Analysis on the implementation of Battery Electric Vehicle Acceleration Program for Road Transportation In Indonesia

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Abstract. This study was conducted to analyze the implementation of the Battery Electric Vehicle Acceleration Program for Road Transportation in Indonesia, based on Presidential Regulation (Perpres) Number 79 of 2023 concerning the Acceleration of the Battery Electric Vehicle Program for Electric Transportation. This research employs a qualitative approach with a descriptive method through a literature review. Data were collected from studies on government efforts to accelerate the EV program in Indonesia. The findings of this study show that there are several factors influencing the success of the program's implementation, including public reluctance to adopt electric vehicles, the availability of supporting infrastructure, and the potential for vehicle recycling as part of future environmentally friendly initiatives. Finally, the government needs to reorganize its strategies to further accelerate the implementation of the EV program in Indonesia.

Keywords: Electric vehicle, Government, Environment, Transportation

1 Introduction

One of the major challenges that humanity will face in the future is the declining supply of non-renewable energy sources [1]. Human dependence on fossil fuels has already led to an energy crisis and has created additional problems, particularly in the form of pollution and environmental degradation, which contribute to global climate change [2]. Scientists have proposed various alternatives to anticipate and mitigate the potential energy crisis in the future. The International Energy Agency (IEA) has projected that global CO_2 emissions from fossil fuel combustion will increase from 31.2 gigatons (Gt) in 2011 to 37.0 Gt by 2035 under the New Policies Scenario [3].

As is well known, petroleum remains the primary energy source in the world today. Almost all global needs still rely on non-renewable natural resources, including in Indonesia. If petroleum continues to be consumed in large quantities, while no new oil reserves are discovered or no innovative technologies are developed to reduce fuel oil consumption, the world will face an increasingly severe energy crisis. According to the 2021 *Climate Transparency Report*, fuel combustion accounts for the majority of Indonesia's CO_2 emissions, with transportation contributing 27%, industry 27%, and electricity generation 35%[4].

The use of electric-based transportation is one of the most effective ways to reduce carbon emissions, as electric motor technology in vehicles significantly decreases the consumption of fossil fuels (BBM). Moreover, electric vehicles are considered environmentally friendly since

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their exhaust emissions are nearly zero, in contrast to conventional vehicles that rely solely on fossil fuels. Therefore, it is recommended that Indonesia intensify efforts to promote electric vehicle (EV) adoption, particularly in the two-wheeler market, which represents a substantial share of the country's transportation sector[5].

As of February 2024, Indonesia had approximately 132.4 million two-wheelers compared with 18.2 million four-wheelers, according to data from Statistics Indonesia (BPS) [6]. Electric vehicles (EVs), particularly electric cars, are recognized as one of the most effective strategies for reducing greenhouse gas (GHG) emissions and fuel consumption. EV technology is considered more efficient and has significant potential to reduce air pollution in densely populated urban areas. Furthermore, the adoption of electric vehicles is aligned with Indonesia's international commitments, such as the Paris Agreement, which targets a 29% reduction in carbon emissions by 2030.

To support this commitment, the Indonesian government issued Presidential Regulation (Perpres) No. 55 of 2019 on the Acceleration of the Battery-Based Electric Motor Vehicle Program. This policy was later reinforced by Presidential Regulation (Perpres) No. 79 of 2023, which amended Perpres No. 55 of 2019 and further emphasized the acceleration of battery electric vehicles for road transportation. These regulations represent the government's concrete initiatives to speed up the adoption of electric vehicles and reduce the nation's dependence on fossil fuels.

Several countries have taken aggressive measures to accelerate the adoption of electric vehicles. Norway, for instance, has achieved the highest market penetration of electric cars in the world, with more than 80% of new car sales in 2022 consisting of pure electric vehicles or plug-in hybrids. This remarkable success was driven by a combination of strong government support, including tax incentives, purchase subsidies, and the development of an extensive charging infrastructure.

In addition, Indonesia has set a target to produce 13 million electric motorbikes and 2.2 million electric cars by 2030. However, Indonesian consumers remain reluctant to switch from conventional vehicles to electric vehicles (EVs). To address this, the government has introduced various incentives, including subsidies and tax exemptions. Nevertheless, public hesitation is largely influenced by several factors, such as the high purchase price, limited infrastructure availability, and entrenched consumer habits.

The government's plan to promote EV development represents a significant effort to reduce fossil fuel (BBM) consumption in the transportation sector [7]. However, if the government is serious about advancing electric car adoption, comprehensive preparations must be made. In Indonesia, electric car technology remains relatively scarce and prohibitively expensive. Therefore, before large-scale deployment, the government must carefully assess the types of electric vehicles that best suit the needs of Indonesian society and prioritize the development of supporting infrastructure. Without adequate infrastructure, it will be nearly impossible for this technology to achieve widespread adoption.

Therefore, this article seeks to analyze the implementation of the Battery Electric Vehicle Acceleration Program for Road Transportation in Indonesia, to identify factors contributing to public reluctance in switching from conventional vehicles to electric vehicles (EVs), and to examine efforts to accelerate EV adoption in the country. The findings are expected to provide a clearer understanding of the steps that need to be taken by the government, industry stakeholders, and the community to achieve more environmentally friendly and sustainable mobility.

2 Methods

This research employed a qualitative approach using a literature study to analyze the implementation of the Battery Electric Vehicle Acceleration Program for Road Transportation in Indonesia, to identify factors related to public reluctance in switching from conventional vehicles to electric vehicles (EVs), and to examine efforts to accelerate EV adoption in the country. Data were collected through an extensive review of government efforts and policies aimed at promoting the EV program in Indonesia.

To ensure validity and reliability, this study applied triangulation of sources and methods in the data verification process. Triangulation was carried out to strengthen the credibility of the findings by comparing information from multiple sources and methodological perspectives.

Furthermore, descriptive analysis was employed to interpret and present the information obtained from secondary data. This approach allowed the researchers to provide a clearer understanding of the legal framework, policy measures, and practical implementation of electric vehicle adoption in Indonesia.

3 Results and Discussion

3.1 The implementation of Battery Electric Vehicle Acceleration Program for Road Transportation In Indonesia

One of the initiatives taken by the Indonesian government, through the Ministry of Transportation, has been to encourage government institutions—ranging from regional governments to ministries—to adopt electric vehicles for their operational activities. In 2020, the Ministry of Transportation issued a policy mandating that all government agencies, both at the central and regional levels, begin transitioning to electric vehicles in their daily operations. This policy forms part of the government's broader efforts to reduce greenhouse gas emissions and decrease dependence on fossil fuels. In addition, it is also intended to enhance energy efficiency and foster the growth of a domestic electric vehicle industry.

One concrete implementation of this policy is the *"Green Government"* program, which requires every ministry and state institution to transition their operational vehicles to electric vehicles within a specified timeframe. This initiative is in line with Presidential Regulation No. 55 of 2019 on the Acceleration of the Battery-Based Electric Motor Vehicle Program for Road Transportation, which outlines a series of strategic measures to encourage the adoption of electric vehicles in Indonesia.

In addition, this policy also aims to provide a direct example to the public and the private sector regarding the benefits of electric vehicles, including reducing greenhouse gas emissions, lowering operational costs, and improving air quality. The adoption of electric vehicles by government agencies is expected to serve as a concrete step that can accelerate broader public adoption of electric vehicles in Indonesia.

According to research by[7], one of the main objectives of this policy is to reduce the government's carbon footprint, which plays an important role in achieving the greenhouse gas (GHG) emission reduction targets outlined in the Paris Agreement. It is expected that replacing fossil-fueled government operational vehicles with electric vehicles will contribute significantly to lowering carbon emissions from the transportation sector.

In addition, the use of electric vehicles is expected to have a positive impact on the development of the electric vehicle industry in Indonesia. The adoption of electric vehicles by

government agencies will stimulate greater demand in the domestic market, which in turn will encourage manufacturers to expand production capacity and gradually reduce the selling price of electric vehicles.

In addition, the government, through Ministry of Industry Regulation (Permenperin) No. 27/2020, has established a regulatory framework for the implementation of the electric vehicle industry in Indonesia, covering activities from production to distribution. This regulation provides comprehensive guidelines for the automotive industry in developing and producing domestic electric vehicles, including provisions on technical standards, incentives, and the development of a national supply chain.

In addition, *Permenperin* also regulates the reduction of exhaust emissions that must be met by all motorized vehicles, thereby encouraging manufacturers to innovate and produce more efficient and environmentally friendly vehicles.

The Indonesian government has also introduced various incentives to accelerate the adoption of electric vehicles. Fiscal incentives include exemptions from luxury goods tax (LGT) for electric vehicles, reduced maintenance costs, and consumer subsidies for the purchase of certain electric vehicles. Meanwhile, non-fiscal incentives include simplified licensing procedures and support for the development of battery charging infrastructure.

Furthermore, the Agency for the Assessment and Application of Technology (BPPT) and the Ministry of Energy and Mineral Resources (ESDM) are actively involved in developing the electric vehicle ecosystem. Their efforts include formulating policies for the establishment of charging stations and ensuring the provision of environmentally friendly electricity to power electric vehicle batteries[8].

In 2023, the Indonesian government, through the Ministry of Energy and Mineral Resources (ESDM) and the Ministry of Industry (Kemenperin), introduced a subsidy policy for electric vehicles, with a particular focus on electric motorbikes. The policy is intended to reduce the selling price of electric motorbikes and encourage the public to transition from fossil fuel-powered vehicles to electric alternatives. To support this initiative, the government allocated a budget of IDR 7 trillion for the period 2023–2024. The subsidy program covers both the purchase of new electric motorbikes and the conversion of conventional motorbikes into electric motorbikes[9].

Some policies related to this subsidy include:

a. New Electric Motorbike Purchase Subsidy: The government provides direct financial subsidies to consumers who purchase new electric motorbikes. The value of the subsidy can reach several tens of millions of rupiah, depending on the type and brand of the vehicle
b. Vehicle Conversion Subsidies: In addition to purchase subsidies for new electric motorbikes, the government also provides incentives for owners of conventional motorcycles to convert their vehicles into electric motorcycles. This policy is intended to reduce transition costs for individuals who already own motorcycles but wish to adopt more environmentally friendly technology. Through this subsidy, the government aims to accelerate the penetration of electric vehicles in Indonesia, thereby reducing dependence on fossil fuels, lowering air pollution levels, and supporting the growth of the domestic automotive industry[9].

Electric vehicles have significant potential to reduce air pollution, particularly in major cities such as Jakarta, Surabaya, and Bandung, which frequently experience severe air quality problems caused by emissions from fossil fuel-powered motor vehicles. The increasing circulation of electric motorbikes is expected to substantially reduce transportation-related air pollution, thereby contributing to improved public health and overall quality of life.

3.2 Factors Affecting People Reluctance to Switch EV

Although the government has issued policies to accelerate the adoption of electric vehicles, many people remain reluctant to replace their conventional vehicles with electric alternatives. This reluctance is primarily due to the following factors:

a. The High Price of Electric Cars
   One of the main reasons Indonesians are reluctant to switch to electric vehicles is the relatively high price of electric cars. Although global prices are expected to decline with technological advancements and economies of scale, the cost of electric cars in Indonesia remains significantly higher than that of equivalent fossil-fueled vehicles. According to a report by the International Energy Agency (IEA), the average price of an entry-level electric car in 2020 was approximately USD 35,000, or around IDR 500 million in Indonesia. In contrast, gasoline-powered cars of a similar class are available at prices ranging from IDR 150 million to IDR 300 million. This stark price disparity makes electric cars unaffordable for many Indonesian consumers, particularly those in the lower-middle class, who continue to prefer conventional vehicles due to their greater affordability[10].
b. Limited Charging Infrastructure
   Another major barrier to the adoption of electric cars in Indonesia is the limited availability of charging infrastructure. Although several large cities, such as Jakarta and Surabaya, have begun to establish electric charging stations, their number remains very limited and does not extend to all regions of the country. According to a study by [11], the lack of charging stations and their uneven distribution across regions make electric cars appear less practical. For Indonesians living in areas without reliable access to charging facilities, concerns over *range anxiety*—the fear of running out of battery power during long-distance travel—remain a significant deterrent to adoption. This situation reinforces the perception that electric cars are not yet capable of meeting the transportation needs of Indonesians, who expect convenience and comfort comparable to that offered by fossil fuel-powered vehicles[11].
c. Lack of Understanding of Electric Vehicles
   In general, Indonesian society still has a limited understanding of electric vehicles and the long-term benefits of their use. Many consumers remain hesitant to switch to electric vehicles due to the lack of clear information on performance, operational costs, and environmental advantages. Research by [12] indicates that consumer ignorance regarding electric vehicles is one of the main barriers to adoption. Public perceptions often assume that electric cars are limited in terms of durability, speed, and range, despite rapid advances in battery technology in recent years. However, the absence of effective educational campaigns has reinforced uncertainty among Indonesians, making them reluctant to invest in electric vehicles.
d. Limited Resources and Infrastructure for Battery Production
   Electric cars rely on batteries as their primary source of power, and most of the raw materials required for battery production—such as lithium, cobalt, and nickel—are still largely imported. Although Indonesia possesses abundant nickel reserves, its domestic battery production capacity for electric vehicles has not yet developed optimally. Reports indicate that despite the country's wealth of natural resources, Indonesia continues to face significant challenges in establishing a battery industry infrastructure capable of meeting domestic market demands. These limitations in local battery

production contribute to the restricted availability of electric vehicles and keep their prices relatively high[13].

e. Dependence on Fossil Fuel Vehicles
The deep-rooted dependence on fossil fuel vehicles is another reason why many Indonesians remain reluctant to switch to electric cars. According to a study by [14], despite increasing environmental awareness, current habits and infrastructure continue to favor the use of fossil fuel vehicles. Conventional vehicles have become an integral part of Indonesians' daily lives, supported by the widespread availability of gas stations (SPBU) across the country. This long-established convenience leads people to prefer maintaining vehicles that are familiar and do not require significant changes to their energy consumption patterns. Consequently, the transition to electric vehicles is often perceived as demanding substantial financial investments and lifestyle adjustments that many consumers are not yet prepared to undertake.

3.3 Efforts to Accelerate

Given the various challenges associated with accelerating electric vehicle adoption in Indonesia, several measures can be taken to strengthen and expedite the implementation of the Electric Vehicle Program. These measures include:

a. Indonesian Government Policy
According to [15], fiscal incentive policies and electric vehicle subsidies can increase the attractiveness of electric vehicles in the domestic market, thereby accelerating the adoption of this technology. The Indonesian government has allocated a budget of up to IDR 7 trillion for 2023–2024 to support subsidies for the purchase and conversion of electric motorbikes, with the aim of reducing the selling price of electric vehicles and enhancing consumer purchasing power [13]. In addition, the government is working to improve regulations related to electric vehicle charging, with the development of a nationwide charging station network designated as a priority to ensure effective EV operations, particularly in major cities. Collaboration with the private sector has also been pursued to accelerate the expansion of charging infrastructure.

b. Charging Infrastructure Development
Indonesia has set an ambitious target to expand the use of electric vehicles (EVs) on its roads. According to estimates by PT Perusahaan Listrik Negara (PLN), the country will require more than 326,000 electric vehicles by 2030 to support the transition toward a more environmentally friendly transportation system. To achieve this goal, the development of charging infrastructure is a critical priority. Without sufficient charging facilities, EV adoption will remain limited, even if vehicles become more affordable and government incentives are provided. Charging infrastructure is thus one of the most crucial factors in accelerating the adoption of electric vehicles in Indonesia. As a geographically vast country, many regions still lack access to modern infrastructure, making nationwide availability of charging stations a significant challenge. This issue is particularly pressing outside Java, where access to charging facilities remains limited.

c. The Role of the Private Sector in Accelerating the Electric Vehicle Program
The private sector plays a crucial role in accelerating the electric vehicle (EV) program in Indonesia. Domestic automotive companies such as Hyundai and Toyota, as well as global EV manufacturers such as Tesla, Wuling, and BYD, have already introduced their products to the Indonesian market. Private sector investment in EV development not only accelerates the adoption of this technology but also contributes to lowering vehicle prices, which remain relatively high. In addition, the private sector is actively involved in the development of charging infrastructure. Energy and technology companies are collaborating with the government to establish charging stations at strategic locations across the country. For instance, PT Perusahaan Listrik Negara (PLN) has begun installing charging stations in several major cities and is working with private companies to expand this network further

4 Conclusions

Accelerating Indonesia's electric vehicle (EV) program is a crucial step in the nation's efforts to reduce dependence on fossil fuels and mitigate air pollution. The government has introduced a range of strategic measures, including fiscal incentives, subsidy policies, and the expansion of charging infrastructure. At the same time, the private sector has played an equally important role by investing in EV production and supporting the development of charging networks. Nevertheless, several challenges remain, particularly the limited availability of charging infrastructure and the relatively high cost of electric vehicles. Addressing these obstacles requires strong collaborative efforts between the government, private sector, and society. Such cooperation is essential to achieving Indonesia's long-term vision of establishing a more environmentally friendly and sustainable transportation system.

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