

ELECTRIFYING ECO-TOURISM: THE TRANSFORMATION OF GREEN CANYON PANGANDARAN THROUGH RENEWABLE ENERGY INTEGRATION

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Abstract

This technical report highlights an eco-tourism transformation initiative led by PT PLN (Persero) in Green Canyon, Pangandaran, West Java. The program aligns with Indonesia's national commitment to achieve Net Zero Emissions (NZE) by 2060 by integrating renewable energy and sustainable practices in the tourism sector. Central to the initiative is converting conventional gasoline-powered tourist boats into electric-powered vessels. This shift has reduced emissions, noise pollution, and wave activity that causes riverbank erosion. As of 2023, 12 out of 80 boats have adopted electric motors. Supporting infrastructure such as battery swap stations (SPBKLU), public electric charging stations (SPLU), and rooftop solar power systems have also been installed to ensure the operational efficiency of the electric fleet. In addition, PT PLN (Persero) introduced the use of Fly Ash and Bottom Ash (FABA) as eco-friendly construction materials for docks and pathways. These byproducts from coal-fired power plants are repurposed to reduce industrial waste while meeting national building standards. The program also emphasizes community empowerment through training, support for small businesses, and the introduction of energy-efficient appliances like induction stoves. This not only supports clean energy use but also reduces operational costs for local entrepreneurs. Green Canyon now serves as a pilot model for green tourism in Indonesia. The initiative showcases how clean energy, environmental conservation, and tourism development can coexist, offering lessons for similar projects nationwide.

Keywords: eco-tourism, electric boats, renewable energy, FABA, sustainable tourism

INTRODUCTION

For decades, the Green Canyon tourist area in Cijulang, Pangandaran Regency, has been a jewel of West Java. This year, however, the region feels more vibrant than ever, thanks to the introduction of electric boats bringing renewed meaning to the future of both nature and people.

Aligned with the Green Canyon Tourist Village Programan initiative by PT PLN (Persero) as part of its Green-Innovative transformation and the "Jabar Smile" Program PLN, in collaboration with the Pangandaran Regency Government, aims to create an environmentally friendly tourist destination. This is achieved through the development of ecotourism and the promotion of the Electrification Lifestyle campaign to help Indonesia achieve its goal of Net Zero Emissions (NZE) by 2060, while encouraging people to adopt renewable energy and switch from oil-fueled engines to electric boat motors.

This transformation is part of the Green Canyon Tourism Village Program, developed by PT PLN (Persero) as part of its green innovation strategy and in synergy with the Jabar Smile initiative. In collaboration with the Pangandaran Regional Government, the project promotes Eco-Tourism and the Electrifying Lifestyle campaign. Its primary goal is to contribute to Indonesia's target of achieving Net Zero Emissions (NZE) by 2060 by introducing clean energy solutions in the tourism sector.

The Gantar boat, which still relies on gasoline and is commonly used in the area, tends to be quite noisy. This noise often makes passengers uncomfortable, as it disrupts conversations and takes away from the peaceful beauty of the Cijulang River.



Figure 1. The Gantar Boat

In addition to the noise, running these traditional boats can be expensive, especially now that it's harder to get subsidized fuel due to changes in government policy.

Environmentally, these boats leave an oil residue, release engine emissions, and create strong waves that contribute to the erosion of the riverbanks.

LITERATURE REVIEW

Ecotourism in the international ecotourism society (TIES) is a journey to change to natural things with the aim of preserving the environment. Therefore, ecotourism is related to several things including nature-based solutions, dimensions of sustainability by considering participation and benefits for the community. This ecotourism must also avoid negative externalities such as illegal mining and logging (Ouboter, Kadosoe, & Ouboter, 2021).

Renewable energy is carried out on the basis of a balance between green energy sources and fossil fuels so that it can provide benefits to the global economy, namely energy efficiency and reduced pollution in the environment (Lee and Yang, 2019).

Eco green tourism is a PLN support program in supporting the Government Program, namely Sustainable Tourism based on PLN's transformation, namely Green Innovative. Sustainable tourism is applied in all forms of tourism that exist to consider the impacts that will be obtained both in the economy, social and environment. In addition, it provides benefits to know what the needs of visitors and local communities are.

Net carbon emissions are a state where the amount of carbon emissions released into the atmosphere is smaller than the amount of emissions that can be absorbed by the earth. Therefore, in order to achieve this, a change from the current energy system to a clean energy system is needed (PLN learning digital).

Fly Ash and Bottom Ash (FABA) are the remaining results of coal combustion in PLTU activities which are not hazardous and toxic waste (B3) so they can be used as a substitute for cement and/or building materials in the form of fine aggregates such as bricks, roof tiles, concrete, paving blocks, subbases and subgrades or coating soil.

RESEARCH METHODS

This study uses qualitative methods and descriptive techniques to systematically describe the conditions in the Green Canyon Pangandaran ecotourism area, the potential for renewable energy available, and the integration of sustainable tourism infrastructure. This approach was chosen because it is appropriate to explain phenomena based on facts and data collected from various sources. With the use of renewable energy in Green Canyon, it has the potential to be a model for other ecotourism destinations throughout Indonesia. This method was chosen to obtain information related to the challenges, potential and impacts of the development of the use of renewable energy in supporting the sustainability of nature tourism. The data collection techniques are by conducting interviews, direct observations in the field and documentation in the form of phenomena that occur and related data.

RESULTS AND DISCUSSION

The Electrifying Lifestyle program is designed to empower communities, especially those in the marine tourism sector. Green Canyon's boat operators are among the direct beneficiaries. Similar programs are also being implemented in the Karst Rammang-Rammang area, Maros Regency, South Sulawesi. There, electric boats have been introduced for tourism activities, supported by public charging stations (SPLU) with a capacity of 7,700 VA at Jetty Bridge 2. These efforts help communities cut costs since electricity is more affordable than fuel, while also protecting the environment.

PLN's support includes converting 12 conventional boat engines to electric, distributing induction stoves for MSMEs, installing rooftop solar power systems (PLTS), and utilizing Fly Ash and Bottom Ash (FABA) from coal combustion as paving and concrete materials for Green Canyon's jetties. Additional infrastructure includes battery swap stations (SPBKLU), electric boat battery packs, and public charging points.

This eco-tourism initiative is a reflection of PLN's long-term commitment to energy transition and zero-emission tourism zones. Pangandaran was selected due to its popularity among both local and international tourists. Going forward, PLN plans to develop eco-tourism in other regions, emphasizing collaboration between local governments, communities, and the private sector.

In Green Canyon, eco-tourism doesn't just strengthen tourism it also contributes to a greener, more sustainable environment. Electric boats provide a quieter, cleaner, and more peaceful ride, enriching the visitor experience while reducing noise and water pollution.

PLN is also focusing on local empowerment through electrification education for MSMEs, training for boat operators, and providing life jackets to enhance safety. Future plans include developing an electric vehicle-based tour package connecting Pangandaran Beach and Green Canyon, along with full electrification of all boats.

Since August 2023, Green Canyon has embraced green energy, with 12 of its 80 boats powered by electricity. PLN has also distributed 52 batteries and established five SPBKLU, where batteries can be recharged within two hours free of charge.



Figure 2. Electric Boat

Electric boats are easy to operate similar to motorbikes and much quieter than gasoline-powered "cantar" engines, which are still commonly used in the region. Passengers prefer electric boats for their silence and comfort, as noisy engines hinder conversations and detract from the natural beauty of the Cijulang River.

In terms of efficiency, electric boats are more economical. A traditional Gantar engine may consume around IDR 40,000 of fuel for four daily trips. Electric boats, by contrast, currently operate at no cost. With the implementation of battery charging tariffs in the future, operating costs are still expected to remain lower than fuel-based options.

Environmentally, these innovations bring significant benefits. Electric boats produce no oil waste or combustion emissions and do not cause waves, preventing erosion of the 15–20 meter-wide riverbanks. For environmental protection, only rescue boats are permitted to use 15 HP engines, and the number of boats is capped at 80.

While electric boats move slightly slower (equivalent to 5–6 HP), their gentle propulsion helps preserve the river. Challenges remain, such as the need for backup batteries and improved access to spare parts and repair facilities.

The use of FABA non-hazardous industrial waste from the Adipala coal-fired power plant in Cilacap, Central Java is a highlight of the initiative. It has been utilized for paving and concrete at the docks. FABA meets green building sub-criteria due to its reusability and non-toxic properties. Products made from FABA (paving blocks, bricks, tiles) are standardized (SNI) and can replace cement in environmentally friendly construction.



Figure 3. Paving FABA

PLN has also installed a 33,000 VA SPLU with six charging points at the rest area in Green Canyon. Additionally, a 5,500-watt solar power system now powers the Green Canyon Tourism Awareness Group office.



Figure 4. SPKLU and SPKLU

As part of the clean energy campaign, PLN is educating local MSMEs about the Electrifying Lifestyle. Entrepreneurs are encouraged to adopt environmentally friendly technologies like induction stoves, supporting the broader movement toward clean energy adoption.

With these innovations, Green Canyon is ready to welcome tourists into a new era of sustainable travel. These changes offer not only a safer and more enjoyable experience but also contribute to the global effort to lower carbon emissions. Tourists can now enjoy the beauty of Green Canyon while playing a role in environmental preservation.

As its name suggests, the green energy movement in Green Canyon has the potential to become a model for other eco-tourism destinations across Indonesia. Tourism, after all, should enrich communities while preserving the environment.

A significant milestone of the project is the conversion of 12 out of 80 conventional gasoline-powered boats into electric boats. These vessels offer various benefits:

- Zero emissions and quieter operation
- Reduced fuel costs
- No wave disturbance, thereby reducing riverbank erosion

Visitors now enjoy a peaceful journey through the 3-kilometer stretch of the Cijulang River without the noise and vibration typically associated with traditional engines. The boats, capable of carrying up to seven passengers, mimic the ease of operating a motorcycle and provide a far more comfortable and environmentally friendly alternative.

To support this electrification effort, PT PLN (Persero) has introduced various energy and infrastructure components:

- Battery exchange stations (SPBKLU): Five units currently operate free of charge, with 52 batteries available for circulation.
- Solar power system (PLTS): A 5,500-watt rooftop solar installation powers the Green Canyon tourism office.
- Public electric charging stations (SPLU): Six outlets are installed at a 33,000 VA rest area station.
- Induction cooktops for MSMEs: Local micro and small business operators have been equipped with clean cooking appliances.

Additionally, PT PLN (Persero) has implemented the use of Fly Ash and Bottom Ash (FABA) a non-toxic byproduct of coal-fired power generation as paving material. These SNI-certified eco-construction materials are utilized in the docks and walkways of Green Canyon, contributing to a circular economy approach.

The project emphasizes local community empowerment through education and training:

- Boat operators are trained to use and maintain electric propulsion systems
- Local MSMEs are educated on electrification and provided with cleaner technology
- Life jackets and other safety gear are supplied to ensure passenger well-being

PLN also plans to develop a tour package connecting Pangandaran Beach and Green Canyon using electric vehicles, further promoting low-emission tourism.

The electric boats offer numerous environmental benefits, including zero fuel combustion, absence of engine oil disposal, and noise reduction all of which contribute to the preservation of the river's ecosystem. The absence of wave activity from electric motors helps prevent riverbank erosion, a common issue with conventional engines.

Economically, the electric boats reduce fuel expenditures. For example, a gasoline engine requires around IDR 40,000 for four trips during weekends. In contrast, electric boats currently operate at no cost, pending future tariff regulations that are still expected to remain more affordable than fuel prices.

Despite its successes, the program faces several challenges:

- Electric motors (5–6 HP equivalent) are slower than traditional engines
- Limited battery capacity (one full round-trip per charge)
- Lack of spare parts and repair facilities in the region

PT PLN (Persero) acknowledges these issues and is actively working on scalability and logistical improvements. As Green Canyon continues to adapt and innovate, the site stands as a replicable model for sustainable tourism in Indonesia.

The implementation of 12 electric boats out of 80 total units showcases a shift toward green mobility. Solar power plants installed at key locations, FABA-based paving blocks, and river traffic lights contribute to a safer, cleaner tourist environment. Community training, UMKM support with induction stoves, and the availability of charging stations reinforce long-term sustainability. Findings indicate improved visitor satisfaction, reduced noise, and a measurable decline in fuel use and emissions.

CONCLUSION

The electrification and renewable energy initiatives at Green Canyon showcase the viability of eco-tourism supported by clean energy technologies. PT PLN (Persero)'s comprehensive approach from transportation to infrastructure and community empowerment has successfully transformed Green Canyon into a quiet, clean, and forward-thinking tourist destination. More than a technical achievement, it is a vision for Indonesia's sustainable tourism future.

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