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Potential of Thorium Power Plant as a New Energy Source in Supporting State Defense (Case Study: West Kalimantan)

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Abstract:- The province of West Kalimantan, which borders on land with Malaysia, has untapped energy potential. There is a need for maximum exploration and utilization to secure these energy sources from the threat of seizing energy sources with neighboring countries. In addition to oil sources, renewable energy also has the potential to be utilized as an energy source in the border area of West Kalimantan, one of which is the use of Thorium as an energy source to support energy security in the region. Energy security for residents in border areas is one of the main things in pursuing ideal conditions for national energy security. One of the obstacles generally felt by border communities is the lack of access to energy. In West Kalimantan, electricity is still imported to support electricity there, with the potential of Thorium, it is hoped that it will be the right opportunity to support energy security, one of which is the use of electricity in the border areas of West Kalimantan. This research was conducted in a qualitative descriptive manner, by conducting interviews and responses from research sources. This research is expected to be a future solution for the government in optimizing the potential of Thorium for energy needs such as in the West Kalimantan.

Keywords:- *Thorium; Energy Security; West Kalimantan; Community Service.*

I. INTRODUCTION

West Kalimantan is geographically located at the position of 2°05‟ North Latitude – 3°05‟ South Latitude and 108°30‟ – 114°10‟ East Longitude. In terms of territorial dimensions, West Kalimantan can be divided into 3 (three) regional dimensions, namely coastal and archipelagic areas, inland areas and border areas between countries. The coastal and archipelagic areas consist of regencies and cities located in coastal areas, namely Pontianak City, Singkawang City, Sambas Regency, Mempawah Regency, Bengkayang Regency, Kubu Raya Regency, Ketapang Regency, and North Kayong Regency. As for the interior, it consists of Kapuas.Hulu Regency, Sintang Regency, Melawi Regency, Sekadau Regency, Sanggau Regency, Landak Regency, and Ketapang Regency. Another specific characteristic is that the West Kalimantan region is one of the provinces in Indonesia which is directly adjacent to a foreign country, namely the State of Sarawak, East Malaysia.

Energy security for residents in border areas is one of the main things in pursuing ideal conditions for national energy security. Access to energy needs to be increased to provide energy for residents in border areas with neighboring countries (Tobing et al., 2019). One of the obstacles generally felt by border communities is the lack of access to energy. Border communities in West Kalimantan Province to be able to enjoy electricity generally use diesel-fueled generators. To illuminate several areas in Kalimantan which are directly adjacent to Malaysia, PT PLN (Persero) is forced to import electricity from neighboring countries. This is because the districts on the border are difficult to reach. There are 4 districts on the border whose electricity is imported from Malaysia, namely Sambas, Bengkayang, Entikong, and Kapuas. A total of 4 border districts have been connected by highways from Malaysia. The total electricity imported is approximately 8 MW to illuminate 4 districts. The existence of a highway allows the construction of an electricity network from Malaysia to Indonesia. From Indonesia itself, there is no land route to get there. Not only electricity, basic needs in border areas are also supplied from Malaysia.

In overcoming this, alternative energy is needed that can support electricity needs and supply in West Kalimantan. That is by optimizing the role of nuclear for energy needs. with the use of nuclear, especially those made from Thorium. In fact, Indonesia is rich in Thorium reserves, namely in Bangka Belitung and West Kalimantan, where Thorium is one of the ingredients contained in rare earth elements. If the PLTT project can be realized there are a number of benefits that can be obtained for Indonesia. Among them, significantly increasing electricity supply at a relatively lower cost; improve the quality of domestic human resources, especially related to nuclear technology (Thorium); increasing mining operations to purify LTJ from the monazite group containing Thorium; and increasing domestic productivity and capability in producing vessels above 30,000 DWT. In addition, with this TMSR technology, the concerns of a number of countries about nuclear weapons can be eliminated.

II. RESEACH METHODS

This research uses descriptive qualitative method. This research will be conducted using qualitative methods. By conducting interviews with sources, observations and literature studies from various references. Researchers used qualitative data collection techniques as a basic guide. Some research data was obtained in May, while conducting a Domestic Work Lecture (KKDN) which is a form of community service carried out by postgraduate defense university students with case studies in West Kalimantan. In this discussion, a study on the utilization of Thorium's

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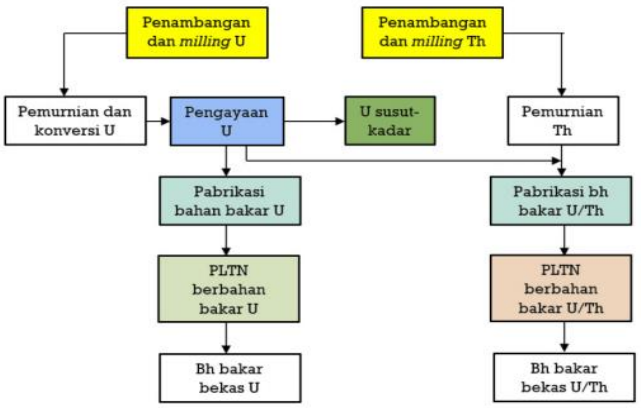
potential in increasing energy security in the West Kalimantan region will be discussed.

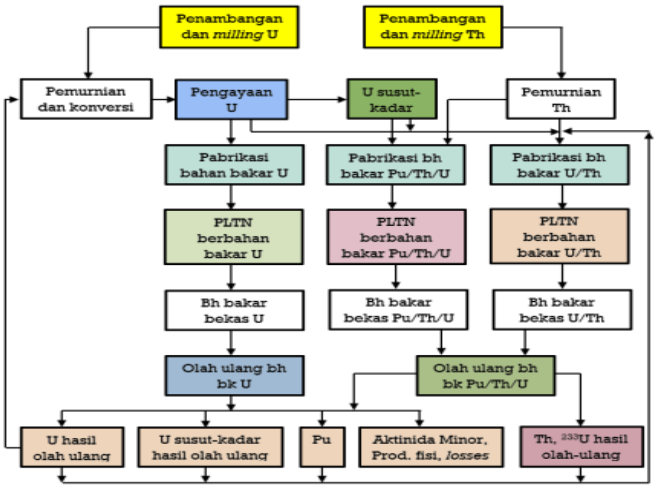
III. RESULT AND DISCUSSION

Thorium is an electropositive actinide dominated by the +4 oxidation state; This element is quite reactive and can ignite in air in the state of a fine powder. Together with the element uranium, thorium is a primordial element that is thought to have formed with the formation of the universe. Thorium is found in the earth's crust with an estimated content of three times greater than uranium. Recent data show that in Indonesia the potential content of thorium is estimated at 210,000 - 270,000 tons stored in Bangka, West Kalimantan and West Sulawesi. some circles of nuclear energy activists raised the discourse of using thorium fuel as fuel for PLTT (Thorium Power Plant). The main reason for using thorium is that it is more environmentally friendly and its reserves are quite abundant in Indonesia so that it can reduce the cost of electricity production (Batan, 2019).



Picture 1: Uranium and Thorium supply cycle for nuclear power plants through an enrichment process (without reprocessing).

Source: Batan, 2019



Picture *2:* Uranium and Thorium supply cycle for nuclear power plants through an enrichment process (without reprocessing).

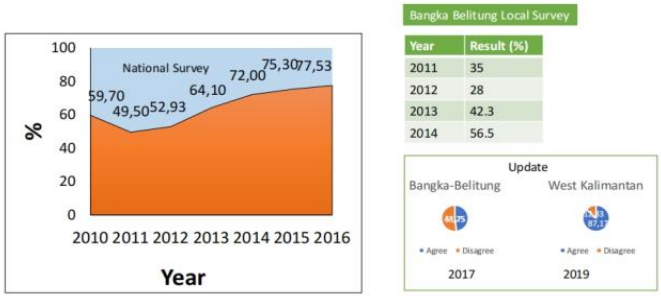
Source: Batan, 2019

A. Responses Regarding PLTT (Thorium Power Plant):

- Until 2021, the West Kalimantan electricity system will be supplied by the Sarawak Electricity Supply Corporation (SESCO), a subsidiary of Sarawak Energy Berhad, the Malaysian state electricity company through the Equator system, because the domestic electricity supply is unable to meet the needs at the border. PLN is very ready to build nuclear or PLTT, but needs to consider many things to include it in the RUPTL. If the PLTT production produces only 100-200 MW of electricity, it can be directly placed in areas around the site, but if the capacity is up to 1000MW, then PLN is not ready because the demand from the industrial sector has not been developed. If PLN is appointed, it will build a power plant and workforce system with reliable human resources from within the country. However, if it is built by an IPP or the private sector, the relationship with PLN is only limited to buying and selling.
- PLTT is the authority of the central government and local governments only support through RUED and RUKD to support the RUEN that has been made by the central government and encourage the use of uranium and thorium as generators. In addition, the government has also conducted a National Research Program (PRN) for commercial scale nuclear power plants in West Kalimantan, which is planned for the 2020-2024 period by involving BAPPENAS, Kemenristekdikti and BATAN. Strategy for accelerating the utilization and development of nuclear power plants in West Kalimantan by encouraging the government's commitment to "Go Nuclear", realizing energy independence and reducing greenhouse gases, seeking political support from the DPR RI, increasing the capacity and quality of regional human resources by sending the best sons and daughters to STTN Yogyakarta, and requires strengthening and active participation of stakeholders in the decision process to build a nuclear power plant: NEPIO (Nuclear Energy Program Implementation Organization).
- The DPRD of West Kalimantan Province has drafted a Regional Regulation on the General Plan of Regional Energy (RUED) of West Kalimantan Province for 2020-2050 to support the national energy policy in order to realize energy sovereignty which is regulated by the Provincial Government of West Kalimantan. In the RUED, the West Kalimantan government plans a 35,000 MW program by bridging the Central Government with the community regarding land acquisition and granting business permits and has included a plan for a Nuclear Power Plant (PLTN) as one of the energy sources that in the future is expected to support energy availability in Kalimantan. West Kalimantan is currently still in deficit and in the future its demand will continue to grow to 3,783 MW in 2027. The West Kalimantan government's determination to include nuclear power plants in the 2020-2025 RUED is based on the large uranium and thorium potential in West Kalimantan and a feasibility study for the nuclear power plant site has been carried out. several potential site candidates, namely from the 9 names of potential site locations agreed on on May 2, 2019 at the Focus Group Discussion Determination of Candidates for Nuclear Power Plant Sites in West Kalimantan, namely

Gosong Beach, Sungai Raya Village, Sungai Raya Islands District, Bengkayang Regency and Parit Baru Village, Salatiga District, Sambas Regency. The challenges in developing Thorium include educating the public and the quality of Human Resources.

- From the research related to the community acceptance survey that has been carried out, it shows that the community openly accepts the nuclear power plant development plan on the condition that the development must be able to prosper them. However, this acceptance is not accompanied by good knowledge of nuclear power plants. Not only the general public who do not have good knowledge about nuclear power plants but also officials there. In addition, there is no commitment or support from the central government that really supports the development of nuclear power plants in West Kalimantan. Therefore, several strategies can be used to support the realization of the development and construction of nuclear power plants in West Kalimantan, namely by encouraging the central government, especially the DPR to immediately issue policies that strengthen Indonesia's national position regarding nuclear by providing data on research results related to nuclear power plants that have been carried out in Indonesia. West Kalimantan. In addition, it is necessary to communicate deliberation, especially to community leaders who come from non-formal channels and the general public, which can be done directly or through the mass media to educate and build a common perception regarding the negative and positive impacts of nuclear so that public knowledge is not unequal, only the negative side of nuclear.
- The characteristics of the people of West Kalimantan, which consist of various ethnicities and religions, are very open or have a high tolerance for new things that enter their area. But they have a deep enough trauma to the government because of injustice. Their customary forests have been destroyed, uneven development and whatever forms of industry or development that have been entered so far have not brought them prosperity. The forest for them is their home as well as their field as well as their source of life. They are very open to the development of nuclear power plants but they emphasize that the development of nuclear power plants must pay attention to forest sustainability, community welfare and justice both economically, socially and culturally. It is also hoped that the nuclear power plant development plan will be socialized with traditional, religious and other leaders because the community has more trust in traditional, religious, etc. leaders than the government.



Picture 3: NPP Support Survey in Indonesia

Source: Batan, 2019

Meanwhile, based on the nuclear power plant survey conducted by BATAN, it is known that the West Kalimantan population strongly supports the establishment of nuclear power plants in their area. It is known that the reason the people of West Kalimantan support the establishment of a nuclear power plant is because the community does not want to depend on imports of electricity from Malaysia, and with the establishment of a nuclear power plant it is expected to improve the quality of electricity in Indonesia. Nuclear Power Plant as a generator that is not intermittent and environmentally friendly so that it can support Indonesia's energy fulfillment in the future, the Paris agreement and the achievement of the NRE mix target of 23% in 2030 and 31% in 2050. Nuclear Power Plants are like renewable energy that is able to support Indonesia's energy fulfillment. Renewable energy sources that are classified as baseload, such as nuclear power plants, are only hydropower and geothermal power plants. Geothermal, which is predicted by Indonesia to have the largest reserves in the world, has not yet been optimally developed as a generator or is still very small and the technology continues to be developed. Meanwhile, nuclear technology has developed from decades ago and has many proven technologies. So, Indonesia should not have to worry about using nuclear power plants. According to the author, nuclear power plants are also needed in Indonesia as well as renewable energy because to reduce energy dependence (base load) on one source. In addition, it is evident that now energy-rich countries such as the United Arab Emirates have now begun to develop nuclear weapons in their countries. The United Arab Emirates has started operating nuclear power plants since August 2020 with a total of 4x1400 MW power plants built and nuclear power plants will contribute 25% of the country's energy.

IV. CONCLUSIONS AND SUGGESTION

West Kalimantan is a province that has abundant natural resources. One of them is the potency of Thorium. Thus, there needs to be an optimal use in developing the role of Thorium energy as an alternative energy in supporting the supply of electrical energy in Indonesia and reducing electricity imports which are still ongoing in West Kalimantan. The use of Thorium as an energy source has many benefits such as being environmentally friendly, supporting the Net Zero Emission (NZE) policy, supporting energy security and reducing imports. By using PLTT as a raw material for energy development, Indonesia can reduce

the need for energy imported from neighboring countries, which can be overcome by domestic needs. In addition, in developing PLTT, it is necessary to cooperate with various parties so as to produce synergistic policies and support. Such as support from the Government, Ministries / Institutions, Academics and also the Community.There is a need for further research that discusses the role and potential of Thorium, so as to create policies and implementations that support PLTT as an alternative energy source in supporting domestic energy security. In addition, there needs to be firmness in the development of PLTT as an alternative energy that is considered optimal in meeting domestic energy needs.

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