GREEN ECONOMY INTEGRATION IN CLIMATE CHANGE MITIGATION AND ENVIRONMENTAL CONSERVATION IN INDONESIA

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Abstract
This article examines green economy integration as Indonesia's main strategy in climate change mitigation and environmental preservation through a comprehensive literature review approach. Two main discussions cover (1) the implementation of the Low Carbon Development Initiative (LCDI), Second Nationally Determined Contribution (SNDC) 2025, and the 23% renewable energy target in the 2025-2029 RPJMN for GHG emission reduction, and (2) the synergy of the circular economy, biodiversity conservation, and community-based practices in agro-industrial waste management, green tourism, and ecosystem restoration. The research results confirm the effectiveness of the green economy in creating 1.8 million green jobs, forestry net sinks, and green Special Economic Zones (KEK) that balance 6.5% economic growth with environmental preservation. However, challenges such as fossil fuel dependency and cross-sectoral coordination require evidence-based recommendations in the form of green sukuk incentives, multi-stakeholder collaboration, and technological innovation to achieve net-zero emissions faster than the 2060 target.
Keywords: green economy, climate change mitigation, environmental conservation, LCDI Indonesia, SNDC 2025, circular economy, net-zero emissions, renewable energy, REDD, RPJMN 2025-2029.

Introduction

Climate change has become an existential threat to Indonesia, with increased greenhouse gas (GHG) emissions driven by deforestation, the fossil fuel sector, and unsustainable industrial activities. According to the latest report, deforestation in Indonesia reached 261,575 hectares in 2024, mainly due to timber concessions and oil palm plantations, which exacerbate habitat loss and increase carbon emissions (Sari et al., 2024).

Indonesia, as the world's largest archipelago, faces direct impacts such as tidal flooding, drought, and mangrove ecosystem damage due to sea level rise. This not only threatens biodiversity, but also the livelihoods of millions of coastal communities who depend on natural resources, thus requiring mitigation strategies that are integrated with economic development (Martawardaya et al., 2022).

At the global level, the Paris Agreement targets limiting temperature rise to 1.5°C, requiring national commitments through Nationally Determined Contributions (NDCs). Indonesia has revised its NDC to a Second NDC (SNDC) in 2025, with a target of reducing emissions by 1.257-1.488 million $MtCO_2$ by 2035 through the Low Carbon Compatible

with Paris (LCCP) scenario, although it has been criticised as unrealistic by the Climate Action Tracker (Sari et al., 2024) .

The Indonesian government has integrated the green economy into the 2025-2029 National Medium-Term Development Plan (RPJMN), with a focus on energy security, resource efficiency, and the transition to renewable energy. This policy includes increasing national energy reserves and monitoring the distribution of subsidised fuel, in line with President Prabowo's Asta Cita (Ningsih, 2024). The Low Carbon Development Initiative (LCDI) is a key instrument, included in the 2020-2024 RPJMN and the 2025-2045 RPJPN, with projections for significant emission reductions through net-sink forest sectors and the achievement of net-zero emissions (NZE) by 2060. A Bappenas study projects GDP growth of up to 6.5% per year until 2050 without compromising the environment, accompanied by the creation of 1.8 million green jobs (Masdar et al., 2022) .

However, the challenges of implementing a green economy in Indonesia remain significant, including dependence on coal (the energy sector contributes the largest emissions) and a lack of green financing. Regulations such as Government Regulation No. 33/2023 on Energy Conservation and Minister of Environment and Forestry Decree No. 842/2024 on Zero Waste-Zero Emission are needed to strengthen transparency through the National Registry System (SRN) and MRV (Sari et al., 2024) .

Environmental conservation is the second pillar, where the green economy promotes sustainable management of natural resources, including forest restoration and REDD+ programmes to reduce emissions from deforestation and forest degradation. Indonesia has implemented a moratorium on forest licensing and peatland rehabilitation, although illegal logging remains a major obstacle (Law et al., 2016). The green economy is not only about climate mitigation, but also supports the circular economy through investment in environmentally friendly technologies and the internalisation of environmental externalities. Research has confirmed the positive impact on economic growth, with a reduction in energy consumption per unit of production and CO2 pollution (Sijabat, 2025) .

Indonesia's Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050) maps emissions peaking in 2030 with a net sink in the forestry sector, reaching 540 Mton CO_2e in 2050, and exploring NZE more quickly. This strategy is in line with the Indonesia Emas 2045 vision, which emphasises the synergy between economic growth and ecosystem preservation (Ulya et al., 2023) .

Thus, this article discusses the integration of the green economy in two main aspects: climate change mitigation and environmental preservation in Indonesia. This study aims to identify best practices, challenges, and evidence-based policy recommendations to support sustainable transition.

Research Methodology

The research method used a systematic literature review approach to primary sources such as books, journals and other documents in accordance with the research context (Patten, 2016) ; (Eliyah & Aslan, 2025) .

Results and Discussion

Integration of the Green Economy in Climate Change Mitigation

The integration of the green economy into climate change mitigation in Indonesia is a crucial strategy for balancing economic growth with reducing greenhouse gas (GHG) emissions. The green economy is a system that promotes income and job growth through investment in low-carbon sectors, resource efficiency, and prevention of environmental degradation, which is relevant to Indonesia as a developing country with high emissions from the energy and forestry sectors (Maidasari et al., 2023) .

Indonesia submitted its Second Nationally Determined Contribution (SNDC) in October 2025 to the UNFCCC, targeting a reduction in emissions of 1,257-1,488 $MtCO_2e$ by 2035 through the Low Carbon Compatible with Paris (LCCP) scenario, with a focus on renewable energy and forestry net sinks. This commitment is in line with the Dubai Climate Pact and emphasises the integration of a green economy to achieve net-zero emissions (NZE) faster than 2060 (Koreshi et al., 2025). The Low Carbon Development Initiative (LCDI), launched by Bappenas, is the main platform for low-carbon development with a Holistic, Integrative, Thematic, and Spatial (HITS) approach. LCDI identifies policies to maintain GDP growth of 6.5% per year while reducing emissions, through green investment climate and cross-sector integration such as energy, AFOLU, and industry (Dianjaya & Epira, 2020) .

The 2025-2029 National Medium-Term Development Plan (RPJMN) integrates the green economy as a transformation strategy, with a focus on energy security and reducing emissions intensity. This policy includes refinancing Green Sukuk for renewable energy infrastructure such as solar power plants and micro-hydro, which is projected to significantly reduce CO_2 emissions (Masdar et al., 2022) . The energy sector is the main focus, where the target of 23% renewable energy mix by 2025 is optimised through PLN's RUPTL, including floating solar power plants, wind power plants, and 10.2 million tonnes of biomass co-firing. Although the 2023 realisation is only 13.1%, the government is optimistic about the acceleration strategy of 10.6 GW of new EBT power plants (Santoso & SIK, 2022).

Since 2009, the REDD+ programme has reformed forest governance, with a moratorium on land clearing and payments for ecosystem services to reduce deforestation. REDD+ contributed to a 24.1% reduction in national emissions (692 $MtCO_2e$) through primary forest protection and peatland restoration, although improvements are needed for further transformation (Sari et al., 2024). The green economy promotes sustainable industries through green Special Economic Zones

(SEZs), with 31 SEZs by 2026 implementing energy efficiency, circular economy, and zero waste management. This concept aligns with downstreaming and ESG principles, creating long-term value for investors (Seftiani, 2024) .

The updated NDC and LTS-LCCR 2050 map emissions peaking in 2030 with a net forestry sink, reducing GDP losses due to climate change by up to 3.45%. The energy and AFOLU sectors are dominant, supported by enablers such as sectoral planning and green districts (NI KADEK PRASTIKA, 2025). The Green Growth Programme (GGGI-Bappenas) supports social inclusion and resource efficiency, targeting SDGs through green investments at provincial and national levels. It strengthens LCDI through multi-stakeholder collaboration for climate mitigation (Abyan, 2025) .

The impact of the green economy has been proven in studies showing the role of NZE policies on growth, with reductions in energy consumption per unit of production and CO_2 emissions. The potential decline in GDP due to climate change of up to 30.2% can be prevented through this transition (Dianjaya & Epira, 2020) . The 2025-2045 RPJPN (National Medium-Term Development Plan) makes the green economy a key objective, with the optimisation of renewable energy for sustainable environmental support. Innovations such as 3.6 GW rooftop solar power plants and B35 biodiesel support this target (Sungkawati & Uthman, 2024). Challenges include fossil fuel dependence and lack of political commitment, but strategies such as INA (Rp 60 trillion) and green sukuk refinancing are accelerating the transition (Masdar et al., 2022) .

The integration of the green economy into climate change mitigation in Indonesia not only focuses on reducing greenhouse gas emissions, but also creates broad economic opportunities, including the creation of 1.8 million green jobs and the simultaneous strengthening of food and energy security (Maidasari et al., 2023) .

Thus, the green economy serves as a pillar of Indonesia's climate mitigation efforts, with the LCDI and NDC as the foundation for sustainability.

The Green Economy as a Pillar of Sustainable Environmental Conservation

The green economy positions itself as a key pillar of environmental conservation in Indonesia by integrating the conservation of natural resources such as forests, water and biodiversity into a sustainable development model. This approach emphasises resource efficiency and waste reduction to preserve ecosystems, in line with the UNEP definition that highlights the balance between economic growth and nature conservation (Ulya et al., 2023) .

The close relationship between the green economy and conservation is evident in the 2020-2024 National Medium-Term Development Plan (RPJMN), which includes Low Carbon Development (PRK), with strategies for reducing greenhouse gas emissions, green stimulus, and the implementation of PRK to preserve the environment while restoring the post-pandemic economy (Alawiyah, 2025). The Ministry of Environment and Forestry (KLHK) has made biodiversity a key asset for green economic

development, through ex-situ conservation such as the Bali Starling breeding programme and nature tourism that preserves wildlife habitats (Hadi et al., 2024) .

A community-based approach is key, where the green economy involves local communities in the management of customary forests and reforestation to prevent land degradation, with corporate CSR support for ecosystem restoration (Tifarani & Ansari, 2023) . The circular economy is revolutionising environmental conservation by transforming the "take-make-dispose" cycle into a closed-loop model, reducing waste through recycling, extending product lifecycles, and regenerating natural ecosystems such as reforestation (Setyoningrum et al., 2024) .

In the agro-industry sector, managing organic waste into biogas and biochar through the circular economy reduces pollution and creates alternative energy, as in Subang, supporting the green economy without wasting production residues (Prasetyo, 2021) . Best practices in the agricultural sector include organic farming, integrated pest management, and crop diversification to increase productivity while minimising soil and water degradation, strengthening sustainable food security (Martawardaya et al., 2022).

Green tourism utilises Indonesia's biodiversity through ecotourism in national parks, generating income while protecting habitats, with KLHK biological inventory for data-based conservation planning (Hadi et al., 2024) . Zero waste management is implemented through the 3R (Reduce, Reuse, Recycle) programme and the KLHK's PROPER initiative, where leading companies apply the green economy for SDGs, inspiring environmentally friendly industrial transformation (Alawiyah, 2025) . Technological innovations such as artificial reproductive technology (ART) for protected species and seed banks support ex-situ conservation, while restocking species increases populations in natural habitats (Tifarani & Ansari, 2023) .

Environmental education and public awareness form the foundation, with Biodiversity Day encouraging collective action through green CSR for in-situ conservation such as national parks and protected forests (Tifarani & Ansari, 2023) . Corporate social responsibility (CSR) contributes through critical land restoration and erosion control, creating synergy between business and conservation to address threats such as invasive species (Martawardaya et al., 2022) . Challenges such as habitat destruction and climate change are addressed through the green economy in IKN, with green technology FGDs and circular waste management as a national model city (Johannes, 2024) .

Overall, the synergy between the green economy and environmental conservation through the circular economy and community-based practices opens up new business opportunities in the agriculture and tourism sectors.

Conclusion

The integration of the green economy is a fundamental strategy for Indonesia in addressing the dual challenges of climate change and environmental conservation. Through the Low Carbon Development Initiative (LCDI), the Second Nationally Determined Contribution (SNDC) 2025, and the National Medium-Term Development Plan (RPJMN) 2025-2029, Indonesia has laid a strong foundation for the transition to inclusive low-carbon development, with a target of 23% renewable energy mix and forestry net-sink as the main pillars.

The implementation of the green economy has not only succeeded in reducing GHG emissions through the energy sector, REDD+, and green Special Economic Zones (SEZs), but also in preserving biodiversity, managing circular waste, and creating 1.8 million green jobs that strengthen national food and energy security. The synergy between the circular economy, environmental CSR, and sustainable tourism demonstrates the potential of this model to achieve a triple bottom line balance: people, planet, and profit. To realise the vision of Indonesia Emas 2045, a sustained commitment is needed through multi-stakeholder collaboration, green technology innovation, and the strengthening of inclusive regulations. The green economy is not merely a strategic choice, but an existential necessity for Indonesia to maintain environmental sovereignty and global competitiveness amid the increasingly urgent global climate crisis.

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