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Green Energy Policy Implementation in Bali: Challenges and Opportunities

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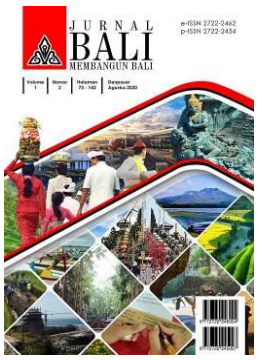

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Abstract
Purpose: This study aims to explain the implementation of green energy policies in Bali as a popular international tourist destination as well as identify various opportunities and challenges faced by the Bali Provincial Government in implementing green energy policies.
Research methods: The study utilizes qualitative methods by conducting interview and collecting secondary data. Qualitative data analysis is carried out by making verbatims, reducing the unimportant discussion, coding the discussion, and classifiying to the themes.
Findings: Bali provincial government enacted some green energy policies, but in term of sustainable waste management, the policy should regulate about how landfill is built and how the gas is converted to the energy.
Implication: The hurdles are enough capacity of fossil energy sources, bad experience in wind power establishment, and lack of government financial supports.

Keywords: green energy, policy implementation, opportunities, challenges

Abstrak
Tujuan: Penelitian ini bertujuan untuk menjelaskan implementasi kebijakan energi terbarukan di Bali sebagai destinasti wisata internasional populer dan mengindentifikasi berbagai peluang dan tantangan dalam mengimplementasikan kebijakan tersebut.
Metode penelitian: Penelitian ini menggunakan metode kualitatif dengan melakukan wawancara dan mengumpulkan data sekunder. Analisis data kualitatif dilakukan dengan membuat verbatim, mereduksi diskusi yang tidak penting, dan mengkoding verbatim, dan mengklasifikasikannya ke dalam beberapa tema.
Hasil: Pemerintah Provinsi Bali telah menerapkan beberapa kebijakan energi terbarukan. Kendati demikian, terkait pengelolaan sampah yang berkelanjutan, kebijakan seharusnya mengatur mengenai bagaimana landfill dibangun dan bagaimana gas yang dihasilkan dapat dikonversi ke energi listrik.
Implikasi: Tantangan yang dihadapi adalah kapasitas fosil yang masih cukup, pengalaman buruh dalam membangun wind power, dan kurangnya dukungan finansial pemerintah.

Kata kunci: energi terbarukan, implementasi kebijakan, peluang, tantangan

INTRODUCTION

Energy is a vital necessity for humans. Humans need energy for metabolism, health, transportation, research, technology, education, and industry. Energy for humans is the most basic need, if there is a shortage of energy supply, it will have an

impact on the economic condition of a country (Aktar *et al*., 2021). Even according to Manfred Hafner and Simone Tagliapietra (Albert, 2021), energy is related to the geopolitics of the country, where the energy transition will trigger competition and conflict between countries.

Human energy needs can no longer rely solely on old energy sources, such as petroleum and coal. Some countries in the world have started to make an energy transition, which is a transition from energy sources that are not environmentally friendly to energy sources that are environmentally friendly (green energy). According to the Energy Transition Index (ETI) data in 2023, European countries such as Sweden, Denmark, Norway, and Finland are the countries that use the most renewable energy. Figure 1 shows the ranking of renewable energy user countries in the world.

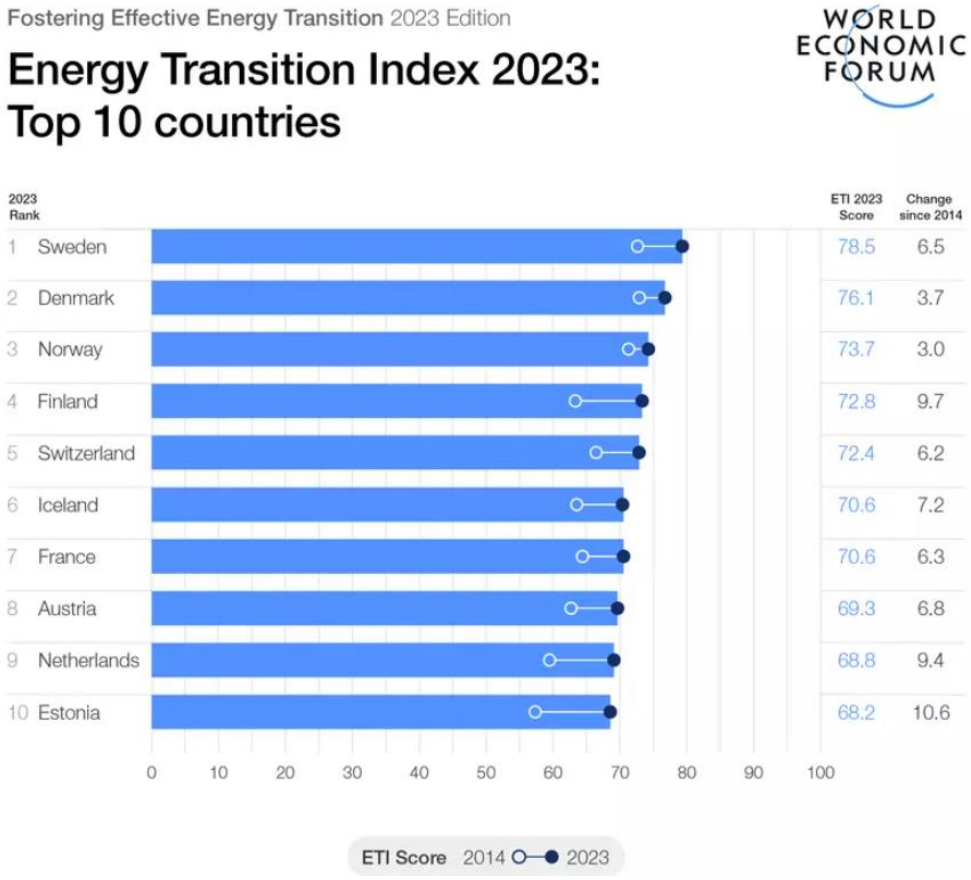

Figure 1. Ranking of Renewable Energy User Countries in 2023
[Source: World Economic Forum, 2023]

The urgency in using renewable energy, such as solar, wind, and water is an effort to face the global challenge of climate change. According to arguments from Adiputro & Martini (2022), green energy is considered as a way to tackle climate change. The impact of climate change is global warming from the greenhouse effect, which comes from the use of coal and petroleum energy that contains high carbon dioxide. Coal accounts for 41% of total global CO2 emissions, followed by petroleum at 32% (TheConversation, 2023).

Indonesia has high potency in renewable energy. Due to Indonesia is equatorial country, Indonesia receives a high amount of sun radiation; therefore, Indonesia high potency in solar power. Moreover, Indonesia has high potency in wind energy due to

archipelagic state. The condition of land and sea makes Indonesia have high amount of wind power (Kiswantono, 2023). The commitment to energy transition is outlined in Law No. 30/2007 on energy. The law mandates the central and regional governments to increase the use of New and Renewable Energy (EBT) in accordance with their respective authorities. Bali is one of the provinces that strongly supports the implementation of the green energy policy. In Governor Regulation Number 97 of 2018, the local government launched the Bali Clean Energy program which focuses on the plastic diet program, and optimizing the use of electrical energy. The program seeks to limit plastic waste that is at risk of environmental pollution and unhealthy lifestyles, as well as the use of environmentally friendly electric vehicles.

The EBT policy is implemented by both the local government and the community. The local government in the future requires office buildings, hospitals, supermarkets, schools, and restaurants to use solar power. The Bali Provincial Government is accelerating the energy transition through various policies and the development of environmentally friendly power plants. The Bali Provincial Government's target of Green Bali and Net Zero Emission (NZE) will be achieved by 2045, which is faster than Indonesia's national target of 2060 (Kominfo, 2022).

The Bali Provincial Government has showed the political commitment by producing nine provincial or governor regulation since 2019 (Bali Government, 2023). The transition of the use of power plants that initially used coal and petroleum fuels is slowly being replaced with environmentally friendly fuels based on Liquid Natural Gas and other renewable energy. The acceleration of the green energy program implemented by the Bali Provincial Government is certainly aligned with the local wisdom of the Balinese people known as *Nangun Sat Kerthi Loka Bali* which means building Bali while maintaining the value of sanctity and inlay harmony with the surrounding nature.

The achievement of the Bali Clean Energy program requires support and commitment from the government, business actors, and the community. According to Bappenas Data, Bali is predicted to spend 8,939.04 Trillion rupiah for achieving long-term target of economic growth in 2045 (Bali Government, 2023). Moreover, Bappenas also collaborates with Bali provincial government to build Bali-Kerthi Development Fund (BDF); consequently, Bali government can analyse the investment needs and the investment impacts on Bali development (Badan Perencanaan Pembangunan Nasional, 2023). This regulation can attract more foreign investors investing in the renewable energy business. Ease in the licensing system, provision of infrastructure and land are important assets to create a good investment climate. Support from businesses, such as hotels, is also a driving force in accelerating the Bali Clean Energy program, one of which is the provision of electricity-based facilities, such as EV Charger facilities and electric cars as company operational vehicles. Community support is also needed in implementing the green energy program, such as reducing the use of plastic shopping bags. Therefore, the efforts made by each party in supporting Bali Clean Energy also aim to maintain the tourism industry in Bali. Bali tourism must implement sustainable tourism, which has a positive and long-term impact on socio-culture, the environment, and the economy.

This research aims to explain the implementation of green energy policies by the Bali Provincial Government in supporting the tourism industry that synergizes with the values of local wisdom of the Balinese people. In addition, this research also

contains an explanation of the various opportunities and challenges faced by the Bali Provincial Government in implementing green energy policies in Bali.

There are some researches discussing green energy development. “100% Renewable Energy Policies in U.S. Cities: Strategies, Recommendations, and Implementation Challenges”, written by Hess & Gentry (2019), exposed that the policy was initiated by environmental organisation and local governments. They collaborated with a coalition of of community organizations. This study also stated about the recommendation and political strategy for advocating the policy, as well as, the implementation plan which is formulated to solve the affordability and equity issues. This research is conducted by interviews with 14 informants, distributing questioners to 82 communities, and collecting secondary data from those communities.

Lim (2020) in “The Role of State Expenditure and Accumulated Experience for Successful Implementation of Green Energy Policies” scrutinizes the determinants of successful green energy policy, such as the level of American Recovery Reinvestment Act (ARRA) funding mechanism; performance ability; subnational government capacity; the understanding of sustainable energy policy implementation, and political influence. This study showed that federal funding is significantly contribute to the success of the policy implementation. Performance ability and political influence is not notably impacted the successful policy implementation. This research is conducted by conllecting panel data from 49 states in US from 2003 to 2013.

“Politics of Green Energy Policy”, written by Pegels *et al*. (2018) defines green energy policy as strategies to align structure of energy sphere of the country with the goals of sustainable development. This paper also showed that state plays important roles in coordinating various stakeholders and generally supporting the development of green energy movement. This research is conducted by collecting secondary data.

Zhen *et al*. (2021) in “Design and Implementation of Smart Home Energy Management Systems Using Green Energy” discusses the use of the smart home renewable energy management (SHREM) system. This scheme is primarily influenced by market. The SHREM is implemented by installing renewable energy and planning. This scheme also controls electricity flow during peak and off-peak periods by conducting optimization techniques. This research conducted simulation analysis.

“The Constrains of Green Building Implementation in Indonesia” (Sahid *et al*., 2020) exposed that hurdlesof green building implementation are government and non-government’s misunderstanding of green building principles and unsynchronized regulation. These constraints lead to unmotivated actors to actively contributing to green building implementation. The research is conducted through literature reviews, policy reviews, and interviews with green building key actors.

“Road Map for the Energy Transition in Bali, Indonesia” (Losch, 2020) explains that many reasons of a slow pace of energy transitian in bali, from cultural barriers to geographical condition which lead to difficulties in constructing renewable energy plants. Balinese people get used to consume coal and oil powered electricity for their daily life. Moreover, balinese people renewable technologies as methods coming along with a high risk.

According to those studies, there is a need to conduct the recent research about green policy implementation in the context of tourism destinations, for instance, Bali because Bali Government has enacted some local regulation to support green energy development. Moreover, implementing green policy in tourism destination faces

different dynamics. This paper also delves the local culture, in indigenous village, which influence green energy police implementation.

RESEARCH METHOD

This research is a descriptive qualitative research, with primary and secondary data analysis methods. Qualitative descriptive studies provide a comprehensive description of events dan this research provides answers questions regarding who, what, where, and how. (Ayton, 2023). Primary data is obtained from interviews conducted with the manager of the Solar Power Plant (PLTS) in Bali, and electric motor business owners. While secondary data is obtained from various scientific journal literature, statistical data in graphical form, and relevant official websites.

Data validity techniques were obtained through source triangulation (Neuman, 2007), through checking data obtained through interviews and document studies. Triangulation aims to obtain an overview of the object of research, and is expected to produce valid information. Triangulation is important because this step ensure that the gathered data can be trusted.

Regarding data analysis, researcher utilized qualitative data analysis. According to Creswell (2007), qualitative data analysis is conducted in analystic circles, so that it is not conducted in a fixed linear approach. In the initial step, researcher organizes qualitative data from interview dan secondary data from report and news. Researcher makes verbatim for interview results and classifies the secondary data into folders. After that, the data is classified into themes and presenting into figures and discussions.

RESULT AND DISCUSSION

Green Energy Policies in Bali

There are several green energy policies which have been implemented by Bali Province Government. Firstly, Bali Province Government enacted Bali's Governor Regulation Number 48 Year 2019 Regarding A Use of Battery Electric Vehicle. This policy aims to create effective, efficient, and manageable utilization of battery electric vehicle; thus, road traffic and transportation in the province can be managed orderly. This policy guides provincial government to formulate technical regulations to support the battery electric vehicle business. Public institutions, local state-owned enterprises, public transport firms are obligated to use battery electric vehicles. Province government also make stages and action plans for public mass transport to use battery electric vehicles. This policy also encourage government to provide incentives for industries to produce battery electric vehicles and tools which are used by battery electric vehicles. It encourages government to make strategy for controlling the use of fossil vehicle; consequently, a decrease of fossil vehicle use can be achieved. This policy accelerates electric motor business development in Bali. In 2026, Bali Provincial Government want to decrease 41,000 tons of carbon emission by utilizing 140.000 electric motorbikes, 5,719 electric cars, and 50 electric buses. Chairman of the Committee for the Acceleration of Use of Battery-Based Electric Vehicles for Bali also stated that Bali province developed six regions to this vehicle to boost the number of Battery Electric Vehicles user in Bali. These regions are Nusa Dua, Kuta, Sanur, Ubud,

Nusa Penida, and Besakih. Bali's Governor Regulations also encourage the private sector to actively participate in implementing the policy. For instance, PT Allied Harvest Indonesia have developed a three-wheeled vehicle model and decide that Bali as one of target market to sell the product.

Secondly, Bali Province Government enacted Bali's Governor Regulation Number 45 Year 2019 regarding Bali Clean Energy. This policy aims to meet the energy needs independently, sustainably, and equitably by utilizing green energy sources, for example, solar cell, water, wind, biomass, geothermal, and natural gas. This policy support solar power plant business development in Bali. This policy also promotes zero energy building. This building uses Balinese architectural design with building layout that makes optimal use of sunlight, utilizing solar power plant, and applying efficient water management. This regulation also encourages local government, state owned enterprises, businessman/woman, small medium enterprises, cooperation, and indigenous villages actively participate in green energy management. This policy supports the solar panel industries in Bali. One of solar panel enterprises is PT. Bintang Terbarukan Indonesia. This some figures (photos) which describe their solar panel projects.

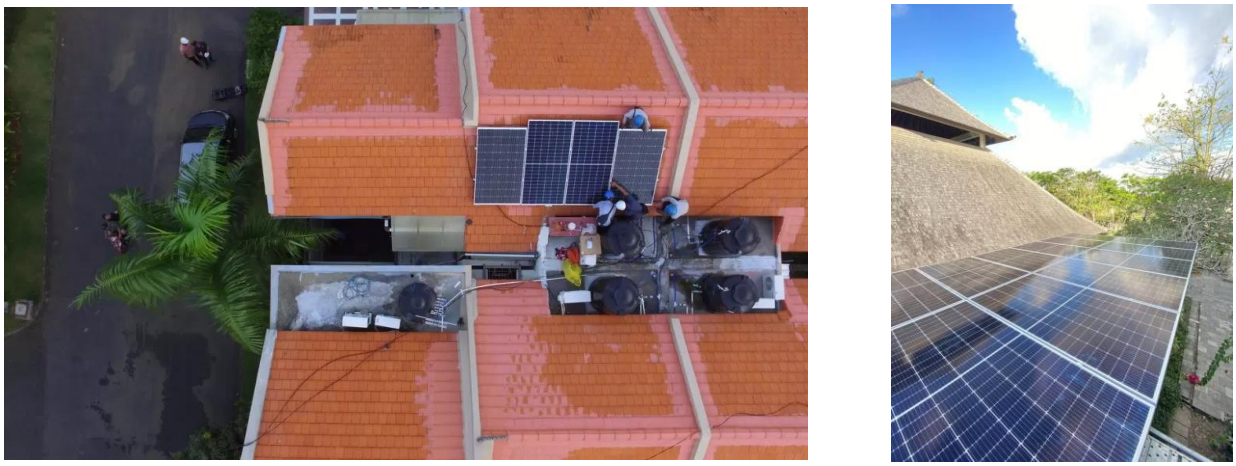

Figure 1. Solar Panel Establishment
[Source: BTI Energy Company, 2023]

Thirdly, regarding waste management, Bali province government enacted Bali's Governor Regulation Number 97 Year 2018 regarding Limiting the Generation of Single Use of Plastic Bag. This policy aims to protect the environment, boost public participation to protect environment, and make young people not relying on plastic bag; consequently, this action can increase the environment qualities and create sustainable cities n the future. This policy encourage business to make non-plastic products, for instance straws. These businesses can reduce the number of single used plastic bag. Although this policy was confronted by the owners of plastic producers, this policy is still implemented. This policy is not intensively promoted because in period of Covid-19 pandemic, the healthcare workers, for instance doctors and nurses, should clothes which are made by plastic. Basically, this policy cannot directly influence the green energy sources. To create more green energy sources, Bali's Provincial Government should formulate policy about how to build landfill in Suwung as the Denpasar's, Badung's, Gianyar's, and Tabanan's waste storage area. After this, this landfill will generate gas which can be converted into energy. Nevertheless, waste recycle can

positively impact on environment. Some regencies in Bali have promoted establishment of waste bank to recycle the waste to some useful goods. For instance, Buduk village, Badung, have created waste bank in each banjar (the lowest level of traditional government in Bali) (Antari, 2024). Waste bank can reduce the possibility of waste burn which leads to air pollution.

Drivers of Green Energy Policy Implementation in Bali

There are three key drivers of green energy policy in Bali. Firstly, Bali has enough potency of green energy sources. According data from RUEN and RUEDP Bali 2020-2050, Bali has eight kind of renewable energy sources. Bali has 320 MW from sea energy, 1,019 MW from wind power, 44.7 MW from biogas, 146.9 MW, 1254 MW from solar cell, 624 MW from water power, 262 MW from geothermal, and 15 MW from minihidro/mikrohidro (Dinas Ketenagakerjaan dan ESDM Bali, 2021). Furthermore, there are still empty spaces where solar cell plant can be built (Kementerian ESDM RI - Berita Unit - Direktorat Jenderal EBTKE - Kebijakan Energi Alternatif Pemerintah Untuk Sektor Transportasi, n.d.).

Secondly, political commitment is one of key drivers of green energy policy implementation in Bali. This commitment can be observed through Bali's government regulations, such as Bali Provincial Regulation Number 9 Year 2020 Regarding General Plan for Local Energy in Bali 2020-2050, Bali's Governor Regulation Number 45 Year 2019 Regarding Bali's Clean Energy, and Bali's Governor Regulation Number 48 Year 2019 Regarding Battery Electric Vehicle. Enactment of Bali Provincial Regulation Number 9 Year 2020 Regarding General Plan for Local Energy in Bali 2020-2050 indicates that Bali's government have long term plan to guide the five-year-plan and short-term-plan; thus, the green energy policy is continuously implemented. Policy commitment highly influences the environmental regulations, in which green energy policy as one of environmental regulations. As stated by Qamruzzaman & Karim (2024), consistent policy commitments can enforce citizens to comply the evironmnetal laws.

Thirdly, best practices of establishing solar cell plants have been existed in Bandung, West Java, Indonesia. These plants can generate LEN 70 MW (Kementerian ESDM RI - Berita Unit - Direktorat Jenderal EBTKE - Kebijakan Energi Alternatif Pemerintah Untuk Sektor Transportasi, n.d.). Bali's Province Government can do benchmarking to Bandung; consequently, Bali' s province government can adapt their strategies in building solar cell plants. Bali government can modify their strategies by considering the Bali's geographical condition, social and cultural conditions surrounding the future plants, and the establishment costs.

The fourth driver is appreciation from foreign countries and think tank, for instance Institute for Essential Services Reform (IESR). This appreciation is a form of acknowledgement for the contribution of Bali's provincial government to the green energy development. Beside IESR, some Non-governmental organizations, for instance WRI and Nexus, also support the development of green energy in Bali by supporting projects which is carried out by green energy enterprises in Bali (Interview Result of one of the CEO of green energy enterprises in Bali, 2024).

Hurdles of Green Energy Policy Implementation in Bali

On the other hand, there are some constrains which lead to ineffective green energy policy implementation. Firstly, Bali have electricity capacity more than the Balinese needs. According to data from Ministry of Energy and Mineral Resources, Bali has electricity capacity mode that 1200 MW, with the maximum energy need of Balinese people is 350 MW. This electricity comes from Paiton, East Java (Kementerian ESDM RI - Berita Unit - Direktorat Jenderal EBTKE - Kebijakan Energi Alternatif Pemerintah Untuk Sektor Transportasi, n.d.).

The second constrain of green energy policy implementation is bad experience in green energy establishment. Puncak Mundi is area where wind power plant was established. This wind power plant cannot generate energy, although the infrastructures still existed. This wind power plant was built in 2007 and less than 2 years after the establishment, the wind power plants did not produce the energy due to the lack of plant tools (Suriyani, 2020). Below the figures which depict the establishment of wind power energy in Puncak Mundi.

Figure 2. Condition of Wind Power in Puncak Mundi, Bali
[Source: Juniantari, 2023]

This bad experience leads to trauma and reluctancy to implement green energy projects. This bad experience was aggravated by negative narratives regarding green energy development. Green energy narratives which adopt culture, local wisdom and citizen's beliefs can make Balinese people trust and contribute in the development of green energy in Bali (CASE Indonesia, 2022).

Thirdly, lack of financial support from government is faced by green energy enterprises. Financial support is one of key factors to successfully build green energy industries. Based on the argument of the CEO of green energy enterprises in Bali (2024), The Government has provided access to some key stakeholders to develop the industry; but this support should be expanded to resources support in developing green energy industry in Bali.

CONCLUSSION

Bali provincial government enacted some green energy policies, but in term of waste management, the policy should regulate about how landfill is built and convert the gas to the energy. Banjar as the lowest level of traditional government in Bali has been involved in carriying out waste banks to positively impact on environment. The drivers of green energy policy in Bali are Bali's potency in renewable energy sources, political commitment; best practices from the other region; acknowledgement and support from foreign countries and think tank. The hurdles are enough capacity of fossil energy sources, bad experience in wind power establishment and negative narrative on green energy development, and lack of government financial supports.

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