form of government bodies. However, it was complicated because these stakeholders thought it was not part of their duties, principles, and functions – a fragment often a wall in the Indonesian bureaucracy. In addition, our informants also stated that they do not have the authority to "force" the stakeholders in the form of government bodies to participate in energy institutions in West Sumatra because their official positions are horizontal and equal. Meanwhile, the involvement of stakeholders in the form of non-government bodies is also only a formality, such as participation in policy drafting meetings.

4. Conclusion
Normatively, the policy on energy development plans in West Sumatera Province stipulated in Regional Regulation 11/2019 has led to plans for massive renewable energy development. This can see from the proportion of the renewable energy mix targeted at 51.7% in 2025 and 70.9% in 2050 from a baseline
of 19.6% in 2015. So to achieve this target, a policy plan is designed that targets 1) Formulation of the legal basis for development and utilization; 2) Development of utilization areas in the form of power plants (solar cell, garbage, wind, biomass, micro-hydro, mini-hydro, water, geothermal); and 3) Empowerment of local communities to support the success of energy sustainability in renewable energy installations. However, the broad scale of energy development requires institutional forms that involve multi-stakeholders: stakeholders in government bodies and non-government bodies. This also regulates in the West Sumatra regional general energy plan document. In theory, the institutional model can accommodate multi-stakeholder involvement in collaborative governance.

Nevertheless, unfortunately, in its implementation, the involvement of these stakeholders in an ideal collaboration forum never happened. Stakeholder involvement is limited to official formalities. We have again found the “magical word”: the tasks, principals, and functions that hinder the movement of the bureaucracy in Indonesia.

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