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The Role of Renewable Energy and Green Finance in Environmental Sustainability in East Kalimantan (Case Study: The Green Province Program of the East Kalimantan Provincial Government)

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Abstract: The issues of climate change and environmental degradation demand a transformation in development towards a more sustainable direction. One strategy adopted is the development of renewable energy and the implementation of green financing schemes, particularly at the regional level. This study aims to analyze the role of renewable energy and green financing in supporting environmental sustainability in East Kalimantan through the implementation of the Green Province Program. This research uses a qualitative descriptive approach based on literature review, with secondary data collected from various scientific sources and policy documents. The results show that although there was a decline in the Environmental Quality Index (IKLH) between 2020 and 2022, an improvement trend began to appear in 2023 and 2024 along with the increased implementation of programs such as communal solar power plants (PLTS), green microcredit, and the distribution of FCPF funds worth USD 20.9 million. The findings also highlight the importance of synergy between stakeholders and the need to scale up the revitalization of new and renewable energy infrastructure. With more thorough planning and adequate resource allocation, the Green Province Program has the potential to become a model for regionally-based low-carbon development and support the achievement of Sustainable Development Goals (SDGs) 7 and 13.

Keywords: Renewable Energy, Green Financing, Green Province, East Kalimantan, Environmental Sustainability.

INTRODUCTION

Climate change and environmental degradation are two interrelated global environmental issues that increasingly require serious attention (Hidayah & Umar, 2025). Environmental sustainability has become a global concern amidst the increasing impacts of climate change

and ecosystem degradation resulting from uncontrolled exploitation of natural resources (Zairin et al., 2022). In this context, sustainable development has become a new paradigm that integrates economic growth, environmental protection, and social justice as an inseparable whole (Widyastuti, 2019). To address these challenges, many countries and regions have begun implementing development strategies that embrace sustainability principles, including the use of renewable energy and the implementation of environmentally-based financing schemes (green financing). Renewable energy development is not only a climate change mitigation strategy but also a crucial pillar in supporting regional energy independence and creating an inclusive green economy (Muhayatul & Umar, 2025).

East Kalimantan, a province rich in natural resources but facing significant ecological pressures, has launched the "Green Province" initiative as part of its commitment to balancing economic development with environmental conservation (Permana et al., 2022). The Green Province program, initiated by the East Kalimantan Provincial Government, aims to encourage development transformation towards a greener and more sustainable direction, through strategies for reducing carbon emissions, protecting forests, and optimizing the use of renewable energy (Pratama et al., 2021).

As a developing country, Indonesia faces complex challenges in achieving low-carbon development (Muslimin et al., 2025). East Kalimantan, a province that has relied on extractive sectors such as coal and oil for decades, enjoys a strategic position but is also vulnerable to ecological pressures(Akbar et al., 2022). Green development programs within the region include the use of renewable energy, the development of environmentally friendly transportation, and efficient waste management (Magelhaes & Hartanto, 2018). These initiatives have the potential to drive sustainable economic growth and support environmental sustainability. Green development can also contribute to increasing environmentally conscious economic growth while also improving a region's Human Development Index (HDI) (Dira et al., 2023). Local governments can initiate a "Green Revolution" policy as a strategic effort to address environmental issues (Yulia, 2019). This program continues to be promoted with the aim of making a region greener and more sustainable, as well as creating a sustainably reorganized environment. The Green Revolution focuses not only on tree planting but also emphasizes the importance of changing mindsets and transforming society's mentality towards environmental preservation (Muharram, 2020). Through this approach, it is hoped that significant changes in community behavior will occur, ultimately driving improvements in overall environmental quality. The Environmental Quality Index (IKLH) can be one indicator of the program's success. The large-scale tree planting movement is a key component of the Green Revolution and is expected to serve as an example for regions in Indonesia in developing sustainable forestry (Rahutomo et al., 2023). More broadly, green development at the regional level, encompassing renewable energy development, environmentally friendly transportation, and waste management, is considered capable of driving sustainable and environmentally friendly economic growth (Nurlaeli et al., 2025). These green sectors not only strengthen environmental resilience but also contribute to improving the national Human Development Index (HDI) (Muharram, 2020).

Although various green development policies have been implemented, academic studies comprehensively examining the direct link between renewable energy utilization and green financing and the success of sustainable development programs are still limited, particularly at the regional level, such as East Kalimantan (Susanti et al., 2025). More focused, locally data-driven research is needed to assess the effectiveness of these policies in practice (Wika, 2025). Against this backdrop, this study examines how renewable energy and green financing schemes play a role in achieving environmental sustainability in East Kalimantan. The primary focus is on analyzing the implementation of the Green Province Program and the involvement of various stakeholders in driving green transformation at the regional level. Green financing is a

crucial mechanism for accelerating the adoption of environmentally friendly technologies and encouraging private sector innovation toward low-carbon development (Muhayatul & Umar, 2025).

Although various green development policies have been implemented by both central and regional governments, academic studies that comprehensively and systematically examine the direct link between renewable energy utilization and green financing schemes and the success of sustainable development programs are still relatively limited. This is particularly evident in the context of regional implementation, such as in East Kalimantan Province, which has its own geographical and economic characteristics (Hakim et al., 2021). As a region that has for years relied on extractive sectors such as mining and plantations, East Kalimantan faces significant challenges in transitioning to low-carbon development (Pamungkas et al., 2025). Despite regional initiatives such as the Green Province Program, there has been limited scientific research that has detailed how renewable energy instruments and green financing actually contribute to achieving environmental sustainability in this region.

Furthermore, much of the available literature tends to be general and normative, lacking empirical evidence or in-depth case studies at the local level (Widyastuti, 2019). Yet, each region faces unique complexities, including institutional capacity, green infrastructure availability, community socio-economic conditions, and stakeholder coordination mechanisms. Therefore, research is needed that not only conceptually describes policies but also evaluates their practical implementation, taking into account local dynamics. This is crucial to ensure that green development strategies are truly impactful, serving not only as a symbol of political commitment but also as an instrument for comprehensive regional development transformation (Handini et al., 2025). The success of green development programs is crucially determined by regional institutional capacity, multi-stakeholder participation, and the availability of sustainable financing to support environmentally-based projects.

Based on this background, this study seeks to examine in depth how the utilization of renewable energy and the application of green financing play a strategic role in realizing environmental sustainability in East Kalimantan. The main focus is directed at analyzing the implementation of the Green Province Program initiated by the East Kalimantan Provincial Government as an effort to transition to green development. In this study, the involvement of key actors such as local governments, financial institutions, the private sector, and civil society will also be an important part of the discussion, to assess the extent to which collaboration and synergy between parties can support the program's success. Thus, this research is expected to contribute both academically and practically, particularly in strengthening more contextual and sustainable regional-based green development policies.

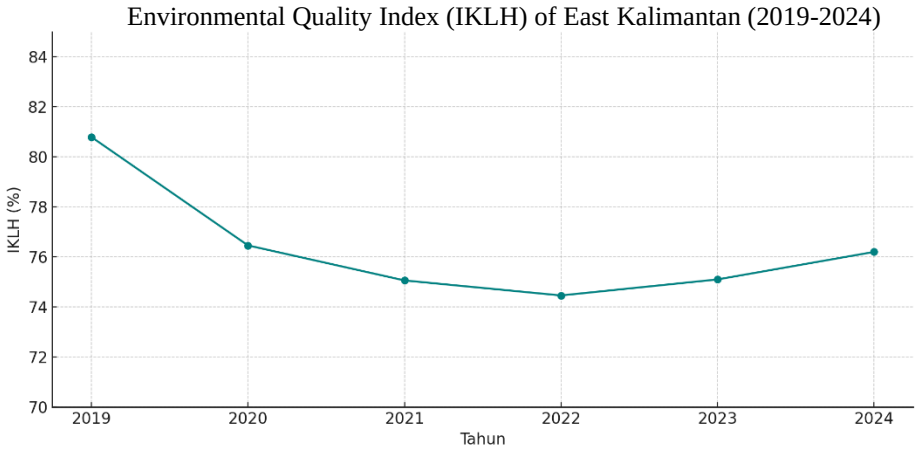
METHOD

This paper uses a qualitative descriptive approach with a library research method, which involves collecting data and information from various written sources relevant to the topic. This method combines descriptive and qualitative approaches to obtain a comprehensive picture of the phenomenon under study. This study presents data as is without manipulation or experimental treatment. The primary sources in this study include various scientific works such as research methods books, journal articles, online publications, and other written documents related to the literature review.

RESULTS AND DISCUSSION

The data from BPS East Kalimantan presents robust statistical estimation results and is compatible with the econometric model used as below;

Table 1. Environmental Quality Index (IKLH) of East Kalimantan (2019-2024)



Source: Processed by the author, 2025

Based on East Kalimantan's Environmental Quality Index (IKLH) data from 2019 to 2024, fluctuations in the province's environmental quality are evident. The highest IKLH score was 80.79 in 2019, reflecting relatively good environmental conditions at the beginning of the observation period. However, from 2020 to 2022, there was a consecutive decline, with the lowest score in 2022 at 74.46, indicating pressure on environmental quality, likely influenced by post-pandemic economic activity, urbanization, and increased energy consumption. However, in 2023 and 2024, a recovery trend occurred, with IKLH scores increasing to 75.10 and 76.20, respectively. This increase indicates the resumption of regional environmental programs, such as the expansion of renewable energy (PLTS), the CPFF program, and green financing incentives, which are beginning to be implemented more systematically. The following table compares the 2020–2024 program with the 2023–2024 program plan and developments:

Table 2. Comparison Of The East Kalimantan Green Program

Program	2020–2022	2023–2024	Change Notes
Communal and Household Solar Power Plants	Pilot project in 5 villages	Expansion to 15 new villages (2024 ESDM data)	Regional expansion and household-based micro-incentives
Forest and Land Rehabilitation	3,500 hectares of rehabilitation area	Target 6,000 hectares with an agroforestry approach	Local farmer involvement through circular economy schemes
Green Microcredit	Pilot project in 3 village cooperatives	Expansion to 20 tourism village-based cooperatives and green MSMEs	Supported by Bank Indonesia and Bank Kaltimtara
Carbon and Emission Trading Schemes	Not yet optimal	Regulatory reform + local carbon market scheme pilot (2024)	Regulatory certainty and private sector participation are needed
Environmental Education and Literacy	Limited green schools	Green School Movement based on local curriculum	Integration in the Regional Action Plan for Low Carbon Development

Source: Processed by the author, 2025

In terms of incentive funding, the Indonesian Government has received an advance payment of US$20.9 million from the Forest Carbon Partnership Facility (FCPF) program for East Kalimantan Province. These funds are allocated as a form of responsibility, recognition

of performance achievements, and rewards for all stakeholders involved in the implementation of environmental programs by the East Kalimantan Provincial Government. The utilization of the FCPF funds is continued through an evaluation process of payment requests submitted in the form of proposals or Annual Work Plans (RKT) submitted to the Environmental Fund Management Agency (BPDLH) as the fund disbursing agency. As part of the benefit distribution mechanism, it is necessary to sign a Cooperation Agreement (PKS) between BPDLH and nine Benefit Managers consisting of the East Kalimantan Provincial Government and eight other district/city governments, namely Balikpapan City, Berau Regency, West Kutai, Kutai Kartanegara, East Kutai, Mahakam Ulu, Paser, and North Penajam Paser. This collaboration aims to ensure that incentive funds are distributed transparently, fairly, and effectively to support the implementation of environmental protection and land-based emission reduction programs in the region (East Kalimantan Provincial Environmental Agency, 2023). Therefore, descriptively, it can be concluded that, despite experiencing a decline, environmental quality in East Kalimantan is showing signs of improvement toward a more sustainable direction, along with increased attention to environmental issues and green energy transition policies at the regional level.

From a financial perspective, the Indonesian government has received an advance payment of US$20.9 million from the Forest Carbon Partnership Facility (FCPF) program for East Kalimantan Province. These funds are allocated as a form of accountability, recognition of performance achievements, and rewards for all stakeholders involved in the implementation of environmental programs by the East Kalimantan Provincial Government . Therefore, it can be concluded that the East Kalimantan Provincial Government has implemented the Green Province program optimally in East Kalimantan.

Green Province Program in 2025, the Department of Energy and Mineral Resources of East Kalimantan Province has designed two main activities in order to support the implementation of the Green Province program through the development of New Renewable Energy (EBT). The first activity is the revitalization of EBT infrastructure with a target of achieving 2 units in 2025. The second activity includes the Implementation of various EBT utilization activities with a target of 28,189 units in 2025 (Peraturan Gubernur Kalimantan Timur No 26 Tahun 2024 Tentang Rencana Kerja Pemerintah Daerah Provinsi Kalimantan Timur Tahun 2025, 2024). Therefore, the implementation of EBT infrastructure revitalization activities is still quite optimal. This is due to the low target set, namely only 2 units, which indicates limitations in the scale of implementation. In addition, there is no clear information regarding the location or priority areas that will receive benefits from the revitalization program, thus raising questions regarding the effectiveness and equity of the implementation of this program in supporting a sustainable energy transition in East Kalimantan.

This section must answer the problems or research hypotheses that have been formulated previously.

CONCLUSION

This study shows that renewable energy (REN) and green financing (Financial Development/FIN) significantly reduced carbon emissions in East Kalimantan during the 2012–2023 period. Using a quantitative approach using the FMOLS and DOLS methods, it was found that energy transition policies and financial sector reforms geared toward green development significantly contributed to environmental sustainability.

The implementation of the Green Province Program by the East Kalimantan Provincial Government showed a positive trend, despite a decline in the Environmental Quality Index (IKLH) from 2020–2022. However, improvements began in 2023, driven by the expansion of the solar power plant (PLTS) program, the green microcredit scheme, the CPFF (Green Finance Freelance Fund), and financial support through the FCPF (Financial Development Fund) of

USD 20.9 million. These policies not only strengthen environmental protection but also serve as part of an inclusive regional economic development strategy. The program's sustainability prospects in 2025 remain promising, although challenges remain, such as the limited scale of renewable energy infrastructure revitalization (only two units) and the lack of clarity regarding implementation locations. To ensure the program's effectiveness in the future, more thorough planning, adequate budget allocation, and multi-stakeholder involvement, including local communities and businesses, are required. Thus, the Green Province Program has the potential to become an integrated low-carbon development area at the regional level, while accelerating the achievement of the SDGs, particularly points 7 (Affordable and Clean Energy) and 13 (Addressing Climate Change).

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