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A Brief Outlook of

ELECTRIC CARS

IN INDONESIA

Author
Ariq Dmitri Andrei
Editors
Anisa Pratita Kirana Mantovani
Anaq Duanaiko
Designer and Layouter
Muhammad Fanani Arifzqi

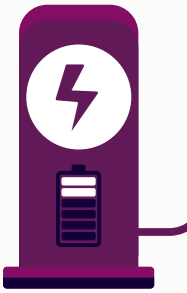
Introduction

With the public's ever-increasing awareness of environmental issues, various industries are starting to shift their operations to be more environmentally friendly. The automotive industry is one of the industries that is following up on this trend. The automotive industry itself contributes significantly to the issue of air pollution in general. According to a study published by the World Health Organization, 16.5% of all CO2 emissions in 2008 came from land transportation[1]. Hence, the automotive industry is often blamed for its role in contributing to the increase in carbon emissions in general. Most states in the European Union even use CO2 emissions as one of the factors in levying a car's taxation rate[2]. As a rational response, most significant players in the automotive industry have introduced electric cars to their line of products. Indonesia is also one of the states that have witnessed electric cars commuting on its roads, although they are still an extremely rare sight to see. This article will investigate, is Indonesia ready yet to have more electric cars on its roads? It can be argued that in terms of regulation, Indonesia is relatively ready, as can be seen in the Presidential Rule Number 55 2019, although to what extent it will be implemented is interesting to observe. While in terms of infrastructure, it will take some time for Indonesia to have the necessary infrastructure, mainly an adequate number of charging stations and service stations to accommodate the growing number of electric cars.

Are Electric Cars Less Polluting?

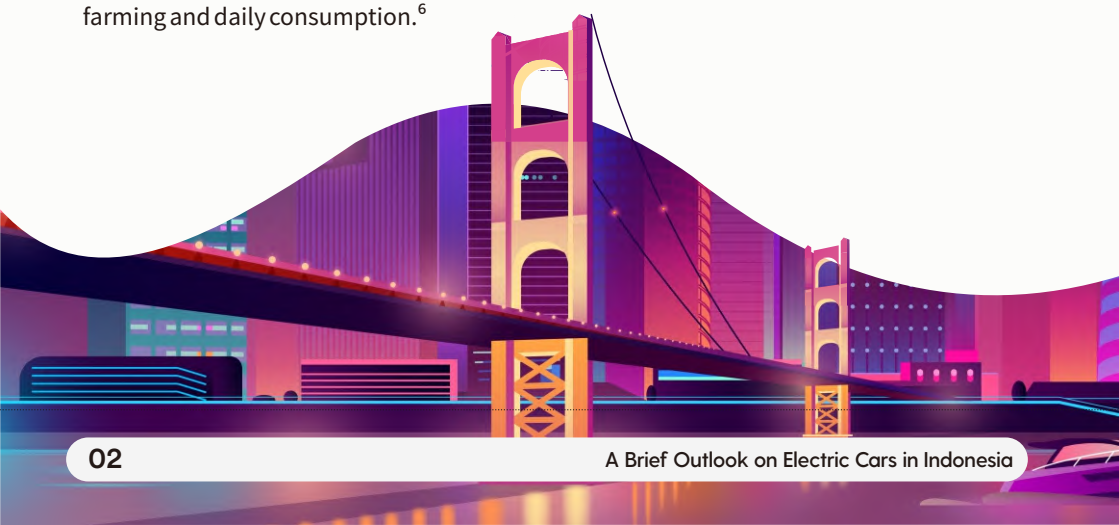
An electric car can be defined as a car that converts electrical energy to kinetic energy for its propulsion. Electric cars are different from the conventional internal combustion engine cars that convert chemical substances (generally petrol or diesel) to kinetic energy to provide propulsion. Furthermore, electric cars are also different from hybrid cars, which use both internal combustion engines and electric motors as a mean of propulsion[3]. Electric cars possess various advantages over their traditional internal combustion engine car counterparts.

In comparison to the traditional internal combustion engine cars, electric cars tend to be more environmentally friendly. Since electric cars do not emit various dangerous pollutants as opposed to internal combustion engine cars. Besides, electric cars emit far less noise, hence able to decrease the existing noise pollution that occurs due to traffic. Moreover, although electric cars tend to cost more to purchase, the cost of using electricity to power a car can be cheaper than using petrol or diesel. In the long run, operating an electric car can be cheaper compared to the traditional internal combustion engine cars, and not to mention the subsidies and tax cuts that some government offer for electric car owners.



A significant portion of electric cars' popularity is the claim that they are more environmentally compared to their internal combustion engine car counterparts. However, how environmentally friendly electric cars depend on various factors. Indeed, when running, electric cars emit little to no pollutants, since they run on electric motors and involves no combustion. However, the production process of electric cars itself already poses a negative impact on the environment.

The mining process to gain lithium, an element that is used in batteries, brings various adverse environmental impacts towards the surrounding areas.[4] Lithium mining pollutes the water and the soil. Lithium mining takes a significant amount of water. One tonne of lithium extraction requires around 500,00 gallons of water.[5] As can be seen in a case in Chile, lithium mining can consume as much as 65% of the local water supply. The decrease in the allocation for the locals for using the water for farming and daily consumption.[6]



Commitment of National Agency of Energy in the Energy Use

Energy	2025	2050
Renewable Energy	25%	31%
Crude Oil	25%	20%
Coal	30%	25%
Natural Gas	22%	24%

Electricity Primary Energy Blend III/2018

Energy	(in percentage)
Fuel Oil	6,18%
Natural Gas	22,30%
Coal	59,20%
Renewable Energy	12,32%

Plan for Composition of Mixed energy for Power Plants with Fuel Types

	RUPTL 2017-2026	RUPTL 2018-2027
PLTA (hydroelectric power plant)	12,3%	9,3%
PLTP (geothermal power plant)	9,0%	9,8%
EBT lain (other renewable energy)	1,1%	1,3%
PLTGU (natural gas power plant)	26,7%	20,6%
PLTD (diesel power plant)	0,4%	0,4%
PLTU (electricity steam power plant))	50,4%	58,6%

*RUPTL (Electricity Supply Business Plan)

Image 1. Sources of Indonesia's electricity. Notice on how "Energi Terbarukan"/ "EBT" (renewable energy) constituted 12.32% of the power generated in Indonesia. This number is expected to reach 31% by 2050. This is important, as to how environmentally friendly an electric car greatly depends on the sources to generate electricity. The more polluting the sources are, the less environmentally friendly an electric car is in the larger picture, and vice versa.

Source: The Official Information Portal of the Government of Indonesia http://www.indonesia.go.id

The differences depend on how the electricity generates, not where it operates. Some states use renewable energy more than others. For example, Iceland generates 100 % of its electricity from clean and renewable sources[7]. However, many other states have far lower usage of clean sources for their electricity. In Indonesia, as of the third quarter of 2018, only 12.32% of electricity in Indonesia was generated from renewable sources[8]. Fortunately, this number is expected to reach 31% by 2050[9]. With such, most of the electricity generated in Indonesia still comes from non-renewable sources, such as coal, oil, and natural gas. Hence, how fast an electric car dramatically depends on the sources of electricity generation itself.

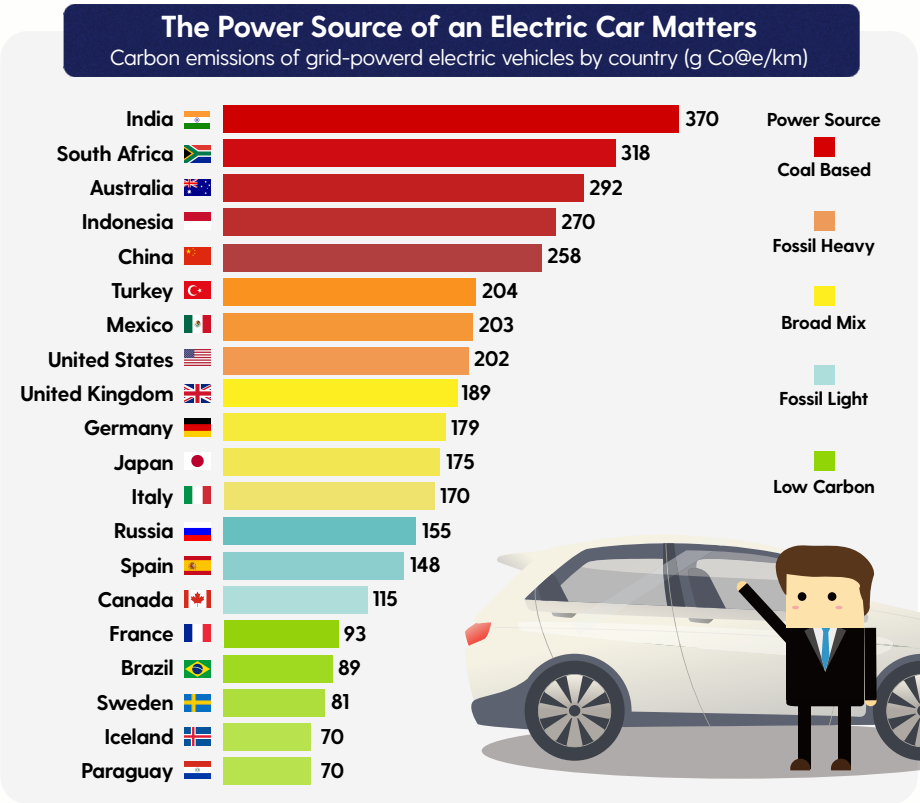


Image 2: The amount of CO2 an electric car emits dramatically depends on where it operates. An electric car that operates in a state that extensively uses coal or fossil fuel to generate electricity is not as environmentally friendly as how electric cars that operate in a country that generates electricity from clean sources.
Source: Statista

The Sales and Operations of Electric Cars in Indonesia

In terms of sales, internal combustion engine cars still dominate the market in Indonesia. According to data published by the Association of Indonesia Automotive Industries (Gaikindo) in regards to the sales of cars in Indonesia as of July 2019, no electric cars made it into the list of the top 20 best-selling cars. It is not surprising since electric cars are relatively new to the Indonesian automotive market. Several variants of electric cars have made its appearance to the public in Indonesia[10]. BMW has introduced BMW i3 and BMW i8 to the Indonesian public during the 2018 Gaikindo Indonesia International Auto Show.

Meanwhile, hybrid cars are more varied than pure electric cars, with various brands, have introduced their variants for the Indonesian market. Mitsubishi has introduced Mitsubishi Outlander PHEV, Toyota with Toyota All New Camry Hybrid, Toyota Alphard Hybrid, and Corolla Altis Hybrid. Previously, these variants are already relatively successful in the Indonesian automotive market in its internal combustion engine versions.

Pure electric cars are still a rare sight on the Indonesian automotive market since very few variants have introduced to the Indonesian market. Obtaining electric cars that are not sold directly on showrooms is still possible. Customers can order electric cars that are not available directly in Indonesia, such as from Tesla, through general importers. Cars ordered through general importers directly imported and generally, reach Indonesia in an entirely built-up (CBU) form. Moreover, a car ordered from a general importer can cost more and takes time to order and import. Furthermore, finding spare parts and maintenance facilities can be more difficult. The problem further worsens if one lives outside of major cities in Indonesia.

Interestingly, Blue Bird, a significant Taxi operator in Indonesia with more than 20,000 cars in its fleet, has introduced electric cars as taxis. As of April 2019, Blue Bird's e-taxi fleet consisted of 25 BYD e6 and 5 Tesla Model X[11] . By 2025, Blue Bird plans to operate 2000 e-taxis and is estimated to reduce more than 21 million kilograms of CO2 from its operations[12]. Customers have expressed their awe due to the silence of these electric cars. The cost of using Blue Bird's e-taxi is Rp. 7,000 – Rp. 9,000 per km, similar to Blue Bird's executive taxi service, and higher than Blue Bird's regular taxi service that costs Rp. 4,100 per km[13].

Is the infrastructure in Indonesia ready to serve electric cars?

An essential aspect of operating electric cars is ensuring that there is enough supply of electricity. Having a reliable and adequate supply of electricity is crucial if one wishes to operate electric cars and hybrid cars without worry. Fortunately, Indonesia has more than enough electricity to accommodate the growing demand. According to Didit Waskito, (the Ministry of Energy and Mineral Resources of the Republic of Indonesia), Indonesia's electricity production as of August 2019 was 36,968 Megawatts (MW), while the peak usage was 33.247 MW[14]. From this data, there were more than 3,000 MW of extra electric output, which can be used to power electric cars. In Jakarta, Indonesia's capital, the total capacity of electricity available for consumption is around 12,000 MW, while the peak usage is still around 8,000 MW[15].

Furthermore, the usage of electricity to power vehicles is not a new phenomenon in Indonesia, at least in Jakarta and its suburbs. Jakarta and its suburbs served by the Kereta Rel Listrik (Electric Rail Train) Commuterline, which started transitioning to use electric-powered trains. The KRL Commuterline network is massive, as it served 315 million passengers in 2017, an increase from 292 million in 2016[16]. In 2019, Jakarta has also started to operate a Mass Rapid Transit system that uses electric-powered trains. Although the Jakarta MRT is still in far smaller compared to the KRL Commuter line. Meanwhile, intercity trains in Indonesia are still powered by diesel. For most of its operations, both the KRL Commuterline and the Jakarta MRT receive adequate electricity supply. However, during a mass power outage that occurred in the

western half of Java, including Jakarta in early August 2019, both systems were unable to operate normally. Passengers had no option but to leave their trains to continue their trips using other modes of transportation. Therefore, power outages are still a threat to electric car operators.

In addition to the electricity supply, another vital consideration for the operation of electric cars is the availability of charging stations. The number of charging stations in Indonesia is still relatively low. By August 2019, according to Ignasius Jonan, the Minister of Energy and Mineral Resources of the Republic of Indonesia, there are already 2,000 charging stations all across Indonesia[17]. This number is expected to increase due to the increasing demand for more charging stations. Bali and Jakarta are the two pilot cities in this project. However, this is still a plan, and its implementation will take some time. A good policy recommendation for the government is to equip the existing Pertamina's gas stations with charging stations, as suggested by his ministry. This policy can greatly help to increase the availability of charging stations in Indonesia, as Pertamina has an extensive network of over 7,400 gas stations across Indonesia. It is essential to achieve energy sovereignty for Indonesia, as currently, Indonesia is an oil-importing state. Meanwhile, for electricity, Indonesia has a surplus of several thousand MW that can be used.

The price of purchasing an electric car is still comparatively higher compared to conventional internal combustion engine cars. Currently, to purchase an electric car, a buyer should purchase it through a general importer, since most electric car variants are not available yet in regular dealers. This, of course, increases the price of an electric car. To illustrate, in the United States, Nissan Leaf, the world's most best-selling electric car, costs $ 29,990[18]. If converted, it costs around Rp 420 million[19]. In Indonesia, as a financial incentive to boost the use of electric cars, an electric car receives less tax duty, as the import tax is valued at 15%, according to Peraturan Pemerintah Nomor 73 tahun 2019[20] (Government Decree Number 73 2019). Also, generally, there is an additional cost as well from general importers, increasing the final price tag of an electric car.

In the end, an electric car tends to cost higher than most common internal combustion engine cars. Price is a major factor in determining the success of a

car variant in the Indonesian market, as Indonesia is still classified as a lower-middle-income economy according to World Bank standards. Meanwhile, hybrid cars are already available in regular dealers in Indonesia. Hence, purchasing one is relatively easier compared to purchasing an electric car, although its variants are nowhere as diverse as internal combustion engine cars.

Regulations on To Increase the Use of Electric Cars in Indonesia

The regulations for electric cars in Indonesia are relatively friendly, as the government also wishes to promote the use of electric cars to the public. Environmental sustainability, energy sovereignty and several other related targets are the main motivations of the government to promote the usage of electric cars, as stated by Peraturan Presiden Nomor 55 Tahun 2019 (Presidential Rule Number 55 2019), or more commonly known as Perpres Mobil Listrik (Presidential Rule Concerning Electric Cars)[21]. Overall, this rule can reflect the eagerness of improving the climate for the production and operation of electric cars in Indonesia. *Perpres Mobil Listrik* also highlights the desire of using local components for electric vehicles in Indonesia.

The obligation to use local components is regulated in this rule. Article 8 stated that for two and three-wheeled vehicles, there is an obligation of using at least 40% local components until 2023, 60% until 2024 and 80% for 2026 and onwards[22]. For electric vehicles with four or more wheels, the minimum usage of local components is 35% until 2021, 40% until 2023, 60% until 2029 and 80% for 2030 and onwards[23]. Furthermore, Article 16 of Perpres Mobil Listrik also stated the plan to limit fossil fuel-powered vehicles.[24]

Another notable point from Perpes Mobil Listrik is the existence of incentives for electric car users, both fiscal and non-fiscal. There are 14 points in the fiscal incentives part in Article 19, with significant ones that include tax removal or tax discount, special tariffs for parking in certain areas, discount on charging fees and many others[25]. Meanwhile, a notable non-fiscal incentive that is included in Article 20 is the exemption from certain vehicle bans. [26]

A well-known ban is an odd-even system in some of Jakarta's main roads, in which only cars with a license plate that ends with odd numbers can pass only on odd dates, and cars with a license plate that ends with an even number can only pass on even dates. If electric cars are exempted from this rule, this will greatly improve the mobility of electric car users, compared to the users of internal combustion engine cars.

The Perpres Mobil Listrik also covers the legal aspect of charging stations. There are public and private charging stations, as mentioned in Article 22[27]. Furthermore, article 26 stated that public charging stations will be provided at gas stations, government offices, shopping centers, and public parking spaces, while private charging stations are also allowed in government offices and residential areas[28]. However, this regulation is still very new, and its implementation will take some time. Overall, the Perpes Mobil Listrik is relatively supportive of the usage of electric cars in Indonesia, as can be seen in the incentives that it provides for electric car users.

What Can Indonesia Learn from the Other States?

Currently, China has the largest population of electric cars in the world, followed by the United States in second place and Norway in third place[29]. Interestingly, when it comes to the number of electric vehicles overall, Norway is punching above its weight. Norway has Europe's largest and the world's 3rd largest fleet of electric vehicles in the world behind China and the United States, with a population of around 5 million compared to the United States' 327 million or China's 1.4 billion[30]. It can be argued that the incentives that the Norwegian government provides for electric car users are an important factor that increases the sales of electric cars in Norway. In addition, Singapore's successful BlueSG, an electric car-sharing service, is also another example that Indonesia's private sector can learn from. Hence, the Indonesian government, the private sector and the Indonesian public as a whole can learn from several successful examples abroad regarding their success stories in increasing the usage of electric cars.

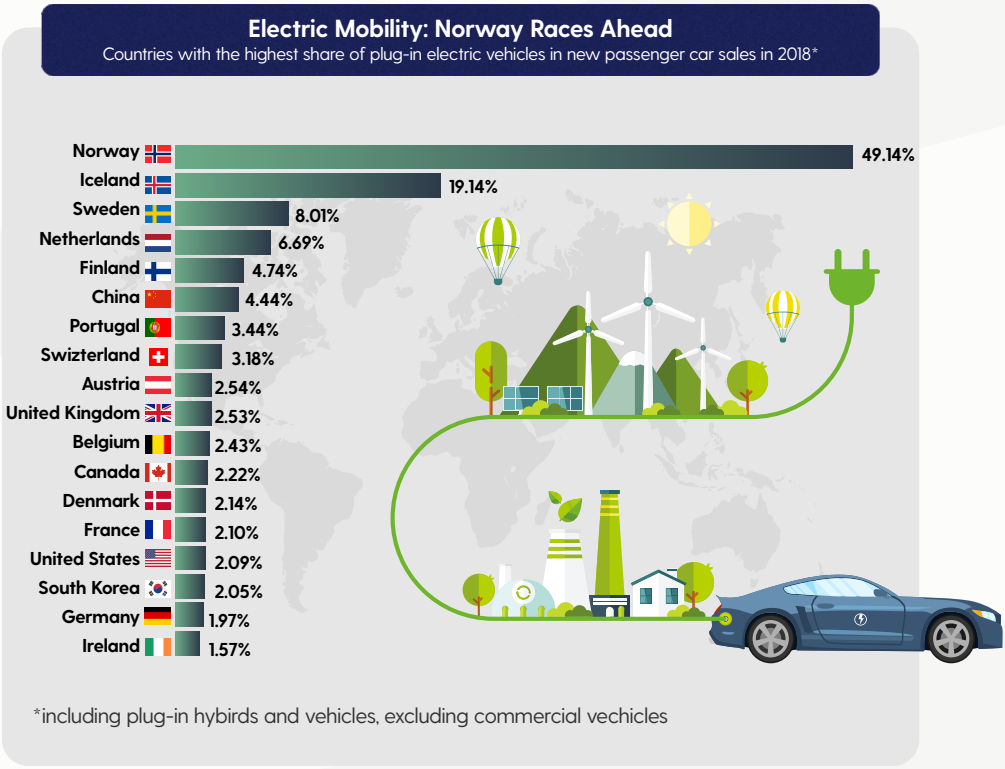


Image 3: The percentage of electric vehicles sold within the total sales of passenger cars in 2018. With 49.14%, Norway is far ahead of all other states, with Iceland being the second at 19.14%.

Source: Statista

Indonesia can learn from several other states when it comes to regulating electric cars. Norway is one prime example. Since the 1990s, the government of Norway has provided various financial incentives to promote electric cars to the public. For electric cars, the import tax was abolished in 1990. The annual road tax was abolished in 1996, and eventually, the 25% value-added tax for purchase was abolished in 2001[31]. Meanwhile, there are non-financial incentives as well for electric car users. Since 2005, electric cars are allowed to pass through bus lanes[32]. It means that electric car owners can avoid some traffic in a way that traditional internal combustion engine cars could not, especially during rush hour periods. Overall, these incentives provided by the Norwegian government have been very successful in increasing the sales of electric cars in Norway.

As of the 30th of June 2019, there were 237,710 battery-electric cars and 104,657 hybrid cars in Norway[33], which made Norway the third-largest operator of electric cars in the world behind China and the United States. By March 2019, electric cars were already the majority in terms of sales in Norway, in which 58.4% of cars sold were electric cars[34]. No other states came close to Norway when it comes to the percentage of electric cars sold within the total sales of cars overall. In 2018, the second and third places were occupied by fellow Nordic states; Iceland and Sweden, with 19.14% and 8.01% respectively[35]. The Netherlands came in fourth place with 6.69%, followed by Finland at the fifth place with 4.74%[36]. While the list was filled with almost entirely developed states, China was the only emerging state that was featured on the list[37]. 4.44% of new cars sold in China were electric cars, which placed China as the state with the 6th largest percentage of electric cars sold in the domestic market within the number of total car sales overall[38].

While the government can learn from Norway, the private sector can also learn a thing or two from successful examples abroad. One good example can be seen in Singapore, with its BlueSG. BlueSG is owned by Bolloré, a major French company focusing on transportation.

BlueSG provides electric car-sharing services, which rents electric cars and provides charging stations. As of December 2018, it operated 300 cars and 531 charging points in 135 locations all around Singapore[39]. Customers need to pay a rental fee, in which when this article was written, it can cost SGD 0.33 or SGD 0.5 per minute, depending on the chosen duration of the package[40].

The GrabCar service from the major ride-hailing app Grab, which already includes a driver, costs SGD 2.5 for its base fare, with a per km rate of SGD 0.5 and a per-minute rate of SGD 0.16 when this article was written[41]. Hence the private sector in Indonesia can learn from BlueSG's experience. Moreover, the tariff for electricity in Indonesia is lower than in Singapore. In Indonesia, the tariff for electricity for business is Rp 435-1,352 per kWh, depending on the capacity used[42]. Meanwhile, the tariff for electricity in Singapore is SGD 23.43 per kWh (for the 1 October–31 December 2019 period)[43]. If converted, then it costs Rp 2,407 per kWh[44].

Implementing a similar system is still relatively difficult in Indonesia, mainly due to the unfamiliarity of electric cars and the lack of facilities to accommodate them in Indonesia. However, developing and promoting a similar mobile application that the public will use is not difficult. The Indonesian population is becoming more tech-savvy in time, especially due to the improving IT infrastructure. According to data by Hootsuite, 56% of Indonesians are already using the internet, and 53% of Indonesians browse the internet through their mobile phones. The successful examples of Grab and Go-Jek, two giants in the ride-hailing industry, showcases the success of using mobile applications for transportation. In Indonesia, the Grab mobile application has been downloaded over 144 million times, while the Go-Jek mobile application has been downloaded over 142 million times[45].

A great advantage that electric cars have over their conventional internal combustion engine counterparts is its lower operating cost. When it comes to powering a car, the cost of using electricity is generally lower compared to using fossil fuel, such as petrol or diesel. Data from the Ministry of Energy and Mineral Resources of the Republic of Indonesia has compared the

cost of operating electric cars and internal combustion engine cars. For a 100 km drive, a car powered with a Research Octane Number (RON) 88 petrol cost Rp 50,385, RON 90 for Rp 60,000, RON 92 for Rp 80,000, and RON 98 for 94,231[46]. The assumed price per liter is Rp 6,550 for RON 88, Rp 7,800 for RON 90, Rp 10,400 for RON 92 and Rp 12,250 for RON 98[47]. Meanwhile, for the same distance, electric cars such as Mitsubishi i-MiEV cost Rp 24,668, Nissan Leaf for Rp 38,895, BMW i3 for Rp 40,125 and Tesla Model S for Rp 46,468[48]. Hence, in Indonesia, using electricity for fuel can cost significantly lower compared to using traditional fossil fuel in internal combustion engine cars.

Conclusion

In conclusion, Indonesia can be a lucrative market for electric cars in the future. Electric cars have numerous advantages over their conventional internal combustion engine counterparts, mainly due to their lower fuel cost and lower emissions. However, these two aspects can greatly vary from one state to another, since the cost of electricity and the sources of electricity (how environmentally friendly are they) significantly differs among states. When it comes to electricity supply, Indonesia's state electricity company (PLN) provides more than enough electricity than the public consumes by more than 3000 MW (as of August 2019).

However, as in many other states, the scarcity of charging stations is still a major obstacle that haunts electric car operators in Indonesia. Furthermore, most available pure electric cars at the moment cost more than internal combustion engine cars. However, hybrid cars tend to be more affordable. In the long run, using electricity to power, a car can be cheaper compared to using fossil fuels in Indonesia, such as petrol or diesel. It has been proven by the Ministry of Energy and Mineral Resources of the Republic of Indonesia. The cost of operating an electric car depends on the type of car that is being used.

The existing regulation on electric cars in Indonesia can be seen in the Peraturan Presiden Nomor 55 Tahun 2019 (Presidential Rule Number 55 2019), which regulates electric cars in Indonesia

The regulations in Indonesia are relatively friendly towards electric cars, as it is also within the governments' interest to curb air pollution and to achieve energy sovereignty. The regulations even mention the obligation of using specific percentages of local components in electric vehicles. It implicitly shows that Indonesia is also eager to participate in the electric car industry. Indonesia can learn from Norway, in which the government provides financial incentives. Incentives such as tax cuts and non-financial incentives such as allowing access to specific lanes for electric car users. Norway's approach has relatively been successful, as Norway has the world's highest percentage of electric car usage. Moreover, the private sector in Indonesia can also learn from BlueSG in Singapore, which provides electric car-sharing services and electric charging stations at attractive prices.

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Center for Digital Society

Faculty of Social and Political Sciences
Universitas Gadjah Mada
Room BC 201-202, BC Building 2nd Floor,
Jalan Socio Yustisia 1
Bulaksumur, Yogyakarta, 55281, Indonesia

Phone : (0274) 563362, Ext. 116
Email : cfds.fisipol@ugm.ac.id
Website : cfds.fisipol.ugm.ac.id

facebook.com/cfdsugm
Center for Digital Society (CfDS)
cfds_ugm
@cfds_ugm
@cfds_ugm
CfDS UGM