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Indonesia-South Korea Cooperation in the Realization of Net Zero Emissions through the KBLBB Program

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Abstract: *This study analyzes Indonesia's cooperation with South Korea in realizing Net Zero Emission (NZE) through the Battery-Based Electric Motor Vehicle (KBLBB) program. With the Theory of Environmentalism, the Concept of Anthropocentrism and the Concept of Environmental Regime, this study explores how the KBLBB program can be one of the strategic programs for mitigating climate change in the energy sector, especially transportation. Indonesia as one of the contributors to global greenhouse gas emissions, requires solutions to reduce carbon emissions and accelerate the green energy transition. With reference to the UNFCCC through the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR), there are several targets that need to be achieved by Indonesia in the short, medium and long term for the realization of NZE 2060. However, Indonesia faces several challenges in developing infrastructure and production of electric vehicles, which requires Indonesia to partner with South Korea through the Indonesia-Korea Comprehensive Economic Partnership Agreement (IK-CEPA). This study reveals the importance of bilateral collaboration, technology transfer and investment to accelerate KBLBB.*
Keywords: NZE, KBLBB, Green Energy Transition, Bilateral Cooperation

INTRODUCTION

Climate change and environmental restructuring have prompted a global transition toward new patterns of life. Changes in the environmental structure and climate are largely influenced by increasingly diverse human activities, driven by rapid technological and societal advancements. Fundamentally, human activity is aimed at meeting essential needs and responding to the demands of modern development. However, these efforts inevitably bring about various negative externalities [1]. Broadly speaking, such activities generate emissions that disrupt environmental balance.

Nonetheless, fulfilling human needs cannot simply be halted in favor of environmental considerations alone—thus, a middle ground is required. Green energy offers a rational alternative to address the environmental crises currently unfolding. In response, the global community, through the United Nations Framework Convention on Climate Change (UNFCCC), initiated a legally binding international agreement on climate change known as the Paris Agreement. The agreement was adopted by 196 parties at the 21st Conference of the Parties (COP21) in Paris on December 12, 2015, and was ratified by Indonesia through Law No. 16/2016. The agreement embodies a collective global commitment to limit global temperature rise well below 2°C above pre-industrial levels, and to strive to limit the increase to 1.5°C. Another priority emphasized in the Paris Agreement is achieving Net Zero Emissions (NZE) by 2060 [2].

Since Indonesia has ratified the Paris Agreement, it is thus obligated to support NZE achievement targets. To realize this, the Indonesian government has adopted five core principles: (1) increasing the use of renewable energy; (2) reducing fossil energy use; (3) adopting electric vehicles (EVs) in the transportation sector; (4) increasing electricity consumption in households and industries; and (5) utilizing

Carbon Capture and Storage (CCS). In line with the third principle, Indonesia established the Battery-Based Electric Motor Vehicle Program (KBLBB), formalized through Presidential Regulation No. 55 of 2019, and updated with Presidential Regulation No. 72 of 2023 [3]. Through this initiative, the government aims to consistently reduce greenhouse gas emissions, as electric vehicles produce no exhaust emissions during operation, thereby contributing to the NZE 2060 target.

However, to accelerate KBLBB—particularly regarding battery charging infrastructure—Indonesia faces critical challenges, including the limited development of the domestic EV industry and the lack of a core technology base for production. This is reflected in the low EV sales in Indonesia; according to Indonesia's Investment Coordinating Board (BKPM), sales increased by only 0.2% in 2020 [4]. In response, South Korea has been chosen as the most relevant partner for EV development and ecosystem establishment. This partnership is embedded in the Indonesia–Korea Comprehensive Economic Partnership Agreement (IK-CEPA). Juridically, IK-CEPA negotiations began in 2012 under President Susilo Bambang Yudhoyono (Indonesia) and President Lee Myung-bak (South Korea) [5]. Although suspended in 2014, IK-CEPA resumed on February 19, 2019, and was officially implemented on January 2, 2023 [6].

IK-CEPA outlines an economic agreement that includes multiple sectors such as agriculture, healthcare, infrastructure, trade, and industry, enabling cross-border investment. Under this agreement, Hyundai has invested approximately USD 1.5 billion in Indonesia [7]. The KBLBB partnership with South Korea is a strategic solution for reducing fuel consumption and mitigating environmental degradation through reduced vehicle emissions. South Korea's investment also includes the establishment of a Hyundai Motor factory in Indonesia, aimed at export markets and positioning Indonesia as a production hub for the Asia-Pacific region [8].

Therefore, the Indonesia–South Korea cooperation in the realization of NZE 2060 through the KBLBB program presents a compelling case for investigation. Using Environmentalism Theory, which posits that environmental problems can be addressed within the current global system, the author aims to analyze whether this bilateral cooperation effectively supports the NZE 2060 agenda. Additionally, the study employs Anthropocentric Concepts and Environmental Regime Theory to explore how non-ecocentric paradigms and the presence of structured environmental regimes may serve as potential solutions to the environmental challenges, particularly regarding the NZE 2060 goal through KBLBB.

RESEARCH METHOD

In this study, the author employs a qualitative research method. The research involves both a descriptive explanation and an analytical approach to the subject under investigation. The qualitative method is considered particularly relevant to the study of South Korea–Indonesia cooperation in the realization of Net Zero Emissions through the KBLBB program.

The data and information used in this research are derived from a variety of sources, including literature such as books discussing the thoughts of experts on international relations theory, environmental issues, and bilateral cooperation between states. Additionally, the study draws upon academic journals, government regulations, official government websites, articles, and news reports related to the collaboration between South Korea and Indonesia in achieving Net Zero Emissions through the Battery-Based Electric Motor Vehicle Program (KBLBB).

RESULT AND DISCUSSION

Historically, bilateral relations between Indonesia and South Korea have been established for quite some time. The year 1968 marked the beginning of more intensive and bilateral interactions between the two nations. During this period, communism continued to exert significant influence across many countries. In response, Indonesia and South Korea initiated cooperation specifically aimed at countering communism and promoting national development [9].

Entering the 1980s, South Korean investment in Indonesia began to increase, particularly in the manufacturing and textile sectors. One of the most significant milestones in the bilateral relationship was the signing of trade and investment agreements, which enabled South Korean companies such as Samsung and LG to establish production facilities in Indonesia [10].

By the early 1990s, the relationship between Indonesia and South Korea became even closer, marked by increasing trade volumes and investment in sectors such as electronics, automotive, and infrastructure. On December 4, 2006, both countries signed the Joint Declaration on Strategic Partnership, an agreement aimed at strengthening bilateral ties, particularly in the fields of economy, trade, and investment [11].

Following this declaration, cooperation between Indonesia and South Korea intensified, especially in economic and trade sectors. A key example is the Indonesia–Korea Comprehensive Economic Partnership Agreement (IK-CEPA), which generally aims to enhance the economic strength of both countries. IK-CEPA is defined as a trade agreement signed by both parties under the CEPA framework, with the goal of strengthening bilateral trade and economic relations by reducing and even eliminating existing trade barriers. The framework extends beyond trade to establish a comprehensive institutional structure between South Korea and Indonesia.

IK-CEPA is founded on three core principles: market access, trade facilitation, and economic cooperation and capacity building. Through this cooperation framework, cross-sectoral investment between the two countries is possible, including in the energy and transportation sectors. The IK-CEPA framework continues to be developed under the administration of President Joko Widodo, showing a consistently positive trend [12].

Indonesia is one of the world's largest contributors to greenhouse gas (GHG) emissions. The country currently ranks eleventh among the top global emitters, having previously been ranked sixth, according to Dwikorita Karnawati, Head of the Meteorology, Climatology, and Geophysics Agency (BMKG) of Indonesia [13].

In general, GHGs include several compounds such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) [13]. According to European Union data published in 2022, Indonesia ranks eleventh in global CO_2 emissions, just below South Korea. Quantitatively, Indonesia contributed approximately 602.59 million tons of CO_2, accounting for 1.59% of total global CO_2 emissions [14].
Below is a graph illustrating Indonesia's greenhouse gas emissions [15].

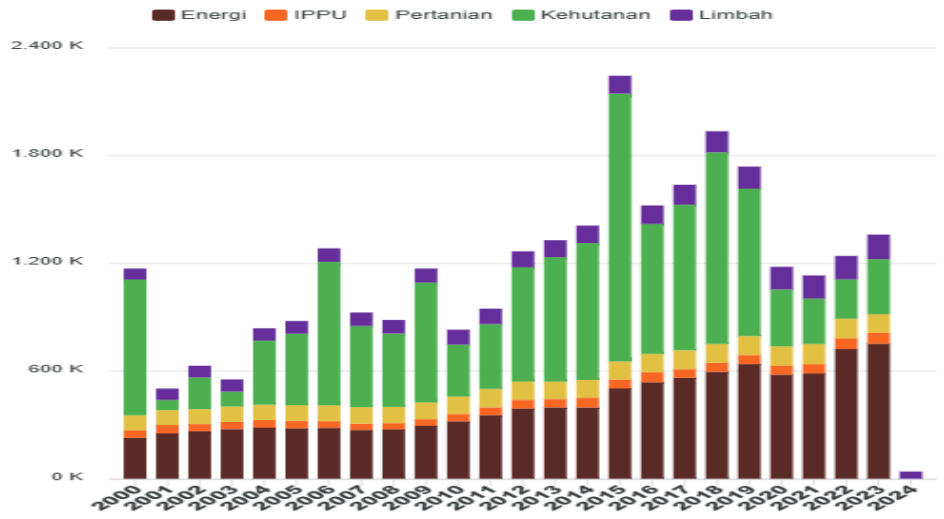

Figure 1. National Greenhouse Gas Emissions

Based on the data, it can be observed that greenhouse gas (GHG) emissions remain fluctuating and are still below the standards set by the Net Zero Emissions (NZE) commitment. To address this, a green energy transition with several mitigation steps is essential. The UNFCCC has initiated the formation of the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR). Through this strategy, Indonesia has committed to a gradual reduction in GHG emissions, aiming to achieve NZE by 2060. The LTS-LCCR outlines four key sectors as the main focus areas for emission reductions [16].

First, in the Forestry and Other Land Use (FOLU) sector, the emission reduction target is set at 140,000 Gg by 2030, known as the "FOLU Net Sink 2030". Between 2020 and 2022, positive progress was recorded, as FOLU emissions were approximately 482,945 Gg, a significant drop from around 1,100,000 Gg in 2015. Although this shows a declining trend, the target figure has yet to be fully reached [17].

Second, in the waste sector, various categories are distinguished, including municipal solid waste, industrial wastewater, and industrial solid waste. Within the LTS-LCCR, a long-term emission reduction strategy has been introduced, called the Low Carbon Compatible Pathway (LCCP). According to LCCP, emissions are targeted to drop by 2.5%; without serious control measures, emissions are projected to reach 272 $MtCO_2e$ by 2050. LCCP aims to lower emissions to 120 $MtCO_2e$ by 2030 through multiple mitigation scenarios.

However, as of now, Indonesia's waste management efforts remain limited. Only 65.71% (13.9 million tons) of national waste is properly managed via 3R Waste Processing Sites (TPS 3R), Sanitary Landfills, and recycling systems, while 34.29% (7.2 million tons) remains unmanaged [18]. This is exacerbated by the lack of implementation of Waste-to-Energy (PLTSa) plants, which have only been developed in 12 cities in Indonesia [19].

Third, in the energy sector, under the Current Policy Scenario (CPOS)—in the absence of policy interventions—GHG emissions are projected to reach 2,115 $MtCO_2e$ by 2050. Given the severity of this figure, LCCP projects a more sustainable target of 1,030 $MtCO_2e$ by 2030 and 572 $MtCO_2e$ by 2050 [16]. However, Indonesia is currently not on track to meet these goals. Between 2015 and 2030, the required reduction is 72.3 $MtCO_2e$/year, yet from 2015 to 2023, energy sector emissions have increased at an average of 25.5 $MtCO_2e$/year [15].

Finally, in the Industrial Processes and Product Use (IPPU) sector, emissions are classified into four categories: cement, ammonia, nitric acid, and aluminum industries. According to LCCP 2030, Indonesia is expected to reach 29.3 $MtCO_2e$ in total emissions for these four sub-sectors. However, data from the Ministry of Environment and Forestry shows that emissions in the IPPU sector increased from 2015 to 2019. The annual reduction target is 1.13 $MtCO_2e$, yet the actual trend shows an increase of 1.32 $MtCO_2e$/year. This is largely due to the rapid growth of heavy industries such as steel, iron, and aluminum, coupled with the limited availability of low-carbon technologies [15].

Indonesia's progress toward achieving Net Zero Emissions (NZE) remains below the expected targets set out in the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR). Therefore, several measures must be taken to address this gap. The realization of NZE in Indonesia continues to face significant challenges, particularly in sectors that contribute the most to national emissions, such as energy and forestry.

Although various mitigation programs have been introduced, current GHG emission reduction efforts are still falling short of LTS-LCCR targets. The downward emission trends in several sectors have yet to show optimal results. Within the energy sector, particularly in the transportation sub-sector, emission levels remain notably high [15].

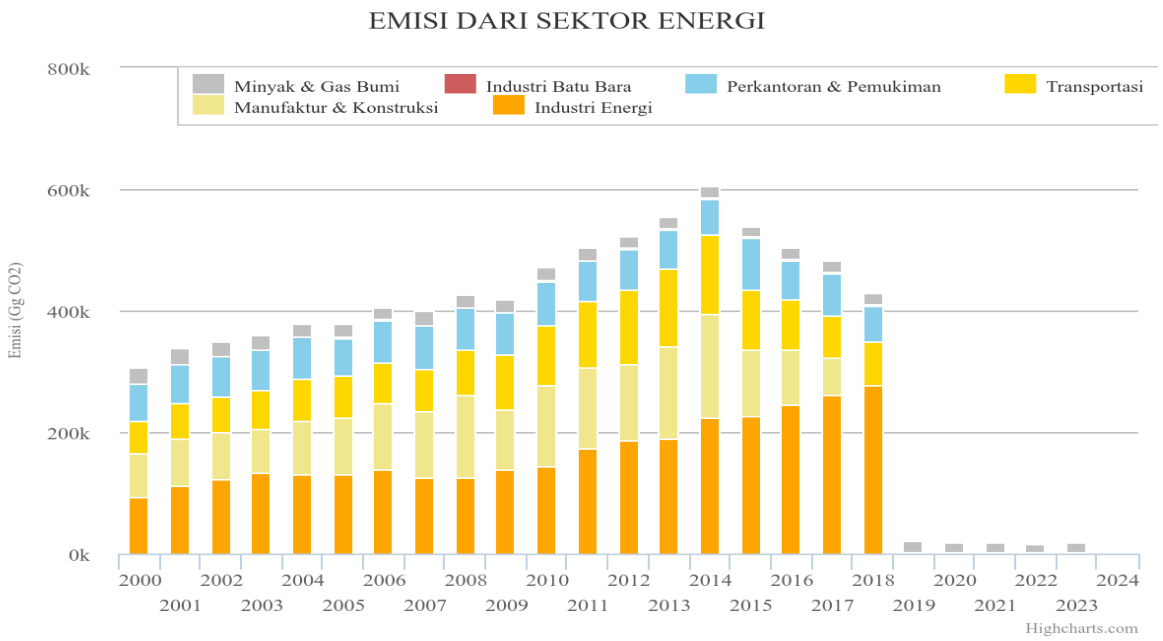

Figure 2. Emissions from the Energy Sector

Based on Figure 2, it can be observed that emissions from the energy sector remain unstable. Furthermore, emissions from the transportation sub-sector contribute significantly to the overall energy sector emissions in Indonesia. The increase in emissions from transportation is driven by several factors, including the rising mobility of the population and the growing number of vehicles in the country.

The following is a table illustrating the dynamics of Indonesia's transportation sector from 2015 to 2022 [20].

Table 1. Number of Vehicles in Indonesia, 2015–2022

Year	Passenger Cars	Buses	Trucks	Motorcycles	Total
2015	12.304.221	196.309	4.145.857	88.656.931	105.303.318
2016	13.142.958	204.512	4.326.731	94.531.510	112.205.711
2017	13.968.202	213.359	4.540.902	100.200.245	118.922.708
2018	14.830.698	222.872	4.797.254	106.657.952	126.508.776
2019	15.592.419	231.569	5.021.888	112.771.136	133.617.012
2020	15.797.746	233.261	5.083.405	115.023.039	136.137.451
2021	16.413.348	237.566	5.299.361	120.042.298	141.992.573
2022	17.168.862	243.450	5.544.173	125.305.332	148.261.817

Based on the data presented by Statistics Indonesia (BPS) in Table 1, it can be observed that the number of vehicles in Indonesia has increased consistently over time. This trend is largely driven by the growing desire among Indonesians to own personal vehicles. Public roads in Indonesia are generally not conducive to pedestrian activity, and the country's hot tropical climate often discourages people from walking.

To address this issue, electric vehicles (EVs) have been proposed as a practical and sustainable solution. In response, the Indonesian government has introduced a policy aligned with this vision, known as the Battery-Based Electric Motor Vehicle Program (KBLBB). The State Electricity Company (PLN), as a state-owned enterprise, plays a key role as one of the main stakeholders in implementing the program.

In support of this initiative, the Ministry of Energy and Mineral Resources (ESDM) issued Regulation No. 13 of 2020, which outlines the government's efforts to provide electric charging infrastructure for KBLBB vehicles [21].

This initiative aligns with Presidential Regulation No. 55 of 2019 concerning the Acceleration of Battery Electric Vehicles (BEVs) for Road Transportation. Article 3 of the regulation outlines the government's commitments to support the KBLBB program, including the acceleration of BEV industry development, the provision of incentives, the deployment of charging infrastructure, electricity tariff regulation for EVs, and environmental protection [22]. In general, this regulation serves as a foundation for the technical implementation of KBLBB in Indonesia, including the formulation of a national roadmap, fiscal and non-fiscal incentives, local content requirements, and institutional coordination across ministries.

Over time, however, the scope of the KBLBB has expanded. Initially, Presidential Regulation No. 55/2019 was intended solely to facilitate the creation of an EV ecosystem. Yet, as Indonesia's national energy needs evolve, the policy landscape has undergone significant transformation. This includes the country's commitment to NZE 2060, the adoption of energy transition as a national strategic agenda, and growing global pressure to reduce dependence on fossil fuels. These new demands were not fully addressed under the 2019 regulation. Consequently, the government issued a follow-up regulation: Presidential Regulation No. 79 of 2023.

This new regulation primarily addresses the acceleration of energy transition in the transportation sector. Compared to its predecessor, it introduces several key developments. First, it expands institutional roles by engaging more ministries, agencies, and local governments in the procurement of electric vehicles and infrastructure development. Second, it strengthens supporting infrastructure through the development of Public Electric Vehicle Charging Stations (SPKLU) and the establishment of technical and safety standards for electrical infrastructure. Third, it broadens the incentive schemes, including tax exemptions and eased permitting processes for EV ecosystem development. Lastly, it introduces target setting and performance monitoring, including the creation of action plans and performance indicators, accompanied by periodic evaluations [23].

Through the implementation of KBLBB, the government aims to significantly reduce greenhouse gas emissions, as targeted under Presidential Regulation No. 79 of 2023, and to support the realization of NZE by 2060. KBLBB is regarded as a strategic solution not only for reducing transportation emissions, but also for decreasing Indonesia's dependence on depleting fossil fuels. The shift from conventional vehicles to electric vehicles is expected to enhance energy independence by increasing the use of renewable energy sources (EBT), making the transportation sector more efficient, environmentally friendly, and sustainable. This vision forms part of Indonesia's national strategy for transitioning to cleaner energy sources and strengthening domestic energy resilience.

However, effective implementation of this policy requires a technology parent company to support mass EV production. In this regard, several countries have invested in Indonesia's EV sector, including South Korea through Hyundai, within the KBLBB program framework. This bilateral cooperation initially emerged through the Indonesia–Korea Comprehensive Economic Partnership Agreement (IK-CEPA). In 2020, IK-CEPA focused on trade in goods, including tariff reductions/eliminations, rules of origin, trade in services, institutional arrangements, and customs regulations. The Indonesian government ratified IK-CEPA through Law No. 25 of 2022, which became effective on January 1, 2023.

IK-CEPA includes several sectoral arrangements with specific schemes:

1. In the trade in goods sector, South Korea agreed to eliminate 95.54% of tariff lines, while Indonesia removed 90.06% of tariff lines.
2. In terms of tariff elimination, Indonesia initially imposed tariffs on 94% of imports from South Korea, while South Korea absorbed 97.3% of Indonesian tariffs. The removal of 11,686 tariff posts (95.54%) under IK-CEPA significantly benefits Indonesia.
3. In the trade in services sector, both countries opened up approximately 100 sub-sectors to promote future service integration across areas such as manufacturing, computer services, postal and courier services, and more.

4. In the investment sector, Indonesia offered preferential tariffs to facilitate Korean investment worth USD 254.96 million, equivalent to 0.96% of tariff calculations, or 2.96% of Indonesia's total imports from South Korea.

In addition, Indonesia has offered supplementary concessions on 104 tariff lines covering raw materials required by South Korea for its investments in Indonesia. Between 2019 and 2020, total bilateral investments between Indonesia and South Korea reached USD 6.7 billion, encompassing 12,992 projects. In terms of trade, total bilateral trade between the two countries amounted to USD 15.65 billion, with Indonesia's exports to South Korea valued at USD 6.44 billion. Furthermore, South Korea ranked as Indonesia's 8th largest export destination (USD 7.23 billion) and 6th largest source of imports (USD 8.42 billion) [24].

As part of its official commitment, South Korea has expressed its intention to position Indonesia as a new manufacturing hub within the ASEAN region. In response, South Korea's automotive giant, Hyundai Motor Company, has allocated USD 1.55 billion to establish a major production facility in Indonesia. Notably, Indonesia is the first country to host Hyundai's research and development (R&D) center outside of South Korea. The production plant, once operational, is capable of producing between 150,000 and 250,000 units annually, and provides employment for approximately 2,000 workers [24].

This significant investment and factory development by Hyundai Motor Company represents South Korea's concrete commitment to supporting the realization of Battery-Based Electric Vehicles (KBLBB) in Indonesia as part of the country's Net Zero Emissions (NZE) agenda. Through Hyundai's domestic EV production, this initiative is expected to contribute meaningfully to the reduction of energy-related emissions, especially in the transportation sector, in alignment with targets set by the United Nations Framework Convention on Climate Change (UNFCCC).

Indonesia's Challenges in Achieving Net Zero Emissions in the Emissions Sector

Despite ongoing efforts, the implementation of Net Zero Emissions (NZE) through the Battery-Based Electric Motor Vehicle (KBLBB) program continues to face several challenges. Indonesia is known to hold the world's largest nickel reserves, accounting for approximately 30% of global supply. This endowment positions Indonesia as a country with high potential to become a leading producer of electric vehicle (EV) batteries and lithium components. However, in practice, Indonesia still struggles to establish itself as a fully independent EV manufacturing nation.

The first challenge lies in the regulatory framework and legal certainty. Although Presidential Regulation No. 55 of 2019 and Presidential Regulation No. 79 of 2023 have been enacted to accelerate the EV program, the risk of policy inconsistency and regulatory shifts could disrupt the continuity of long-term programs. Without firm legal guarantees, investors may hesitate to allocate large-scale resources [25].

The second challenge involves funding and fiscal incentives. The realization of KBLBB requires substantial investment—not only for vehicle production but also for the development of supporting infrastructure such as Public Electric Vehicle Charging Stations (SPKLU). While the government has offered incentives such as luxury tax (PPnBM) exemptions and import duty reductions, implementation has been uneven. This has negatively impacted Completely Built-Up (CBU) imported vehicles, which still face relatively high taxes. In addition, various administrative charges such as vehicle ownership transfer fees (BBNKB) contribute to higher EV prices in Indonesia compared to other countries.

The third major challenge is the lack of supporting infrastructure. In the EV production ecosystem, infrastructure remains a critical component. Two key elements of the KBLBB ecosystem are Public Electric Vehicle Charging Stations (SPKLU) and Battery Swapping Stations (SPBKLU). However, the limited network coverage and the lack of technical standardization in infrastructure development pose serious barriers to mass EV adoption. The government must accelerate infrastructure deployment by involving private sector actors and ensuring that the charging network can accommodate the projected growth of electric vehicles. According to Indonesia's National Energy Grand Strategy, the government targets the construction of 572 SPKLU units, with expansion to 31,859 units by 2030, to support the anticipated 2.2 million KBLBB units on the road by that year [26].

Finally, a critical challenge lies in the low market demand for EVs in Indonesia. Data from Statistics Indonesia (BPS) shows a steady increase in the number of conventional vehicles over the years. This

trend presents a policy dilemma: on one hand, increased vehicle ownership offers growth opportunities for the automotive industry; on the other hand, it contributes to rising emissions and necessitates a rapid transition to electric mobility. A key obstacle is the consumer behavior shift—many Indonesians are still reluctant to move away from fossil-fuel vehicles, especially due to the relatively high upfront cost of EVs.

Therefore, the government must adopt effective marketing strategies, long-term public education, and the development of attractive financing schemes to encourage EV adoption and stimulate market demand [25].

Indonesia and South Korea's Strategies in the KBLBB Agenda to Achieve Net Zero Emissions by 2060

Given the various challenges in realizing Net Zero Emissions (NZE), strategic efforts are required. Indonesia and South Korea have both developed collaborative strategies within the framework of the Battery-Based Electric Motor Vehicle (KBLBB) program, aligning with their mutual commitment to NZE 2060. The foundation of these strategies stems from each country's commitment to the Paris Agreement. While South Korea has not explicitly ratified the Agreement, its principles have been incorporated into national regulatory frameworks. In contrast, Indonesia officially ratified the Paris Agreement through Law No. 16 of 2016, concerning the Ratification of the Paris Agreement to the United Nations Framework Convention on Climate Change [27].

Both nations demonstrate a shared commitment to achieving NZE by 2060. Their collaboration is not limited to individual national policies but extends to joint initiatives, exemplified by the signing of a Memorandum of Understanding (MoU) for the Implementation of Article 6 of the Paris Agreement.

The first strategic step is the establishment of PT Hyundai Motor Manufacturing Indonesia (PT HMMI) in Cikarang, Indonesia. This development represents Hyundai's commitment to supporting Indonesia's transition to electric vehicles, as stated by Young Tack Lee, President of Hyundai Motor ASEAN HQ [28]. Through PT HMMI, Hyundai aims to produce a diverse range of EVs for the Indonesian market, targeting 1,000 units per month to meet local demand.

The second strategy involves Hyundai's support for local supply chain development, particularly in battery production. Hyundai Energy Indonesia (HEI), a subsidiary of Hyundai Motor Group, began construction of its first battery system plant in Cikarang, West Java. According to Chang Oug Hong, President Director of Hyundai Energy Indonesia, this project solidifies Hyundai's role in leading the electrification of Indonesia's automotive sector. The plant is funded directly by the South Korean government, following the P4G Summit as part of its NZE commitments [29]. This initiative addresses key infrastructure and supply chain challenges, particularly the domestic production of EV batteries essential for KBLBB implementation.

The third strategy involves Hyundai's participation in developing charging and battery-swapping infrastructure. Realizing the KBLBB program requires not only vehicles but also a robust ecosystem of charging stations (SPKLU) and battery-swapping stations (SPBKLU). As of early 2024, Hyundai has established over 200 SPKLU stations across Indonesia, including at Hyundai dealership networks. These stations are interoperable, meaning they can be used by EVs from all manufacturers [30].

In the battery-swapping sector, Hyundai—via Hyundai Kefico—has partnered with PLN, Indonesia's state electricity company, to expand the EV ecosystem. One milestone project was in Bali, where 50 EV units were deployed by Hyundai Kefico to support PLN operations during the G20 Summit. The project also involved installing SPBKLU infrastructure in collaboration with local governments [31]. These infrastructure projects directly address the second major challenge of KBLBB implementation: the lack of charging and battery-swapping facilities.

While the bilateral cooperation between South Korea and Indonesia has made significant progress, Indonesia has also adopted domestic strategies to stimulate EV demand. One such measure involves fiscal incentives from the Directorate General of Taxes (DJP):

Income Tax (PPh): 0% income tax incentive on the sale of battery-based electric vehicles (BBEVs) used for EVs.

Value-Added Tax (VAT): 0% VAT on the sale of two-wheeled EVs, both local and imported, for vehicles priced under IDR 250 million; above this threshold, a 10% VAT applies.

Luxury Goods Tax (PPnBM): 0% PPnBM on the sale of locally produced four-wheeled EVs, applicable to vehicles priced under IDR 250 million. Those exceeding this threshold are taxed according to existing regulations [32].

These tax incentives effectively respond to the second major challenge: fiscal barriers to EV adoption. Furthermore, the Hyundai–Indonesia partnership, under the IK-CEPA agreement, facilitates tariff reductions and technology transfers. Hyundai Motor Group, as a multinational corporation under IK-CEPA, benefits from Indonesia eliminating 90.06% of tariff lines for South Korea, while South Korea eliminates 95.54% of tariff lines for Indonesia. This significantly reduces the cost of imported EV components, supporting the expansion of KBLBB.

The combined effect of tax incentives on PPh, VAT, and PPnBM also addresses the fourth major challenge: low consumer demand for EVs. In 2024, Indonesia recorded a 177.32% year-on-year increase in electric vehicle demand compared to the previous year [33]. According to Jongkie Sugiharto, Chairman of GAIKINDO, the growth in EV sales was largely driven by government incentives on VAT and PPnBM for imported CBU vehicles. This growing consumer interest reflects a positive trend for the success of Indonesia's KBLBB agenda.

Analysis Based on Theory and Concepts

The bilateral strategies between Indonesia and South Korea, along with Indonesia's domestic policies within the framework of the Battery Electric Vehicle (KBLBB) program for achieving Net Zero Emissions (NZE) by 2060, demonstrate strong relevance to Environmentalism Theory and two of its derivative concepts: Anthropocentrism and Environmental Regimes [34].

According to Environmentalism Theory, the global system can serve as a relevant solution to environmental issues. This system can be classified into several forms, such as bilateral cooperation, multilateral agreements, and international organizations. The cooperation between Indonesia and South Korea in the KBLBB framework represents the function of a global system in addressing environmental challenges. The bilateral partnership through Hyundai's electric vehicle (EV) production is a tangible effort to enable the green energy transition. Previously, Indonesia relied heavily on fossil fuels. To shift toward electric vehicles, Indonesia collaborated with Hyundai for technology transfer. This cooperation not only reflects the commitment to achieving NZE 2060 but also reinforces that the global system can serve as an effective platform for energy transitions through the development of charging stations (SPKLU), battery-swapping infrastructure (SPBKLU), and EV production technology.

Environmentalism Theory also emphasizes that technological innovation can help reduce the negative environmental impact of human activity. In the case of the Indonesia–South Korea partnership in KBLBB via Hyundai, electric vehicles represent an environmentally friendly technological development that does not compromise human needs. The KBLBB program highlights the significant advantages of technology. In the past, it was difficult to find a middle ground between human needs and environmental protection. In the transportation sector, people's primary needs include mobility and fuel. KBLBB provides a solution to all three issues: mobility, energy supply, and environmental sustainability. EVs, as a result of this technological innovation, can operate without emitting exhaust gases, and recharging is done through battery systems rather than fossil fuels.

This leads to the insight that radical environmental approaches may be less effective in today's Industry 4.0 era. Industrialization has significantly changed the way human needs are met. Human life cannot be constructed solely around environmental considerations. Therefore, halting all industrial and modernization efforts solely for environmental reasons is not a practical solution. The KBLBB–Hyundai collaboration exemplifies a non-radical environmental approach. Instead of abruptly halting vehicle production to drastically cut emissions, the Indonesian government has chosen to balance human needs and environmental concerns through KBLBB in cooperation with Hyundai.

Furthermore, this cooperation can also be analyzed through the lens of the Anthropocentrism Concept. This concept offers a renewed perspective, emphasizing that human needs and well-being should be prioritized, while also upholding responsibility toward environmental sustainability. A moderate

anthropocentric approach promotes sustainable development, which aligns with KBLBB's aim to reach NZE 2060 without compromising mobility needs. KBLBB illustrates how humans use technology to fulfill mobility needs while maintaining long-term ecological balance.

The final relevant concept is Environmental Regimes, which assumes that cooperation under a regime can offer solutions to environmental problems. The Indonesia–South Korea partnership through Hyundai within the KBLBB agenda demonstrates that both countries shared concerns over the environmental crisis and signed an MoU on the Implementation of Article 6 of the Paris Agreement. This shows that bilateral regimes can prioritize not only economic factors but also environmental considerations. While economic interests often dominate regime agendas, environmental regimes seek to mitigate environmental impacts—such as through the promotion of electric vehicles.

1. Moreover, this environmental regime, represented by the Hyundai partnership, proves useful in addressing three of the four primary challenges of the KBLBB implementation:
2. The second challenge (financing and fiscal incentives) is addressed through tariff exemptions, with South Korea eliminating 95.54% of tariff lines and Indonesia 90.06% [24].
3. The third challenge (infrastructure limitations) is addressed by Hyundai's development of over 200 SPKLUs and Hyundai Kefico's SPBKLUs in Bali.
4. The fourth challenge (low market demand for EVs) is tackled through PPN, PPh, and PPnBM incentives [32], which successfully increased EV demand by 177.32% year-on-year in 2024 [33].
5. Thus, the Indonesia–South Korea bilateral cooperation through Hyundai under the KBLBB framework proves to be beneficial and relevant, as it successfully responds to three out of four major challenges in achieving NZE 2060.

CONCLUSION

The escalating environmental crisis observed over the years has prompted countries to establish commitments aimed at addressing these challenges. One such commitment is embodied in the Paris Agreement, initiated by the UNFCCC, with the goal of achieving Net Zero Emissions (NZE) by 2060. The mitigation strategies and targets that must be pursued by signatory countries are clearly outlined by the UNFCCC. As a country that has ratified the Paris Agreement, Indonesia is obligated to make concrete efforts toward achieving the set targets. One of Indonesia's efforts in reaching NZE 2060 is the implementation of the Battery Electric Vehicle (KBLBB) program, which focuses on the energy sector—one of the largest contributors to global emissions. However, Indonesia faces several challenges in realizing this program independently. Therefore, strategic partnerships are necessary for the development and implementation of KBLBB.

Indonesia has chosen South Korea as a partner in the development and production of KBLBB. This decision is based on the existing trade cooperation between the two countries through the Indonesia-Korea Comprehensive Economic Partnership Agreement (IK-CEPA), as well as the signing of a Memorandum of Understanding (MoU) regarding the implementation of Article 6 of the Paris Agreement. Through Hyundai Motors Group, South Korea supports Indonesia's realization of the KBLBB program. Hyundai's involvement includes three main actions: producing electric vehicles, building public electric vehicle charging stations (SPKLU), and establishing battery-swapping stations (SPBKLU) across various regions in Indonesia. Nonetheless, the realization of KBLBB faces several obstacles, such as the absence of comprehensive legal frameworks, funding and fiscal incentive limitations, insufficient supporting infrastructure, and low public interest in electric vehicles among Indonesian consumers.

To address these challenges, the Indonesian government—together with Hyundai Motor Group—has developed several strategies, including the construction of EV manufacturing plants, the establishment of battery production facilities, and the development of supporting infrastructure. Additionally, the government has introduced internal strategies such as tax reductions for electric vehicles. Through these combined strategies, the government hopes to encourage the Indonesian public to shift toward KBLBB, thereby supporting the achievement of NZE by 2060. These strategies have successfully addressed three out of the four key challenges. It can therefore be concluded that the bilateral cooperation between Indonesia and South Korea has been largely effective in overcoming the main barriers to KBLBB implementation. Moreover, this collaboration not only demonstrates both countries' commitment to

global environmental agendas, but also serves to strengthen bilateral relations in the energy and technology sectors.

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