Ambivalence of Renewable Energy: Electric Vehicles for Reducing Carbon Emissions and Its Impact on Environmental Damage in Indonesia

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Abstract

*This paper discusses the phenomenon of electric vehicles, which are an alternative to reducing carbon emissions. This study discusses the intervention between the implementation of electric vehicles with interrelated dependent variables, one of which is nickel as an emulsion raw material for batteries. The phenomenon that occurs is that, on the one hand, electric vehicles can be used as an alternative to reducing carbon emissions, and on the other hand, it creates environmental impacts related to nickel mining. In this case, ambivalence occurs between the text and the context in the field. Weak regulations make ambivalent phenomena ineffective in terms of application, especially to the environmental effects caused, so the author will focus on describing the ambivalence of the presence of electric vehicles in Indonesia because the presence of electric vehicles can reduce carbon emissions. However, it also can cause other environmental damage. Therefore, to answer the above problems, the research method in this paper will use normative research methods with a focus on discussing and analyzing the problem formulation related to how government policies regulate the use of renewable energy, especially regarding electric vehicles and their impact on environmental damage in Indonesi*a.

Keywords: *Carbon Emissions; Electric Vehicles; Ambivalence;*

Abstrak

Artikel ini membahas tentang fenomena kendaraan listrik yang merupakan salah satu alternatif dalam mengurangi emisi karbon. Penelitian ini menguraikan mengenai ambilvensi antara implementasi kendaraan listrik dengan variabel terikat yang saling berkaitan, salah satunya adalah bahan baku nikel sebagai emulsi bahan baku baterai. Fenomena yang terjadi adalah di satu sisi kendaraan listrik dapat digunakan sebagai alternatif pengurangan emisi karbon, dan di sisi lain berdampak buruk bagi lingkungan berkaitan dengan penambangan nikel. Dalam hal ini kondisi ambivalensi terjadi antara teks dan konteks di lapangan. Lemahnya regulasi membuat fenomena yang ambivalen menjadi tidak efektif dalam hal penerapan, terutama terhadap efek lingkungan yang ditimbulkan, maka penulis akan fokus menguraikan tentang ambivalensi dari adanya kendaraan listrik di Indonesia, karena di satu sisi hadirnya Kendaraan listrik dapat mengurangi emisi karbon namun disisi lain justru dapat menyebabkan kerusakan lingkungan. Oleh karena itu untuk menjawab permasalahan di atas, maka metode penelitian dalam tulisan ini akan menggunakan metode penelitian normatif dengan fokus membahas dan menganalisis rumusan masalah terkait dengan bagaimana kebijakan pemerintah yang mengatur pemanfaatan energi terbarukan khususnya tentang kendaraan listrik dan dampaknya terhadap kerusakan lingkungan di Indonesia.

Kata Kunci: Emisi Karbon; Kendaraan Listrik; Ambivalensi;

P-ISSN: 2541-4682
E-ISSN: 2614-5642

INTRODUCTION

Climate change is becoming an interesting problem for the global community, including Indonesia, because of the increase in global temperature, which has caused climate change in various parts of the world. According to the Global Risk Report 2020 from the World Economic Forum, climate change is happening faster than people think. Global temperature is expected to increase by at least 3 degrees Celsius by the end of 2020. Even climate change has a tangible impact on the earth and its inhabitants. The global average temperature has increased by one °C and has an effect on increasing natural disasters.[1] The immediate impact of climate change is that it can add to planetary emergencies such as loss of life, social and geopolitical tensions, as well as negative economic impacts[2]. One of the leading causes of climate change is carbon emissions. According to the Cambridge Dictionary, the emission is the amount of gas, heat, and light that is emitted. In simple terms, carbon emission is the release of carbon into the atmosphere. Carbon emission is one of the causes of climate change worldwide. This change process will indirectly impact the environment and human health and create economic instability. Several research studies of carbon emissions have attracted the attention of researchers due to the rapidly changing global climate. Researchers have discovered that anthropogenic carbon emissions of one trillion tons are likely to cause a global temperature increase of two degrees Celsius.

As an effort for Indonesia to support carbon emission reductions, recently, President Joko Widodo (Jokowi) officially passed a Presidential Regulation (Perpres) on the Economic Value of Carbon (NEK). The Jokowi government will reduce carbon emissions by 41% with international support by 2030.[3] Indonesia itself has committed to reducing emissions through the ratification of the Paris Agreement, which is reflected in Law No. 16/2016. document the Nationally Determined Contribution (NDC) and submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC).[4] One of the steps that can be taken to reduce carbon emissions is to reduce the footprint that can be reduced through increased energy efficiency and changes in lifestyle and buying habits. The shift in one's use of energy and transportation can have

[1]Hans Nicholas Jong, "Indonesia Won't Sacrifice Economy for More Ambitious Emissions Cuts," *https://news.mongabay.com/2020/04/indonesia-emissions-reduction-climate-carbon-econo-my-growth/*, diakses 30 Mei 2022.

[2]Word Economic Forum, "Global Competitiveness Report special edition 2020: How Countries are Performir on the Road to Recovery," (2020), hlm 15.

[3]Disampaikan oleh presiden Joko widodo dalam Conference of the Parties (COP) 26 United Nations Framework Convention on Climate Change (UNFCCC) di Glasgow, United Kingdom.

[4]Diskusi NDC Dalam Upaya mengurangi Emisi Nasional *http://greengrowth.bappenas.go.id/diskusi-ndc-dalam-upaya-mengurangi-emisi-nasional/*, di akses tanggal 14 Juni 2022.

P-ISSN: 2541-4682
E-ISSN: 2614-5642

an impact on the primary carbon footprint. For example, using renewable energy sources generates the electricity needed, in this case, electric vehicles. This is inseparable because one of the sectors that contributes very significantly to emissions is energy, especially transportation. In 2018, total GHG emissions from the energy sector reached 595 million tCO2e (tons equivalent to CO2)10, and of this, 28% came from the transportation sector.[5]

Indonesia is also currently working on combating climate change conditions. Various efforts have been made, and one of Indonesia's significant steps in maintaining environmental conditions and fighting climate change is by launching the National Action Plan for Reducing Greenhouse Gas Emissions (RANGRK) in 2011, as stipulated in the Presidential Regulation of the Republic of Indonesia Number 61 of 2011 and the National Action Plan for Adaptation. Climate Change (RAN-API) was released in 2014. Behind these steps, Indonesia actually has a national mission together with international parties, as stated in the Kyoto Protocol, to create a greenhouse strategy in the energy sector, including in the field of electrical energy, by conducting optimizing electric vehicles as an effort to reduce carbon emissions in the transportation sector. However, along with this, there is something that needs to be watched out for, namely the use of electric vehicles to help reduce the climate impact of the transportation sector, which produces around 15% of global greenhouse gas emissions. The innovation of environmentally friendly and low-emission vehicles is one solution that is considered to be able to reduce GHG emissions and is correlated with controlling the impact of climate change. Countries in Europe, China, and the United States have used electric vehicles massively.[6] The trend of electric vehicles has developed in various countries, including Indonesia. It can be seen in the Presidential Regulation Number 22 of 2017 concerning the General National Energy Plan (RUEN), the Government of Indonesia targets the development of electric or hybrid-powered vehicles by 2025 to reach 2,200 units of Cars and 2.1 million motorcycles.

Although the presence of electric vehicles has a positive impact on reducing carbon emissions, there are things to note; electric vehicles, in many cases, still use fossil fuels to a certain level, so there are concerns that they are less effective in preventing environmental damage. For example, electric vehicles use raw materials such as lithium and nickel because, throughout the process of making batteries and electric vehicles, they

[5]Julius Christian Adiatma dan Idoan Marciano, *Ringkasan untuk Para Pembuat Kebijakan: Peranan Kendaraan Listrik dalam Dekarbonisasi Sektor Transportasi Darat Indonesia*, (Jakarta: Institute for Essential Services Reform, (2020), hlm 9.

[6]Erika Farkas Csamangó, "The Legal Environment of Electromobility in Hungary", Journal of Agricul- tural and Environmental Law, (2020), hlm 182.

P-ISSN: 2541-4682
E-ISSN: 2614-5642

go through the stages of extraction, purification, and manufacturing, which consume enormous amounts of energy and clean water. The exploitation of these materials from nature also causes damage to the ecosystem, as well as, the release of hazardous tailings substances and waste into the environment. On the other hand, much remains unknown about the long-term impact of recycling waste batteries,[7] and the presence of electric vehicles, although it can reduce carbon emissions but will also cause new problems for climate change. Also, the increasing electricity consumption amid the high use of fossil fuels as primary energy for power generation will increase emissions from the energy sector. The process of processing materials in electric vehicle fuel will also present its potential to damage the environment and human health.[8] In addition, the raw material for batteries for electric vehicles uses nickel obtained from nickel mining activities. Based on research conducted by the Mining Advocacy Network (Jatam) in 2021, it was revealed that the mining industry, including nickel, in Indonesia often causes negative impacts on the environment, triggering conflicts, violence, and criminalization in practice as in some areas, for example in North Morowali. in Central Sulawesi, the island of obi in North Maluku.[9]

Based on the background above, we can look at the problem points that occur, namely, on the one hand, the presence of electric vehicles can reduce carbon emissions, but on the other hand, it can cause other environmental damage. Therefore, in this paper, the author will focus on describing the ambivalence of the existence of electric vehicles in Indonesia with the Problem Formulation How Effectiveness of government policies governing the use of renewable energy, especially regarding electric vehicles, and their impact on environmental damage in Indonesia.

To answer the problem formulation above, the research method used in this paper is a normative research method with a focus on discussing and analyzing government policies related to the use of renewable energy, especially regarding electric vehicles and their impact on environmental damage in Indonesia. To answer the problem, the author also uses an approach through case studies whose aim is to be able to explore or measure the success of the regulations of a program, event, activity, institution, individual, or group in dealing with a case or event. In addition, to support the existing case studies, so

[7]Riset-Pro BRIN, "Dampak Negatif Kendaraan Listrik Terhadap Lingkungan", *https://risetpro.brin.go.id/web/2021/10/07/dampak-negatif-kendaraan-listrik-terhadap-lingkungan/",* diakses tanggal 30 Mei 2021.

[8] *Ibid.*

[9]Artikel CNN Indonesia, "Bayang-bayang Ekstraksi Nikel di Balik Proyek Mobil Listrik", *https://www.cnnindonesia.com/nasional/20210219205135-20-608629/bayang-bayang-ekstraksi-nikel-di-balik-proyek-mobil-listrik*, diakses 8 Juni 2022.

P-ISSN: 2541-4682
E-ISSN: 2614-5642

that in this paper it requires data collection techniques using the internet searching method. This technique uses the internet as a source of data collection techniques because on the internet, there is much information related to the problem to be studied a variety of information which is certainly very useful in answering the formulation of the problem.

DISCUSSION

The Use of Electric Vehicles and Nickel Mining Activities in Indonesia

As a form of commitment to reducing carbon emissions' impact on the environment, many countries have begun to develop electric vehicles. Indonesia has declared its readiness to enter the era of electric vehicles. This determination was strengthened through the issuance of Presidential Regulation Number 55 of 2019 concerning the Acceleration of the Battery-Based Electric Vehicle (BEV) Program for Road Transportation. It has planned to ban the sale of fossil energy-based vehicles starting in 2030, including these countries Germany, Britain, the United States (US), and India.[10] Meanwhile, Norway, which is currently one of the countries that is very serious about switching to electric vehicles. This country will ban the sale of fossil fuel vehicles from 2025, while Indonesia itself has also committed to contributing to reducing greenhouse gas (GHG) emissions as outlined in the Contribution document. National (NDC). In addition, Indonesia has ratified the Paris Agreement through Law No. 16 of 2016 concerning Ratification of the Paris Agreement to The United Nations Framework Convention on Climate Change. The government is committed to reducing GHG emissions by 29% against the business baseline scenario, as usual, by 2030 and 41% with international assistance.[11]

On the other hand, the trend of electric vehicles is still a matter of irony and discussion. Because electric vehicles use the standard in the form of nickel obtained from mining. However, nickel mining is currently proliferating in several parts of Indonesia to meet the needs of the battery industry in the world. Indonesia is currently said to have the largest nickel reserves in the world. Based on data from the Geological Agency of the Ministry of Energy and Mineral Resources (ESDM)[12], throughout 2019, Indonesia became the largest nickel ore producer in the world. World nickel ore production reached

[10]Portal Informasi Indonesia, *https://indonesia.go.id/kategori/indonesia-dalam-angka/1638/menyelamatkan-dunia-mendorong-keniscayaan*, diakses tanggal 9 Juni 2022.

[11]Rita Helbra Tenrini, 2019, *Kebijakan pembiayaan perubahan iklim*, (Penerbit IPB Press), hlm.50.

[12]Data dari Badan Geologi Kementerian Energi dan Sumber Daya Mineral (ESDM) Tahun 2019, diakses tanggal 31 Mei 2022.

P-ISSN: 2541-4682
E-ISSN: 2614-5642

2.67 million tons, of which Indonesia became the largest producer, with nickel production of 800 thousand tons. The regions with immense nickel potential include Southeast Sulawesi, Central Sulawesi, and North Maluku. Based on research conducted by the Central Sulawesi Walhi researcher, Khaerudin. The public is widely discussing Southeast Sulawesi and Central Sulawesi because of the mining activities. Not because of positive things, nickel mining in the two provinces causes environmental damage, including disturbed environmental conditions due to nickel mining activities such as seawater polluted with mud which causes disturbed ecosystems, and floods.[13] In addition, research conducted by the Mining Advocacy Network (Jatam) in 2021 revealed that the mining industry, including nickel, in Indonesia often causes negative impacts on the environment, triggering conflicts, violence, and criminalization in practice, as is the case in several areas, for example in the case of in North Morowali in Central Sulawesi, obi island in North Maluku.[14]

In this case, there are positive efforts that are being pushed by various parties to reduce greenhouse gas emissions that cause the climate crisis, namely by replacing fossil fuel transportation with electric power transportation. However, another problem that can arise from electric vehicles is related to the production and waste of batteries. As one of the main components, the battery has a vital role and determines the selling price of electric vehicles.[15] The raw materials for these batteries are mineral minerals such as lithium, nickel, cobalt, and manganese. Therefore, the massive use of electric vehicles cannot avoid the increase in demand for these four minerals and have implications for mining activities. The solution to saving the earth still has to sacrifice other parts of the earth.[16] Nickel mining activities for electric vehicles are not carried out sustainably, and even a lot of nickel mining causes environmental damage. It is in line with what was conveyed by the National Coordinator of Jatam Merah Johansyah, who underlined the potential damage to mangrove ecosystems in coastal areas and small islands as sources of nickel mining, which incidentally have a role in absorbing carbon emissions. Instead of being in line with the big goal of controlling the impact of climate change, downstream

[13]Tambang Nikel dan Kendaraan Listrik, *https://kbr.id/nasional/06-2021/mobil_listrik__tambang_nikel_dan_kerusakan_lingkungan_di_sulawesi/105651.html* diakses tanggal 30 Mei 2022

[14]Artikel CNN Indonesia "Bayang-bayang Ekstraksi Nikel di Balik Proyek Mobil Listrik," *https://www.cnnindonesia.com/nasional/20210219205135-20-608629/bayang-bayang-ekstraksi-nikel-di-balik-proyek-mobil-listrik*, diakses tanggal 8 Juni 2022

[15]David Coffin dan Jeff Horowitz, "The Supply Chain for Electric Vehicle Batteries", United States International Trade Commision, Journal of International Commerce and Economics, (2018), hlm. 4.

[16]Xu, C., Dai, Q., Gaines, L. *et al.,* 2020*, Future material demand for automotive lithium-based batteries*". (*Communication Materials)*, hlm. 13.

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E-ISSN: 2614-5642

activities are potentially counterproductive. Until now, Indonesia has not been able to confirm whether the presence of electric vehicles is an effort to protect the environment or vice versa.

Commitments to Reduce Carbon Emissions in Indonesia and its challenges

Reducing CO2 emissions is a form of an international agreement in dealing with climate change, which the Government of Indonesia has responded to through a commitment to reduce greenhouse gas (GHG) emissions by 29% by 2030 with their own efforts or by 41% with international assistance. From this 29% figure, the energy sector gets a portion of GHG emission reductions of 314 million tons of CO2. This is the basis for changing the target for reducing GHG emissions in Indonesia from the previous 26% in 2020.[17]

As a follow-up to this commitment, a policy framework and normative reference for the Government in order to realize national commitments related to climate change have been prepared in the form of a National Action Plan for Reducing Greenhouse Gas Emissions (RAN GRK). The National Action Plan for Reducing Greenhouse Gas Emissions is a work plan document for the implementation of various activities that directly and indirectly reduce greenhouse gas emissions in accordance with the national development targets as outlined in Presidential Regulation (Perpres) Number 61 of 2011 concerning the National Action Plan for Reduction Greenhouse Gas Emissions (RAN-GRK) which is a guideline for planning, implementing, monitoring, and evaluating GHG emission reductions. In Presidential Decree No. 61 of 2011, there is an elaboration of targets and strategies for reducing greenhouse gas emissions in five main sectors, which include agriculture, forestry and peatland; energy and transportation; industry; and waste management.

Currently, the Directorate of Energy Conservation is still making intensive efforts to carry out activities that support the implementation of reducing greenhouse gas emissions to fulfill the Indonesian government's commitment to reducing greenhouse gas emissions. In 2019, the CO2 emission reduction was achieved by 54.8 million tons of CO2, while in 2020, the Ministry of Energy and Mineral Resources set a target of 58 million tons of CO2 reduction.[18] The realization of emission reduction in 2020 in the energy sector is

[17]Data Penurunan Emisi CO2 Tahun 2020, dikases dari laman resmi dari Direktorat Jnedral Energi Baru Terbarukan dan Konservasi Energi (EBTKE) Direkrorat Jenderal Energi Baru Terbarukan dan Konservasi Energi (EBTKE) Capaian Program Konservasi Energi, *https://simebtke.esdm.go.id/sinergi/program_konservasi_energi/detail/2/capaian-program-konservasi-energi*, diakses tanggal 2 Juni 2022.

[18]*Ibid.*

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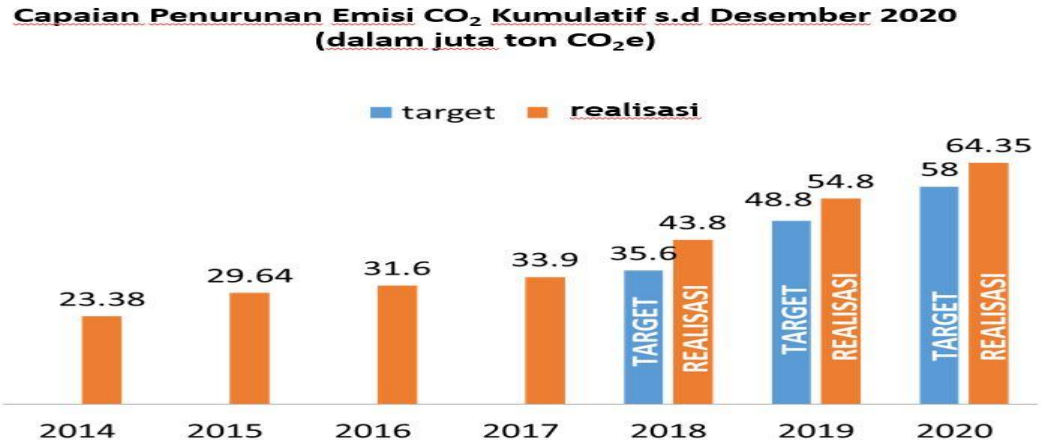
E-ISSN: 2614-5642

64.35 million tons of CO2 or exceeding the set target (58 million tons of CO2). This calculation is based on the MRV methodology released by the Ministry of Environment and Forestry, where the data calculation lags one year. The emission reduction was achieved through the use of 53% renewable energy, 20% energy efficiency implementation, 13% use of low carbon fossil fuels, 9% use of clean generation technology, and 4% post-mining reclamation activities.[19]

The image below shows how much CO2 emissions have decreased from 2014.



The use of electric vehicles is also a way to reduce emissions in the transportation sector. This sector is one of the largest emitters, namely 27 percent, based on the 2020 Climate Transparency Report. According to the IESR, the ambitious scenario of electric vehicle penetration has the potential to reduce GHG emissions by 8.4 million tons of CO2 in 2030 and 49.5 million tons of CO2 in 2050. This figure contributes about 10 percent and 34 percent respectively of the emission reduction target of the transportation sector following the Paris Agreement scenario. However, a number of challenges still face the acceleration of the implementation of electric vehicles. Among them, Indonesia's dependence is still quite large on coal-fired power plants (PLTU). In fact, currently, electricity and heating activities in Indonesia still contribute up to 27 percent of CO2 emissions. The emission risk from the power plant that relies on coal energy is still quite large. According to the Climate Transparency report, emissions in Indonesia's electricity sector continue to show an increase. Instead of decreasing, what happened was an increase from 0.734 tCO2/MWh in 2014 to 0.761 tCO2/MWh in 2018. Although the government plans to gradually stop the operation of coal-fired power plants from achieving the carbon-neutral target in 2025, the role of this type of power plant is still quite large. In the span of 2005 to 2019 alone, Indonesia has added 25 GW of coal-fired

[19] *Ibid.*

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power plants. This figure has even increased by 260 percent over the past 14 years, according to an IESR study.[20]

The Indonesian Government's Policy on Renewable Energy Comparison with other countries.

Politics of agrarian law related to the concept of energy which is the focus of the Jokowi government, can be assessed from two points of view, first from the point of view of facts and challenges. In terms of facts, development and energy sector management have become an issue in various parts of the world, including Indonesia. The utilization of fossil energy which is the main ingredient in the energy sector, is a challenge in itself, especially with regard to the carbon emissions produced. Fossil energy[21] is a source of energy obtained from the earth's bowels of both solids, liquids, and gases. Fossil energy is a wealth contained in the earth of Indonesia as a privilege that can be used as a tool for prosperity. This explanation is in accordance with the editorial of the constitution which refers to Article 33 paragraph 3 of the 1945 Constitution of the Republic of Indonesia which stipulates that "the state manages the earth and the water contained therein for the prosperity of the people". During post-independence Indonesia, the prosperity of the people was only understood by exploring the greatest wealth for foreign exchange. This view becomes a paradox; the people's prosperity that is aspired is actually reversed. The utilization of energy sources and excessive exploration have implications for the occurrence of environmental problems. The environmental problem is the use of fossil energy, especially coal, which is the source of carbon emissions.[22] This carbon emission makes the right to get clean air, and global warming puts the aspired prosperity into a bias.

The government has committed to reducing GHG emissions since 2010 with a target of 26% in 2010 and 41% with international support, compared to the Business as usual scenario in 2020. Indonesia has also issued policies to implement these commitments. It is in the form of a National Action Plan for Reduction GHG emissions, stated in Presidential Regulation No. 61 of 2011 and GHG Inventory through

[20]Mariana Garcia, "*Dua Sisi Kendaraan Listrik - Analisis Data Katadata*", https://katadata.co.id/jeany/analisisdata/619b59a7a4069/dua-sisi-kendaraan-listrik, diakses 1 Juni 2022.

[21] Watson, "The Single Most Important Factor: Fossil Fuel Energy, Groundwater, and Irrigation on the High Plains, 1955–1985," Agricultural History, (Volume 94, Nomor 4, 2020), hlm. 629.

[22] *Ibid,* "The Single Most Important Factor: Fossil Fuel Energy, Groundwater, and Irrigation on the High Plains, 1955–1985," Agricultural History, (Volume 94, Nomor 4, 2020).

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E-ISSN: 2614-5642

Presidential Regulation No. 71 of 2011.[23] After 2020, Indonesia plans to increase its emission reduction target so that it exceeds existing commitments, where Indonesia sets an unconditional target of 29% and a conditional target with international support of up to 41%, compared to the business as usual scenario in 2030. The proposition related to the issue is waste pollution carbon generated from the use of energy and the issue of renewable energy, which is the concern of the government of Joko Widodo.[24] his concession is a breath of fresh air for the massive use of fossil energy in supporting Indonesia's development. It is necessary to carry out the political will and a healthy and prominent political constellation on environmental issues to issue policies regarding renewable energy. [25]

The results of the ratification of the Paris Agreement are contained in a law that was agreed upon between the Government and the People's Representative Council (DPR), namely Law Number 16 of 2016, concerning Ratification of the Paris Agreement To The United Nations Framework Convention On Climate Change. -Nation on Climate Change). The provisions of the Paris Agreement are contained, in the appendix to this Law, where there is a copy of the original text in English, and its translation into Indonesian and this appendix is an integral part of this Law. Thus, the provisions contained in the Paris Agreement have become the national legal norms in Indonesia, as contained in Article 1 and Article 2 of this Law, namely ratifying the Paris Agreement and taking effect from the date of promulgation, namely October 25, 2016..[26]

Referring to Law Number 30 of 2007 concerning Energy and Government Regulation Number 79 of 2014 concerning National Energy Policy to build energy security by referring to Article 9 point (f) of the Government Regulation, it targets the new and renewable energy mix to reach 23% by 2025 and 31% in 2050. Indonesia is still faced with utilizing fossil-derived resources for developing the energy sector until 2050. The issue of fossil energy becomes a paradox; on the one hand, Indonesia is a producer of abundant fossil energy sources, but on the other hand, Indonesia is also a producer of fossil fuels. Issuance of Presidential Regulation Number 55 of 2019 concerning the Acceleration of the Battery Electric Vehicle (BEV) program. It is also an effort to respond

[23] I*bid,* "The Single Most Important Factor: Fossil Fuel Energy, Groundwater, and Irrigation on the High Plains, 1955–1985," Agricultural History, (Volume 94, Nomor 4, 2020).

[24]Kominfo, "Reforma Agraria Menjamin Pemerataan Sosial Ekonomi Masyarakat Secara Menyeluruh," Siaran Pers Edisi Agustus 2018, diakses 30 Mei 2022.

[25]*Ibid,* Kominfo, "Reforma Agraria Menjamin Pemerataan Sosial Ekonomi Masyarakat Secara Menyeluruh," Siaran Pers Edisi Agustus 2018, diakses 30 Mei 2022.

[26]Faris Faza Ghaniyyu, "Upaya Pengendalian Perubahan Iklim Melalui Pembatasan Kendaraan Berbahan Bakar Minyak di Indonesia Berdasarkan Paris Agreement," Jurnal Ilmu Hukum, (Volume 7 Nomor 1, 2021), hlm 114.

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to the issue of carbon emissions through regulations. In general, this Presidential Regulation regulates the acceleration of industrial development and the provision of incentives, electric charging infrastructure and regulation of electricity tariffs, vehicle engineering, environmental protection, and coordination of implementation. This Presidential Regulation mandates the formation of various more technical regulations. At least 14 Ministerial Regulations must be enacted so that the provisions in the Presidential Regulation can be implemented. The ministers who were given the delegation to regulate further were the Coordinating Minister for Maritime Affairs and Investment, the Minister of Industry, the Minister of Transportation, the Minister of Finance, the Minister of Home Affairs, the Minister of Trade, the Minister of Forestry and the Environment, and the Minister of Energy and Mineral Resources.[27]

The presence of a particular institution or team to accelerate the electric vehicle program can be interpreted as an effort to harmonize policies between sectors and related ministries/agencies. On the other hand, the presence of this special institution has the potential to add to the bureaucratic chain and hinder the acceleration of the program. All Ministries involved in this team should ensure that the existence of a special team positively impacts accelerating the production and use of electric vehicles in Indonesia.[28] However, the presence of the Presidential Regulation on electric vehicles and all its technical regulations should be able to create a proper and comprehensive legal ecosystem to support the development and growth of electric vehicles in Indonesia. Dimensions that need to be considered are the industry and other aspects, especially the environment, which has historically encouraged the development of electric vehicle technology. Energy development with technology and high risk requires a comprehensive legal regime, including arrangements providing opportunities for the private sector to participate and the state's right to collect royalties and protect its national interests. Third, the future technology trend is the reduced involvement of large enterprises. Small companies and individuals can become investors both on a local and national scale with maximum legal protection.

In contrast to Indonesia, the world's epicentres of the production and consumption of electric vehicles are in three regions, namely China, Europe, and the United States. Half of the world's electric vehicle sales in 2019 were controlled by China, followed by

[27]Peraturan Presiden Nomor 55 Tahun 2019 tentang Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai (*Battery Electric Vehicle*) untuk Transportasi Jalan, LN Tahun 2019 Nomor 146, Pasal 34 ayat 5.

[28]Hal ini sesuai dengan Pidato Presiden Republik Indonesia pada Sidang Paripurna MPR RI dalam rangka Pelantikan Presiden dan Wakil Presiden Terpilih Periode 2019-2024, Jakarta, 24 Oktober 2019.

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E-ISSN: 2614-5642

the European Union and the United States.[29] China's excellence in the use of electric vehicles began in 2001 with the launch of the National High-Tech Research and Development Program.[30] Then in 2009 followed by the policy of "New Energy Vehicles" nationally, then followed by the provision of incentives subsidies. It began to require the use of hybrid vehicles. Regulations that regulate electric vehicles do not only exist at the national level but also the regional level.[31] Even China, the European Union, and the United States as leaders in the production and market of electric vehicles also have the same background, namely concern for the environment and the impact of climate change. In other words, regulations governing electric vehicles are very concerned about sustainability aspects and realize that fossil fuels have a negative impact on the environment. [32] Electric vehicles can be one solution for controlling the impact of climate change, one of which can help reduce GHG emissions from the transportation sector. In addition, the existence of electric vehicles must be supported by the availability of renewable energy electricity generated by power plants.

In addition, one of the countries that has implemented a policy of intensifying electric vehicle infrastructure is Norway. The country has even built a charging network long before electric vehicles entered the country's automotive market. In 2013, Norway has built 4,029 SPKLU and 127 fast-charging points for electric vehicles, which is far more than the number of electric vehicles at that time which was only 9,500 units. By the end of 2020, citing the Norwegian Parliament website, there were more than 330,000 battery electric cars (BEVs) registered in the country. This type of vehicle even controls 54 percent of the market share in 2020. This shows that the infrastructure intensification policy can significantly increase the use of electric vehicles. The seriousness of this country to switch to using electric vehicles because it is supported by the right policies. Indonesia should be able to reflect on these countries so that there is no ambivalence towards the phenomenon of electric vehicles in terms of their impact on the environment.

CONCLUSION

Based on the aforementioned discussion, it turns out that the ambivalence

[29]International Energy Agency, "Global EV Outlook 2020: Entering the Decade of Electric Drive?", International Energy Agency, (2020), hlm. 44.

[30]Wang Tao, "Recharging China's Electric Vehicle Plocy", Carnegie-Tsinghua Center for Global Pol- icy, Policy Outlook, (2013), hlm. 2.

[31]Hui He *et al.*, Assessment of Electric Car Promotion Policies in Chinese Cities, (Washington DC: Inter- national Council on Clean Transportation, 2018), hlm. 12-13.

[32]Idoan Marciano, 2021, *Mengembangkan Ekosistem Kendaraan Listrik di Indonesia Pelajaran dari Pengalaman Amerika Serikat, Norwegia, dan Cina,* (Jakarta: Institute for Essential Services Reform), hlm. 23 dan 29.

P-ISSN: 2541-4682
E-ISSN: 2614-5642

between the impact of electric vehicles on reducing carbon emissions is indeed very good. However, on the one hand, it creates new environmental damage, especially in the case of nickel mining as a lithium raw material that pollutes the environment for which the regulations are not clear. In the use of electric vehicles, in this case, it is believed that the government should take into account the environmental impacts that may be caused, especially since Indonesia is currently one of the leading producers of raw materials for battery manufacturing components, such as nickel, which in large quantities poses an adverse risk to the environment. While downstream, no companies in Indonesia are assigned to manage battery waste. Therefore, the government needs to monitor to what extent Indonesia is committed so that the sustainability of the electric vehicle industry can be maintained from upstream to downstream. Such supervision can be started with the proper regulations.

The regulations needed to support the acceleration of the electric vehicle program are increasing the use of renewable energy at power plants, carefully regulating mining activities for battery raw materials, providing adequate battery waste treatment facilities and systems prior to increasing the use of electric vehicles, providing incentives for electric vehicles and disincentives to conventional vehicles by regulating them comprehensively and integrated with laws and regulations that provide legal certainty, especially for the public and the environment. Because it can be a time bomb for environmental control and will have an impact on climate change, this condition does not make electric vehicles a solution; it has the potential to become a new problem.

Thus, to maximize the potential of electric vehicles in controlling the impact of climate change so that ambivalence no longer occurs is to implement power plants with environmentally friendly primary energy sources, control mineral mining activities as battery raw materials, and provide battery waste treatment facilities. Regulations without considering this will not make electric vehicles a solution, instead, it can become a new problem for controlling the impact of climate change. In addition, the increasing electricity consumption in the midst of the high use of fossil fuels as primary energy for power generation will increase emissions from the energy sector. Therefore, the availability of power plants sourced from environmentally friendly energy is a mandatory requirement for the massive use of electric vehicles.

The issuance of the Regulation on the Acceleration of the Battery-Based Electric Motorized Vehicle Program, as outlined in Presidential Regulation Number 55 of 2019, is the initial rule that becomes the legal umbrella for Indonesian electric vehicles. The Presidential Regulation and all its technical regulations should be able to create a proper

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and comprehensive legal ecosystem to support the development and growth of electric vehicles in Indonesia. Aspects that need to be considered are both the industry and environment, which has historically encouraged the development of electric vehicle technology. Second, the battery waste treatment mechanism must be available first before there is a significant increase in the use of electric vehicles. One of the drawbacks, as well as a note from the author, is that Presidential Regulation Number 55 of 2019 needs to regulate in detail regarding waste management because the Government and the public certainly do not want cases of environmental pollution due to battery waste. Therefore, the waste treatment plant needs to be regulated in more detail, so there is no overlap.

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