Agree or disagree: local youth’s perception of renewable energy development

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Abstract. This article aims to determine the perception of local youth in renewable energy policy and governance in West Sumatra Province. The local youth we mean in this study are university students. Our previous research shows an educated and critical community group conveying their aspirations and network to form coalitions. They played an essential role in rejecting the construction of renewable energy-based power plants in West Sumatra Province. This study uses a quantitative descriptive method supported by a survey to get local youth perceptions about renewable energy development in West Sumatra Province. Our survey was conducted online and got 346 respondents. The study results show that local youth do not fully understand renewable energy and the potential in West Sumatra Province. However, they relatively agree with renewable energy development even though they are less aware of developing and managing renewable energy policies. From the government side, they consider that the most qualified government is the one whose central role is the state, hoping that people can feel the benefits of renewable energy.

1. Introduction
Energy security is one of the essential requirements for Indonesia to grow into a developed country in the future [1,2]. However, Indonesia's energy condition, which is still very dependent on fossil energy, is one of the obstacles in realizing this target [3]. In 2019, fossil energy supplied 90.85% of Indonesia's energy needs, with details: Oil 33.58%, Coal 37.15%, and Gas 20.13% [4]. Indonesia's energy reserves derived from fossils are very limited. Oil is expected to last for another nine years if no new resources are found, and Coal is estimated only to have reserves for 65 years, while natural gas reserves only have 19 years left [5].

In addition, the international consensus generated through the 2015 Paris Agreement indirectly encourages the reduction of the use of fossil energy because it is considered not environmentally friendly and contributes to the increase in global warming through the emission of greenhouse gases produced. Thus, the Indonesian government responds with a renewable energy development policy to accelerate the energy transition from fossil energy to renewable energy that is more environmentally friendly and sustainable.
The development activities carried out are by opening new exploration points that are considered potential, most of which involve the private sector. However, renewable energy development projects are accompanied by the phenomenon of many rejections by local communities. One of the exploration areas that has been rejected in Indonesia is developing a geothermal power plant in the Gunung Talang area, West Sumatra. Our previous research showed that civil communities’ refusal was carried out in West Sumatra Province, which was generally youths and especially students [6,7]. Thus, the study results indirectly indicate that local youth acceptance is the key to accepting renewable energy development in the region.

Many studies also look at the acceptance of renewable energy by subjecting students to their research. Some of these studies include [8], which examines the map of acceptance and non-admission of students in wind energy development, [9] on student social acceptance in hydropower development, [10] on awareness and attitudes of students towards renewable energy sources, [11] on the level of student awareness towards renewable energy sources. [12] assess students’ knowledge, attitudes, and practices towards renewable energy, and Fah on energy literacy among students. Our other study also stated that acceptance or rejection of one of them depends on the knowledge possessed by the local community [13]. Therefore, this study aims to describe the knowledge and understanding of local youth on renewable energy policy and management and the development of renewable energy projects in their area.

2. Methodology
We use google forms as a medium for distributing questionnaires online at the following link https://forms.gle/TVdVF9zEKmjpUkwx5. The distribution of the online questionnaire was carried out from July 14 to July 23, 2021. The questionnaire we compiled had 24 questions, with details, namely six questions about personal data and lectures, 1 question about sources of information, two questions about their knowledge of renewable energy, three questions about their acceptance of renewable energy development in West Sumatra Province, and three questions about renewable energy policy and management in West Sumatra Province. We have designed these questions in various forms, namely in answers with secure options and answers on a Likert scale. We use 1 to answer with the lowest points (strongly disagree, strongly do not know) and 5 to respond with the highest points (strongly agree, very knowledgeable, etc.). We then arrange the questions into five sections to adjust with the subsections in the results section.

Furthermore, we analyzed the data obtained using a descriptive quantitative analysis approach, the results of which would later be in the form of numbers and percentages. Descriptive research methods with a quantitative approach describe or explain events or events that are happening at present in the form of significant numbers [14]. For data derived from answers using a Likert scale, we processed using SPSS statistical software version 24.0. Likewise, with some data that comes from closed solutions.

3. Results and discussion

3.1 Characteristics of respondents
Following the purpose of this study, namely to see the perception of local youth – in this case, are students – about the development of renewable energy, the target respondents are students. When viewed from gender, most respondents were women, namely 194 people or 56.1%, while 152 people or 43.9% were male, the difference was 42 people or 12.2%. For the age of the respondents, the majority of the respondents were in the 20-22 year group, namely 178 people or 51.4, followed by the 17-19 year age group, which was 116 people or 33.5%, while the least was the 26-28 age group, which was only two people or 0.6%.

Furthermore, based on the regional origin, most respondents came from West Sumatra Province, as many as 296 people or 85.5%, while those from outside were 50 people or 14.5%. However, those from outside are confirmed to be studying in West Sumatra, so they can still be used as research objects. If you look at the origin of the respondent's universities, most of them come from state universities as...
many as 222 people or 64.2. The respondents came from state universities in West Sumatra such as Universitas Andalas, Universitas Negeri Padang, Universitas Islam Negeri Imam Bonjol, Institut Seni Indonesia Padang Panjang and Politeknik Padang. At the same time, the respondents from private universities were 124 people or 35.8% with campus origins, namely Sekolah Tinggi Ilmu Kesehatan Mercubaktijaya, Institut Teknologi Padang, Universitas Bung Hatta, Sekolah Tinggi Ilmu Sosial Politik Imam Bonjol, Sekolah Tinggi Ilmu Administrasi "LPPN", Universitas Putera Indonesia YPTK, Sekolah Tinggi Keguruan dan Ilmu Pendidikan PGRI, and Universitas Mohammad Natsir.

Table 1. Characteristics of respondents.

| Variables          | Characteristics | Respondents |
|--------------------|-----------------|-------------|
|                    |                 | N           | %   |
| Gender             | Male            | 152         | 43.9|
|                    | Female          | 194         | 56.1|
| Age                | 17 – 19 years old | 116         | 33.5|
|                    | 20 – 22 years old | 178         | 51.4|
|                    | 23 – 25 years old | 33          | 9.5 |
|                    | 26 – 28 years old | 2           | 0.6 |
|                    | > 28 years old   | 17          | 4.9 |
| Domicile           | West Sumatera   | 296         | 85.5|
|                    | Outside West Sumatera | 50   | 14.5|
| Universities       | Public          | 222         | 64.2|
|                    | Private         | 124         | 35.8|
| Subjects           | Science         | 101         | 29.2|
|                    | Social          | 245         | 70.8|
| Active in an       | Active          | 100         | 27.9|
| organization and/or| Normal          | 119         | 34.5|
| community          | Not Active      | 127         | 36.7|

Respondents generally come from majors that fall into the social sciences group, as many as 245 people or 70.8% and only 101 people or 29.2% from non-social science groups or science. As for the majors that we mean to be included in the social science group, among others, Economics, Law, Politics, Education, Tourism, Religion, Sociology, and similar departments; while the science majors are majors such as Engineering, Health, Medicine, Mathematics, Physics, Chemistry, Biology and the like. As for the activity level in organizations or communities, some respondents are not active, namely 127 people or 36.7%, then 119 people or 34.5% are mediocre, and only 100 active people or 27.9%.

3.2. Sources of information about renewable energy

Furthermore, table 2 shows the media used as a source of information by respondents related to renewable energy. The majority of respondents stated that they got information about renewable energy from the Internet and Social Media, like 243 people or 67.6%. The following media used as a source of information by respondents were journals, books, and other academic materials, with 39 people or 11.3%. With a number that is not much different, the media used as information successively with a more significant number are friends (20 people or 5.8%), lecturers (19 people or 5.5%), other reading sources (7 people or 2%), television (6 people or 1.7%) and see directly (5 people or 1.4%). These results indicate that the internet and social media are the most influential media in disseminating information about renewable energy by stakeholders to reach the younger generation. This finding aligns with findings [15] that show that the internet and social media are the dominant media source of information for local youth. Even if the media in academics are combined, it is still far less effective than using the internet and social media as a medium for distributing information.
Table 2. Sources of information regarding renewable energy.

| Sources of Information                        | Respondents |
|----------------------------------------------|-------------|
|                                              | N  | %  |
| Reading such as newspaper and/or Magazine    | 16 | 4.6|
| Journals, Book and Other academic material   | 39 | 11.3|
| Internet and/or Social Media                 | 234| 67.6|
| See directly                                 | 5  | 1.4|
| Other sources of reading material            | 7  | 2  |
| Televisi                                     | 6  | 1.7|
| Lecturer                                     | 19 | 5.5|
| Friend                                       | 20 | 5.8|

3.3. Local youth knowledge of renewable energy development

In this subsection, we aim to look at local youth knowledge in general about renewable energy. There are two questions that we ask to find out this goal. The first question is about how much local youth know about renewable energy. We mean by knowing is being able to identify and distinguish among energy sources with other energy sources. Most of the respondents' answers were to know, namely 125 people or 36.1%. Respondents who answered very well were 38 people or 11%, so that the majority of respondents had good knowledge of renewable energy, namely 163 people or 46.1%. At the same time, the respondents who answered that they did not know about renewable energy were 35 people or 10.1%. Respondents who answered slightly did not know as much as 40% or 11.6%, and the remaining 108 people or 31.2% responded doubtfully. So if it is concluded that the average respondent does not know enough about renewable energy, the average obtained from this question is 3.26.

Table 3. Local youth knowledge of renewable energy development.

| Indicator                                      | Characteristics    | Respondents |
|------------------------------------------------|-------------------|
| Knowledge about renewable energy               | Very Know         | 38   |
|                                               | Know              | 125  |
|                                               | Doubtful          | 108  |
|                                               | A little does not know | 40  |
|                                               | Do not know       | 35   |
| Knowledge about the potential of renewable energy sources in West Sumatra | Very Know | 26 |
|                                               | Know              | 64   |
|                                               | Doubtful          | 125  |
|                                               | A little does not know | 84  |
|                                               | Do not know       | 47   |

Table 4. Mean score and standard deviation of knowledge local youth on renewable energy development.

| Indicator                                      | $\bar{x}$ | SD  |
|------------------------------------------------|-----------|-----|
| Knowledge about renewable energy               | 3.26      | 1.120|
| Knowledge about the potential of renewable energy sources in West Sumatra | 2.87 | 1.115|

The next question we ask is to what extent they know about renewable energy potential in West Sumatra. One hundred twenty-five people or 36.5% of respondents answered that they had doubts, only 26 people or 7.5% answered very know and 64 people or 18.5% answered they know. On the other hand,
84 people, or 24.3%, responded that they a little do not know, and 47 people or 13.6% answered that they do not know about the potential of renewable energy in West Sumatra Province. While the average obtained from all respondents’ answers is 2.87, most respondents are hesitant and tend not to know renewable energy potential in West Sumatra.

3.4. Local youth acceptance of renewable energy development

This subsection tries to determine the local youth’s perception of renewable energy development in West Sumatra Province. We compiled this question based on our findings in our previous research, which discussed the social movements of the community that occurred in the construction of a geothermal power plant in the Gunung Talang area, West Sumatra. Our first question is to see their acceptance of renewable energy development in West Sumatra Province. The answers generated by the respondents surprised us that as many as 151 people, or 43.6% stated that they strongly agreed with the development of renewable energy in West Sumatra. Respondents also answered that they agree to the second most chosen answer (98 people or 28.5%). While on the other hand, only 19 people responded slightly disagree or 5.5%, and only one person answered they disagree or 0.3%. So when viewed in general, the average answer to this question is 4.1 or agree with renewable energy development in West Sumatra Province.

Table 5. Local youth acceptance of renewable energy development.

| Indicator                                    | Characteristics       | N   | %   |
|----------------------------------------------|-----------------------|-----|-----|
| Agree with the development of renewable energy in West Sumatra | Strongly agree        | 151 | 43.6|
|                                              | Agree                 | 98  | 28.5|
|                                              | Doubtful              | 77  | 22.3|
|                                              | Slightly disagree     | 19  | 5.5 |
|                                              | Disagree              | 1   | 0.3 |
| Find out information/news of the rejection of renewable energy development in West Sumatra | Very Know             | 32  | 9.2 |
|                                              | Know                  | 47  | 13.6|
|                                              | Doubtful              | 112 | 32.4|
|                                              | A little does not know| 85  | 24.6|
|                                              | Do not know           | 70  | 20.2|
| Agree with investment from abroad for the development of renewable energy in West Sumatra  | Strongly agree        | 46  | 13.3|
|                                              | Agree                 | 71  | 20.5|
|                                              | Doubtful              | 125 | 36.1|
|                                              | Slightly disagree     | 52  | 15  |
|                                              | Disagree              | 52  | 15  |

Table 6. Mean score of local youth acceptance of renewable energy development.

| Indicator                                         | \( \bar{x} \) | SD  |
|---------------------------------------------------|---------------|-----|
| Agree with the development of renewable energy in West Sumatra | 4.10          | 0.948|
| Find out information/news of the rejection of renewable energy development in West Sumatra | 2.67          | 1.207|
| Agree with investment from abroad for the development of renewable energy in West Sumatra | 3.02          | 1.222|
The next question is whether the respondent knows the information or news about rejecting renewable energy development in West Sumatra. Most of the answers given by respondents were in doubt, namely 112 people or 32.4%. Furthermore, a little do not know is the second most chosen answer by respondents (85 people or 24.6%), the third most chosen answer does not know as many as 70 people or 20.2%. While on the other hand, only 32 people answered knowing or 9.2%, and those who responded very well knew 32 people or 9.2%. In this case, we suspect that the group who answered knows very well as a group actively involved in the social movement against renewable energy development in West Sumatra Province. Meanwhile, the average in this question is 2.67, which means that most local youths are hesitant or even a little ignorant about the resistance to developing renewable energy in West Sumatra.

The last question that we formulated to look at the perception of local youth in developing renewable energy is whether they agree if the development of renewable energy in West Sumatra is financed and carried out by foreign investors. Most of the answers we got were that they were undecided (125 people or 36.1%). The second most voted answer agrees with the number of respondents who chose as many as 71 people or 20.5 people. On the other hand, 52 people or 15% disagree slightly. While those who answered strongly agreed were only 46 people or 13.3%.

Meanwhile, the average obtained from this question is 3.02, concluding that local youth are hesitant if development takes investment abroad. This finding is interesting because there has been a decline in local youth acceptance of renewable energy development when financing comes from foreign investment. The following sub-chapter will show the management scheme considered the most qualified by local youth in developing renewable energy in West Sumatra.

3.5. Renewable energy policy and governance from a local youth's perspective

Before getting into management that local youth consider best, let us determine how much they know about renewable energy policies. A total of 128 people, or 37%, answered doubtfully. Slightly do not know became the answer with the second most choices, namely 104 people or 30.1%, and those who did not realize answered as many as 54 people or 15.6%. On the other hand, only 46 people answered they knew or 13.3%, and only 14 or 4% responded very well. So that the average respondent's answer regarding his knowledge of renewable energy policies is only 2.60, which means he is hesitant and tends to be a little indifferent.

| Indicator                                      | Characteristics         | Respondents |
|-----------------------------------------------|-------------------------|-------------|
| Knowing the policies or Regulations in the    | Very Know               | 14          | 4           |
| development of renewable energy               | Know                    | 46          | 13.3        |
|                                               | Doubtful                | 128         | 37          |
|                                               | A little does not know  | 104         | 30.1        |
|                                               | Do not know             | 54          | 15.6        |

| Indicator                                        | $\bar{x}$ | SD  |
|--------------------------------------------------|-----------|-----|
| Knowing the policies or Regulations in the       | 2.60      | 1.031 |
| development of renewable energy                  |           |     |

We next asked about the most responsible level of government in renewable energy development. We provide alternative answers: the central government, provincial government, district and municipality governments, and village governments. Respondents who answered that the central government was most responsible for developing renewable energy were the most chosen answer,
namely 212 people or 61.24%. The provincial government was the answer most answered by respondents, namely 67 people or 19.38%. While 46 people or 13.29 people answered the district/city government, only 21 people, or 6.09%, answered the village government. According to local youth, this finding shows that the central government still has strong authority in developing renewable energy. Of course, this is undeniable because with the latest local government law, Law no. 23/2014, more and more authority on energy, especially renewable energy, is being centralized again.

![Figure 1](image1.png)

**Figure 1.** Most responsible level government in the development of renewable energy.

The last question we asked to determine the local youth's perception of renewable energy development in West Sumatra was their most qualified governance model. This question also answers the gap in the previous sub-section, which showed a decrease in the acceptance of local youth in renewable energy development. The answers to these questions are made in the form of closed solutions. We offer some forms of governance: Public-Private partnerships, State-owned Enterprises, Collaboration, Private sector, and unprocessed. From the respondents' answers, the respondents most chose the form of public-private partnership governance with 43.60%. The second most preferred form of governance is State-owned Enterprises with 32.90%. Collaboration governance was chosen by 15% of respondents. 7.20% of respondents chose the purely private sector, and 1.20% chose renewable energy not to be processed, developed, or managed. In this case, we see that local youth want the presence of the state in the management of renewable energy, the goal of which, according to our hypothesis, is that the public can feel the benefits of renewable energy.

![Figure 2](image2.png)

**Figure 2.** Local youth's perceptions of the most capable model of renewable energy governance.

The results of this study broadly indicate that the local young generation, in this case, students in West Sumatra Province, still do not have a good understanding of renewable energy. This result is in line with research [16,17,18], which states that students' understanding of renewable energy is still low.
Therefore, although the results of our research show that the average local young generation agrees with the development of renewable energy, it is necessary to increase their understanding of the policies and institutions in the development of renewable energy in their area so that no conflict results in the development of renewable energy being hindered.

4. Conclusion
This study aims to look at the perceptions of local youth in developing renewable energy in West Sumatra Province. From the research results described previously, this study can conclude that local youth do not fully understand renewable energy and the potential in West Sumatra Province. However, they relatively agree with renewable energy development even though they are less aware of developing and managing renewable energy policies. The form of government they consider most capable is Public-Private Partnership. There is a central role for the state in this model of government, which in our estimation is the hope of local youth so that the community can benefit from renewable energy. In addition to these conclusions, we also recommend that stakeholders actively disseminate information about renewable energy to the younger generation. Because they are an educated community group and can network and advocate for policies, both those who reject a policy or support a policy, we suggest that the internet and social media can be used as socialization media because they are the most effective media to reach young people.

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