

Observing the Correlation of the Use of Electric Vehicles with Increasing the Degree of Public Health in Indonesia

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ABSTRACT

Indonesia's population growth rate is increasing from year to year. Based on data from the Central Statistics Agency (CSA), Indonesia's population growth in the 2010-2020 period was 1.25% per year. Population growth is of course accompanied by an increase in energy demand for transportation. Fossil-fueled motor vehicles are increasingly filling the streets in urban areas. There are so many negative impacts that arise from pollution or exhaust emissions resulting from the combustion of conventional car engines. These various negative impacts of course also disturb the health and welfare of the community as well as create unfavorable and healthy environmental conditions. The Indonesian government is serious about realizing the conversion of electric-based vehicles (EBV). The presence of electric-based vehicles as a means of transportation that can meet the mobility needs of the community while remaining environmentally friendly is also a breath of fresh air for efforts to create clean air because electric vehicles do not cause pollution. In this paper, we will discuss the development of electric vehicle technology. Then, it will also be discussed related to the support of the Indonesian government for electric cars as a solution to people's worries. In addition, support for other policies and incentives will also be discussed in this paper. These policies and incentives are expected to have a significant impact in line with the increasing awareness of consumers to switch from conventional vehicles to electric vehicles for the realization of the benefit and health of living together.

Keywords: *Electric Vehicles, Eco-friendly, Convertible.*

1. INTRODUCTION

A good and healthy environment is one of the manifestations of human rights for every Indonesian citizen as stated in Article 28H paragraph (1) The 1945 Constitution of the Republic of Indonesia, "Everyone has the right to live in physical and spiritual prosperity, to have a place to live, and to have a good and healthy environment and have the right to obtain health services." Likewise with the air clean, all Indonesian people have full rights to access to clean air. However, in line with the development of physical development of cities, industrial centers, as well as the increase in the number of transportation, air quality is also deteriorating. This is caused by air pollution or changes in one of the compositions of the air from its normal state, namely the

entry of pollutant substances (in the form of gases and small particles or aerosols) into the air in a certain quantity in a long enough period of time so that it has the potential to disrupt animal life, plants, and humans. In general, of the many sectors that have the potential for air pollution, the transportation sector plays a very large role compared to other sectors. In big cities, while the contribution of exhaust gases from industrial chimneys is only about 10-15%, and the rest comes from other sources of combustion, such as households, forest fires, burning garbage, and others (BLPH DKI Jakarta, 2013).

The number of motorized vehicles in Indonesia is based on data from the Central Statistics Agency, which is 118,922,708 in 2017, 126,508,776 in 2018, as well as the latest data, namely 133,617,012 units [1]. This shows

that there is an increase in the number of motorized vehicles every year. Even though according to Sales data from the Association of Indonesian Automotive Industries (Gaikindo) and the Indonesian Motorcycle Industry Association (AIS) 2020, the vehicle population is not predicted to experience a significant increase due to the effects of the Corona virus (COVID-19) pandemic, but we all agree that under normal conditions prior to the arrival of the pandemic, the number of motorized vehicles is increasing. No wonder that this often causes traffic jams that can hinder people's mobility, especially in big cities, such as Jakarta, Bandung, Yogyakarta, and so on.

Air pollution is still a scourge in the world because it affects various fields of human life, one of which is health. According to WHO, air pollution is the biggest health risk in the world. It is estimated that in 2016, around 6.5 million people died each year due to exposure to air pollution. Air pollution in Indonesia causes 16,000 deaths every year, 1 in 10 people suffer from upper respiratory infections (URI) and 1 in 10 children suffer from asthma [2].

Departing from these problems, an effort was born to bring up electric-based vehicles as a means of transportation that can meet the mobility needs of the community while remaining environmentally friendly. This is a breath of fresh air for efforts to create clean air because electric vehicles do not cause pollution. The Indonesian government is serious about realizing the conversion of electric-based vehicles (EBV). As recently, President Joko Widodo at the 2020 annual financial services industry event at the Grand Ballroom of The Ritz Carlton Pacific Place (PP) Jakarta said that only electric cars would one day be allowed to travel in the new capital city. The Indonesian government's support for electric cars is stated in Presidential Decree No. 55 of 2019 concerning the Acceleration of Battery-Based Programs for Road Transportation.

President Joko Widodo plans to make Indonesia one of the centers of the world's electric car industry (Kompas, 2019). One of the efforts to accelerate this, the government seeks to downstream the nickel industry which will later be produced into lithium batteries, which are the main components in electric cars. This scientific article is an analysis to determine the relationship between the development of electric vehicles and the improvement of the health status of the Indonesian people.

2. DISCUSSION

2.1. Development of Electric Vehicles in Indonesia

Electric Vehicles (EV) or Electric Vehicles (KL) are all types of passenger vehicles that are driven by an

electric motor, either wholly or partially, for example in a system with a combined combustion motor. The group of vehicles that is only driven by an electric motor is called a Battery Electric Vehicle (BEV) or which is translated as a Battery Electric Vehicle (BEV). BEV is an electric vehicle that uses a battery as a store of electrical energy which will later be converted into mechanical energy by electric motor [3]. Recently, people's understanding, especially in developed countries, on the relationship between lifestyle and environmental quality is getting better. This condition is very positive to support the development of the electric vehicle industry.

The President of the Republic of Indonesia, Susilo Bambang Yudhoyono, at the G-20 Forum in Pittsburgh, USA in 2009 and at the Conference of the Parties (COP) 15 in Copenhagen said that Indonesia could reduce GHG emissions by 26% and could even reach 41% with assistance. developed countries until 2020. One of the efforts that can be done is to reduce the use of fuel for transportation and replace it with electrical energy. The development of electric-powered cars in Indonesia has been started since 2012, since the reign of the 6th President of the Republic of Indonesia, Susilo Bambang Yudhoyono. At that time, Dahlan Iskan, the Minister of State-Owned Enterprises, initiated the initiative. He then asked Ricky Elson for help, of course the name was not foreign in the national electric automotive scene. Ricky is one of the young men from Indonesia who understands about electric cars. He lived for 14 years in Japan and already has international patents on electric cars in Japan. The figure, nicknamed the Son of Lightning, is a very influential figure in the presence of electric cars as an effort to advance the nation. The fruit of his hard work produced an electric car called the Selo which was exhibited at the APEC Summit in Bali in 2013. Besides the Selo, Ricky also succeeded in giving birth to the Tucuxi car. Not surprisingly, Ricky Elson's hard work has made him considered a pioneer of the national electric car. Although it is undeniable, there are obstacles in it, the two cars made by Ricky never got a sign of passing the emission test. The roadworthiness permit submitted to the Ministry of Research and Technology has not yet come to light.

Despite these obstacles, our country's desire to be able to develop electric vehicle technology does not end there. Of course there will always be movements that support the development of electric vehicles in Indonesia from various circles, including from educational institutions. Five Indonesian state universities are participating in the effort to move the era of battery-based electric vehicles in Indonesia through the development of the national electric car (Molina). The Minister of Research, Technology and Higher Education for the 2014-2019 government period, Mohamad Nasir, stated that the five universities involved in the development of Molina were the University of Indonesia (UI), Institut Bandung

Technology (ITB), Gajah Mada University (UGM), Sebelas Maret University (UNS), and Sepuluh Nopember Institute of Technology (ITS). The five universities have jointly participated in developing Molina which has been started since 2012.

Various studies have been carried out with the hope that in the future there will be electric cars created by the nation's children. Such as the research on electric vehicles at the University of Sebelas Maret which was initiated in 2009. At this early stage, the first generation Smart UNS electric car (SMART EV.1) was successfully created. This car is a concept car for four people with a 3 Kw BLDC motor drive and battery lead acid 3kW. The advantages of this UNS electric car product are in the form of application body from the composite of research results at UNS and the design of the motor control itself. In 2012, UNS was appointed as one of the five member universities of the national electric car research development consortium of the Ministry of Education and Culture and received a research grant from the Directorate of Research and Community Service (DP2M) DIKTI in 2012-2013. The grant produced a prototype of the UNS Electric Car, named Smart Generation-2 (SMART EV.2).

Then, in 2013-2014, UNS received a grant from the Rispro LPDP program of the Ministry of Finance of the Republic of Indonesia in research and development of LiFePo4 batteries. This battery prototype is planned to be applied to electric vehicles nationwide. Research on the development of electric vehicles at UNS continues to this day with funding from the research program for the assignment of a national electric car development funded by the LPDP in 2014-2015. At the end of the period, it is expected that one prototype the third generation of the UNS electric car (Smart EV.3). The features developed from this research are a more ergonomic design and are wider and more comfortable, the drive used is an axial BLDC motor with a maximum capacity of 25kW, a UNS LiFePo4 battery, a UNS Battery Management system, and an interior made of natural fiber composite which is environmentally friendly and strong. In addition, studies on the commercialization of electric vehicle components have been successfully studied using the model spin off. This electric vehicle is expected to be mass-produced to meet the need for environmentally friendly vehicles in Indonesia [4].

In addition to the five state universities, Budi Luhur University (UBL) exhibited the work of electric vehicles at the 2021 Indonesia International Motor Show (IIMS) at Jiexpo Kemayoran, Central Jakarta. There are three electric motorcycles on display, namely Budi Luhur 40 (BL-40), Budi Luhur Charge Electric Vehicle 01 (BL-CEVO1), and the latest is Budi Luhur Sport Electric Vehicle 01 (BL-SEVO1). UBL is the only university that exhibits its work at the prestigious and largest automotive event in Indonesia. This is the second time UBL has

participated in IIMS. Previously, UBL showcased the Neo BLITZ electric car.

The Chancellor of Budi Luhur University, Wendi Usino, said that the BL SEVO1 electric motorcycle as a vehicle that does not have exhaust emissions is a clear proof of UBL's active role in supporting environmentally friendly transportation mode programs. Specifications BL- SEVO1 is powered by a 96 Volt BLDC electric motor with a power of up to 16 kW, powered by 48Ah battery and 96 Volt 200 Ampere controller. This motorbike can go up to 100 kilometers for a single battery charge, with a battery charging time of 4 hours [5].

2.2. Indonesian Government Support for Electric Cars and the Regulations That Govern It

Based on data compiled by Investor Daily, the Ministry of Industry's website states that the target number of electric cars in Indonesia will reach 400,000 units by 2025, then increase to 5.7 million units in 2035. The government is aggressive in encouraging the development of the electric car technology industry. One of the ways is by providing incentives to the industry in the context of accelerating the electric-based or battery-based vehicle program. This is stated in Presidential Decree No. 55 of 2019 concerning the Acceleration of the Battery-Based Vehicle Program for Road Transportation. The incentives referred to include import duty incentives for battery-based imports, which are called completely knock down (CKD) or incompletely knock down (IKD) or the main component for a certain amount and period of time. Other incentives can also be in the form of incentives for Sales Tax on Luxury Goods (PPnBM), namely the exemption or reduction of central and local taxes; import duty on the import of machinery, goods, and raw materials in the context of investment; suspension of import duty for export; and incentives for import duties borne by the government on imports of raw materials and auxiliary materials for the production process.

In addition, there are also incentives for the production of general electric vehicle charging unit (SPKLU) equipment, export financing incentives, fiscal incentives for research and development, parking rates, reduction of electricity charging costs at SPKLU, support for SPKLU development financing, competency certification for EBV-based human resources, batteries, and product certification and technical standards for battery-based EBV industry companies. The non-fiscal incentives that can be given include exemption from restrictions on the use of certain roads, delegation of production rights to technology related to electricity-based KBL, and development of operational security in the industrial sector. Finally, there are additional fiscal

and non-fiscal incentives for the national branded EBV industry [6].o

With the issuance of Presidential Decree No. 55 of 2019 concerning the Acceleration of Battery-Based Programs for Road Transportation, the government is committed to developing a transportation energy system that leads to an electric-based vehicle (EBV) policy. The underlying reason for the government's commitment to shifting conventional vehicles to EBV is due to new technology for transportation energy to anticipate the projected growing demand for fuel oil. The main impact of the mass transition of road transportation to electric cars is the increase in the need for electrical energy on a large scale.

As an effort to accelerate the EBV program, contributions from all parties are needed in order to reduce the inhibiting factors that are considered by consumers' preferences in choosing EBV, namely price, maintenance, vehicle durability, and infrastructure readiness. Through the supervisory function, the House of Representatives (DPR) can take part in ensuring the acceleration of the conversion of conventional vehicles to EBV goes well, supported by the readiness of supporting infrastructure. Not only that, the DPR also plays a role in ensuring that the government's performance in providing incentives for the industry and community using EBV is right on target.

Following up on Presidential Decree No. 55 of 2019, Governor Regulation (Pergub) Number 3 of 2020 concerning tax incentives for transfer of title to motorized vehicles (BBN-KB) on vehicles Battery-Based Electric Motors are also expected to stimulate the population of electric-based vehicles in the Capital City because with this regulation, now all pure electric motorcycles and cars in the DKI Jakarta area will not be subject to a 12.5% biofuel tax. As stated in Article 2 paragraph (2) of the Regulation of the Governor of the Special Capital City Region of Jakarta, namely all battery-based electric vehicles will not be subject to a motorized vehicle transfer fee. Another advantage, especially for those who have electric cars, will also be free from the odd-even policy that applies in Jakarta.

2.3. Increasing the Degree of Public Health through the Effective Use of Electric-Based Vehicles

The state guarantee for the health and quality of health of its citizens can be seen in Article 28H paragraph (1) of the 1945 Constitution of the Republic of Indonesia which reads "everyone has the right to live in physical and spiritual prosperity, to live and to have a good and healthy life and has the right to obtain health services". In addition, it is also guaranteed in Article 6 of the Law of the Republic of Indonesia Number 36 of 2009 concerning Health which reads "Everyone has the right

to a healthy environment for the achievement of health degrees." Followed by Article 15 which states that the Government is responsible for the availability of the environment, arrangement, health facilities, both physical and social for the community to achieve the highest degree of health. Based on this article, then the state should also guarantee clean air quality to support the health level of its citizens. However, air pollution is even more rampant due to various factors, one of which is exhaust gas from motor vehicles.

Motor vehicle exhaust gases cause discomfort to people around the road, air pollution problems, as well as impacts on health caused by the accumulation of air pollution from day to day. Health problems at the highest point that can be caused are cancer of the lungs or other organs of the body, diseases of the throat that are acute or chronic, and conditions caused by the influence of pollutants on other organs such as the lungs or nervous system.

Many researchers have concluded that there is a close relationship between the level of air pollution in urban areas and the incidence or prevalence of disease in humans, including:

1. Lung Cancer

Benzopyrene compounds, asbestos, and nitrosoamines are very virulent carcinogenic agents (Holum, 1977).

2. Skin Cancer (Melanoma)

The reduction in the ozone layer in the atmosphere will result in an increase in ultra violet radiation which will stimulate skin cancer (Eckholm, 1983).

3. Baldness (alopecia), Anemia, and Gastro-enteritis

These three diseases are caused by lead residues that enter the body.

4. Bronchitis and Emphysema

SO₂ gas and benzopyrene can weaken the movement of vibrating hairs in the windpipe. In addition, this gas can stimulate the secretion of mucus in the base of the lungs (Owen, 1980) [7].

Motor vehicle pollution is generally caused by an incomplete combustion process in the engine, meaning that not all of the fuel that enters the engine is burned out or there is still fuel that does not burn properly. This unburned fuel will come out with the exhaust gases through the exhaust and then be wasted into the free air. This unburned gas contains CO, NO_x, and SO₂ gases. This gas is not good for breathing because it contains toxins that are harmful to the health of humans, animals, and plants. The incomplete combustion process in the engine is caused by the lack of control of the engine

against periodic maintenance such as engine damage (dirty air filter, spark plugs do not work optimally, gasoline quality is not good, and so on).

Based on research conducted by Yuni, et al. (2016), entitled "The Influence of the Number of Gasoline-Based Vehicles on the Concentration of Lead (Pb) in Ambient Air on Jalan Raya Padang City", this study describes the concentration of Pb in the air in order to determine the level of quality and impact on health. In this study, it was found that the greatest concentration of Pb was found in areas with heavy traffic flow and dominated by private vehicles and public transportation, which on average use gasoline.

Then, the results of research conducted by Chazizah Gusnita entitled "Air Pollution of Motorized Vehicles as a Form of Crime Without Victims" regarding air pollution caused by motor vehicle pollutants is not an ordinary environmental crime. It is called environmental crime because it has a large, long-term, and continuous impact. The effects of motor vehicle pollutants are not directly realized by the people who use motorized vehicles. Crimes without victims cannot be sued in the criminal justice system because they are difficult to prove. In this case, an in-depth study of this issue is needed so that in the future new problems will no longer arise outside of the health impact on the community. Correspondingly, research published in the journal *European Heart Journal* found that adults in the same age group living in areas with high levels of pollution were more prone to developing high blood pressure than those living in areas with minimal pollution. This risk is equivalent to the effect of obesity with a body mass index between 25-30.

The presence of electric vehicles will certainly indirectly have an impact on increasing health status as a form of national resilience in the health sector. As we know, electric vehicles are more environmentally friendly and do not cause pollution. The use of electric vehicles can help reduce air pollution rather than emitting smoke into the air like gasoline-fueled vehicles. In fact, one electric car can reduce air pollution by up to 4.6 metric tons of greenhouse gases. In addition, electric power can be produced from renewable energy sources, in contrast to gasoline which is taken from petroleum which cannot be renewed and the amount continues to decrease. Through the development of existing populist components, it is hoped that the framework of building a strong and strong Indonesian nation and state will be realized.

3. CONCLUSION

Clean air quality and free from pollution is everyone's dream. However, the increasing population growth rate from year to year is accompanied by an increase in energy needs for transportation. Fossil-fueled motor vehicles are

increasingly filling the streets in urban areas. There are so many negative impacts that arise from pollution or exhaust emissions resulting from the combustion of conventional car engines. This pollution also affects the health and welfare of the community.

Departing from these problems, an effort was born to create electric-based vehicles as a means of transportation that can meet the mobility needs of the community while remaining environmentally friendly. The Indonesian government strongly supports conversion electric-based vehicles (EBV) with the issuance of Presidential Decree No. 55 of 2019 concerning the Acceleration of Battery-Based Programs for Road Transportation.

The presence of electric vehicles will certainly indirectly have an impact on increasing health status as a form of national resilience in the health sector. The use of electric vehicles can help reduce air pollution rather than emitting smoke into the air like gasoline-fueled vehicles. Through fostering the existing components of society, it is hoped that a strong and strong framework for building the nation and state of Indonesia will be realized.

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