

Indonesia transport electrification strategy

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Keywords: Indonesia, EV policy, electric vehicles, two-wheelers, three-wheelers, city buses

Introduction

This strategy document examines the ongoing efforts to promote electromobility in Indonesia, identifies key stakeholders relevant to electric vehicle (EV) issues, and identifies synergies among existing EV initiatives nationwide, as well as policy gaps in the effort to accelerate EV uptake in Indonesia. The strategy highlights actions and instruments of third parties to support the government in accelerating electric mobility transition in the country. It aims to guide NGOs and civil society organizations in channeling their support for the EV transition and to help philanthropic agencies to prioritize support for this objective.

The EVs mentioned in this strategy document refer to battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) of all key transport modes, including two-/three-wheelers (2/3W) and four-wheel vehicles for private use and public transport. Fuel cell electric vehicles, despite having been included in the country's roadmap for automotive industry development, are not included since the technology and infrastructure are at a nascent stage.

Because EV development is highly dynamic, this document focuses on potential actions by NGO communities and philanthropic agencies for advancing EVs in the medium-term, defined as a three- to five-year period. The local knowledge to develop this strategy document was compiled from discussions and inputs emerging from a strategy development virtual workshop (three half-days) held over the 29 September–1 October period in 2020. Participants for the event came from government entities at the national and local levels, domestic and international NGOs, universities, and industry. Bilateral meetings with key stakeholders were also held to clarify and enrich the conclusions of this work.

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Acknowledgments: We thank the Aspen Global Change Institute and Climate Works Foundation for financial support for this work. We also thank Sandra Wappelhorst, Ray Minjares, Tenny Kristiana, and Anup Bandivadekar for their comments.

Background

Indonesia is the fourth largest country in the world, with a population of nearly 250 million people. As a G20¹ country and an emerging market with great economic potential, Indonesia faces air pollution and climate challenges, and the transportation sector is a key contributor to each. Transport activities are the source of 13% of ambient PM_{2.5} and were a key contributor to ozone-related deaths in 2015.² The rapid growth of road-based transport and poor fuel quality have resulted in severe environmental degradation and increasing health costs from air pollution-related illnesses.³

Indonesia's greenhouse gas (GHG) emissions nearly doubled between 1990 and 2016. Around 28% of that total comes from transport, the same volume as from energy generation. The country has pledged its commitment to reduce greenhouse gas (GHG) emissions through its Nationally Determined Contribution (NDC) as part of the 2015 Paris Agreement, but progress in decarbonizing the transport sector is slow and the focus is instead on adoption of biofuels.⁴

The electrification of the transport sector offers great potential to reduce the sector's impact on air quality and climate. But the effort required is massive and requires widespread support. Traditional transport modes have relied on diesel and gasoline engine technologies. A transition to electrification in the transport sector would require significant policy and technical efforts.

Indonesia mid-term electrification goals

The Government of Indonesia (GOI) is preparing to become a major player in the electric vehicle economy.⁵ Under President Joko Widodo's administration, several targets for EV uptake have been pledged since 2017, the latest announced in the new National Energy Grand Strategy. Presidential Regulation (PR) No.55/2019 requires that all line ministries set up their own implementing regulations to support the EV transition and those could also include quantified EV uptake targets. Table 1 lists EV-related targets in several key strategic policy documents issued from 2017 to 2019.

1 The G20 is an international forum for the governments and central bank governors from 19 countries and the European Union with the aim to discuss policy pertaining to the promotion of international financial stability.

2 Susan Anenberg, Josh Miller, Daven Henze, Ray Minjares (2019), *A global snapshot of the air pollution related health impacts of transportation sector emissions in 2010 and 2015*, (ICCT: Washington DC, 2019), https://theicct.org/sites/default/files/publications/Global_health_impacts_transport_emissions_2010-2015_20190226.pdf.

3 Zhenying Shao, Josh Miller, Lingzhi Jin, *Soot-free road transport in Indonesia: A cost-benefit analysis and implications for fuel policy*, (ICCT: Washington DC, 2020).

4 Climate Transparency, Indonesia (2019), https://www.climate-transparency.org/wp-content/uploads/2019/11/B2G_2019_Indonesia.pdf.

5 Paul Zubrinich, "Indonesia plans domestic electric vehicle industry," *PV-magazine.com*, December 4, 2019, <https://www.pv-magazine.com/2019/12/04/indonesia-plans-domestic-electric-vehicle-industry/>.

Table 1. National electric vehicle targets relevant to two- and four-wheelers

Document	Relevance to EVs
General Plan for Energy (2017)	Uptake targets of 2,200 EVs and hybrid cars (no specification regarding type of hybrid) and 2.1 million electric two-wheeler by 2025. ¹
Presidential Regulation (PR) 55/2019 on Battery Electric Vehicles (BEVs)	Launched in 2019 with the goal of accelerating the uptake of BEVs, but with no quantified target. ^{2,3}
Ministry of Industry (MoI) automotive production target	<ul style="list-style-type: none"> • Low Carbon Emission Vehicle (LCEV), which includes hybrid vehicles, PHEV, BEV, and FCEV to cover 20% of annual vehicle production by 2025 and 30% in 2035. • Electric two-wheelers production target of 7,700,000 units in 2025.⁴
National Energy Grand Strategy, Ministry of Energy and Mineral Resources (MEMR)⁵	<p>The timeline of this strategy is 2020–2040. It includes plans to reduce oil imports and promote electric vehicle development. EV uptake targets in the strategy are as follow:</p> <ul style="list-style-type: none"> • 2,195,000 of EVs by 2030 (cumulative number)⁶ • 13,002,000 of electric two-wheelers by 2030 (cumulative number)

Notes:

¹ Presidential Regulation, Republic of Indonesia No. 22/2017 on General Energy Plan, 2017, <https://www.esdm.go.id/assets/media/content/content-rencana-umum-energi-nasional-ruen.pdf>. The General Energy Plan is currently under review and new or revised targets may be included.

² Presidential Regulation Republic of Indonesia No. 55/2019 on Battery Electric Vehicle, 2019, 2021, <https://peraturan.bpk.go.id/Home/Details/116973/perpres-no-55-tahun-2019>.

³ Although the presidential Regulations does not provide quantified targets, it covers the acceleration policy guidance for the uptake of Batter Electric Vehicle that includes two- and three-wheelers, and four-wheelers. For Indonesia, the share of two-wheelers is significantly higher compared to four-wheelers.

⁴ The Ministry of Industry, Presentation on Promoting Electric Vehicles in Indonesia, presented in Strategy Development Workshop, 29 September 2020.

⁵ The Ministry of Energy and Mineral Resources, Press Release National Energy Grand Strategy to Ensure Energy Availability, October 2020, <https://www.esdm.go.id/en/media-center/news-archives/national-energy-grand-strategy-to-ensure-energy-availability>.

⁶ Presentation by Mr. Hariyanto, Director of Energy Conservation, MEMR, at the virtual workshop “Economic Benefits of Emission Control,” organized by Komite Penghapusan Bensin Bertimbel (KPBB), 2 February 2021.

Indonesia’s EV landscape

Current state of EV market in Indonesia

Indonesia has a large vehicle market compared with other ASEAN countries. Its two-wheeler market is twice as large as that of the next largest in the region⁶ and it was the 2nd largest passenger vehicle market in the ASEAN region in 2020.⁷ In 2019, total domestic sales of passenger cars, buses, and trucks published by the Association of Indonesia Automotive Industry (GAIKINDO) were 1,030,126 units and total domestic sales of two-wheelers as published by the Association of Indonesia Motorcycle Industry (AISI), were 6,487,460 units. As a direct result of the COVID 19 pandemic, domestic sales for four-wheelers in 2020 declined to 532,407 units⁸ and domestic sales of two-wheelers plummeted to 3,660,616 units.⁹ Indonesia is still in the early stages of the transition to electric mobility, despite some regulations and incentives for EV having been set in place by the government.

As of November 2020, 15 two- and three-wheeler (2/3W) manufacturers and one electric bus manufacturer had set up manufacturing facilities in Indonesia and begun producing electric vehicles.¹⁰ Several other EV manufacturers have registered with the Ministry of Industry (MoI), but have not yet begun production. Two domestic battery manufacturers have registered with MoT and several potential global battery/energy storage manufacturers have expressed interest in setting up production facilities in Indonesia. In mid-2021 Indonesia Battery Corporation (IBC), a holding company consisting of state-owned enterprises, announced that it had initiated construction of its first EV battery plant

⁶ Motorcycle Data (McD), <https://www.motorcyclesdata.com/>

⁷ ASEAN Automotive Federation Statistics, 2019 and 2020, <http://www.asean-autofed.com/statistics.html>.

⁸ The Association of Indonesia Automotive Industries, Indonesian Automobile Industry Data, accessed 31 May 2021, <https://www.gaikindo.or.id/indonesian-automobile-industry-data/>.

⁹ Association of Indonesia Motorcycle Industry, Statistic Distribution, accessed 31 May 2021, <https://www.aisi.or.id/statistic/>.

¹⁰ The Ministry of Industry, “Presentation on Promoting Electric Vehicles in Indonesia,” presented in Strategy Development Workshop, 29 September 2020.

and aims to begin production by 2023.¹¹ However, there is no clear information on actual production capacity for EV batteries. In June 2021, the Minister of Energy and Mineral Resources mentioned an ambitious national target requiring that only electric motorcycles be sold from 2040 forward and that all vehicles sold from 2050 be EVs.¹² However, this statement has not been reflected in any strategic document or policy.

At present, there are several domestically produced and imported EV brands that cover different categories and segments. Table 2 provides information on available EVs by category.

Table 2. EVs by category available for sale in the Indonesian market as of November 2020

Type	Brand	Domestic/ Foreign	Model: Battery Capacity and Specification	Note
Passenger vehicle	BYD	Foreign	E6: 75 kWh	Taxi/ by Bluebird group
	Hyundai	Foreign	Ioniq: 38.3 kWh	Taxi/ by Grab Indonesia
	Tesla	Foreign	X 75D: 75 kWh	Taxi/ by Bluebird group
	BMW	Foreign	I3: 42.4 kWh	I3 model is offered
	Mitsubishi	Foreign	Outlander PHEV: 13.8 kWh, 2360 cc	Offer Outlander PHEV
Bus	Mobil Anak Bangsa (MAB)	Domestic	City bus: 12 m, 315.85 kWh Inter-city bus: 12 m, 315.85 kWh	In production
	BYD	Foreign	K9: 12 m, 324 kWh C6: 7.4 m, 135 kWh	No production yet Prototype
	Skywell	Foreign	NJL612BEV: 12 m, 258 kWh	Prototype (no production yet)
	Inka	Domestic	E-Inobus: 8 m, 143 kWh	Prototype (no production yet)
	Higher	Foreign	Higher bus: 8 m, 385 kWh	Prototype (no production yet)
Two- /three- wheeler	Viar	Domestic	Q1: 2 kWh	In production
	Gesit	Domestic	Gesits: 1.98 kWh	In production
	Selis	Domestic	Eagle Prix: 0.96 kWh Agats: 1.4 kWh Balis: 2.7 kWh Jalak Pro: 1.2 kWh E-max: 1.2 kWh	In production
	MIGO	Domestic	ECGO 2: 1.4 kWh	In production
	United	Domestic	T1800: 1.68 kWh	In production
	Tomara (e3Ws)	Domestic	Semar: 1.9 kWh	In production
	ECGO	Foreign	ECGO Bike-2: 1.25 kWh	In production
	Volta	Domestic	Volta 100: 0.4 kWh Volta 202/203/301/302: 0.6 kWh Volta 501 (e3Ws): 3.5 kWh	In production
	Unity	Foreign	Unity Scoopy: 0.6 kWh	In production
	Electro (MAB)	Domestic (MAB)	ML 01: 3.4 kWh	In production
	Sunrace	Domestic	Jupiter: 1.4 kWh F1: 1.4 kWh Stylish: 0.6 kWh & 0.9 kWh	In production
	Artas	Foreign		In production
	Gelis (e3Ws)	Domestic	Cargo: 3 kWh	In production
	Benelli	Foreign	Divo: 1.56 kWh	In production
	Keeway	Foreign	E-Zi: 1.2 kWh	In production
Kymco	Foreign	Nice 100 EV: 1.5 kWh	In production	

Note: Information compiled from promotional materials or company's website

11 Ayman Falak Medina, ASEAN Briefing, "Indonesia to Build Electric Vehicle Battery Plant, Production Starting in 2023," <https://www.aseanbriefing.com/news/indonesia-to-build-electric-vehicle-battery-plant-production-starting-in-2023/>.

12 Bernadette Christina Munthe, "Indonesia aims to sell only electric-powered cars, motorbikes by 2050," *Reuters*, June 14, 2021, <https://www.reuters.com/business/sustainable-business/indonesia-aims-sell-only-electric-powered-cars-motorbikes-by-2050-2021-06-14/>.

In terms of EV sales, the GAIKINDO wholesale database shows that several hundred EVs have been purchased by domestic consumers since the rollout of Presidential Regulation No. 55/2019, and there has been significant growth in EV sales in Q1 and Q2 2021 compared to the previous year.¹³ (Table 3). The MoI stated that EV production capacity in 2020 is 1,200 units/year for vehicles and 877,000 units/year for two/three-wheelers. Unfortunately, there is no clear number of electric two/three-wheelers in Indonesia.

Table 3. EV sales in Indonesia from the introduction of Presidential Regulation No 55/2019 up to June 2021

Brand	Model	Sales 2020	Sales Q1 & Q2 2021
Hyundai	Ioniq	81	186
	Kona	38	249
Lexus	UX300E	1	8
Toyota	COMS EV	-	20
	C+POD EV	-	6
Mitsubishi	Outlander PHEV	6	34
Total		126	503

Note: Not all EV brands are included in GAIKINDO's wholesale data. For example, BYD and Tesla are not included.

Some electric two-wheeler models can be purchased without a battery, in which case the owner uses a battery swap service. In November 2020, during the national electricity day commemoration, the Ministry of Energy and Mineral Resources launched three battery swap stations for electric two-wheelers in the capital city of Jakarta.¹⁴ The ride hailing company “Grab,” electric two-wheeler manufacturer “Kymco,” and battery swap providers “Ezyfast” and “Oyika”¹⁵ jointly set up the battery swap station. As of the end of 2020, two of the 15 electric two- and three-wheeler manufacturers, Viar and Selis, produce models that can use the battery swap station run by Ezyfast and Oyika.¹⁶

Indonesia's largest taxi company, Bluebird Group, operated 35 electric taxis. The company has announced its plan to increase its EV fleet to more than 2,000 units in the coming years.¹⁷ However, in January 2021, the company announced that the plan is postponed due to business uncertainties resulting from the impact of the COVID 19 pandemic.¹⁸

On-demand transport providers Grab and Gojek also plan to expand their EV fleets, both for passenger and delivery services. Grab has 5 million partners (individuals who own the vehicle, both motorcycle and passenger car) as October 2019¹⁹ and Gojek has over 2 million drivers across Indonesia, Vietnam, Thailand, and Singapore as of April 2021.²⁰ In

13 GAIKINDO, Indonesian Automobile Industry Data, <https://www.gaikindo.or.id/indonesian-automobile-industry-data/>.

14 Stanly Ravel, KOMPAS.com, “Stasiun Swap Baterai Motor Listrik Mulai Tersedia di Alfamart,” 2020 <https://otomotif.kompas.com/read/2020/11/04/070200815/stasiun-swap-baterai-motor-listrik-mulai-tersedia-di-alfamart>, accessed 13 July 2021.

15 Ezyfast is a domestic company (<https://ezy-fast.com/#learn-more>), while Oyika is a company from Singapore that focuses on providing battery swaps for electric two-wheelers.

16 Wisnu Andebar, “Baru Dua Merek Motor Listrik Ini yang Bisa Tukar Baterai di SPBKLU, Berapa Biayanya?” GridOto.com, November 7, 2020, <https://www.gridoto.com/read/222417424/baru-dua-merek-motor-listrik-ini-yang-bisa-tukar-baterai-di-spbklu-berapa-biayanya>.

17 Mr. Leo Harwidono, Electric Vehicle Project Team-Blue Bird Group, presentation at Indonesia Electrification Workshop, 1 October 2020.

18 Dian Tami Kosasih, “Ada Pandemi COVID 19, Blue Bird Batal Alokasikan Dana untuk Mobil Listrik,” *Liputan6*, January 17, 2021, <https://www.liputan6.com/saham/read/4459082/ada-pandemi-covid-19-blue-bird-batal-alokasikan-dana-untuk-mobil-listrik>.

19 “Punya 5 Juta Mitra, Grab Klaim Sumbang Rp 48,9 Triliun ke Perekonomian RI,” *Tribun News*, October 15, 2019, <https://www.tribunnews.com/techno/2019/10/15/punya-5-juta-mitra-grab-klaim-sumbang-rp-489-triliun-ke-perekonomian-ri>.

20 Fanny Potkin, Fathin Ungku, “Ride-hailing giant Gojek to shift to electric vehicles by 2030,” Reuters, April 30, 2021, <https://www.reuters.com/business/sustainable-business/ride-hailing-giant-gojek-shift-electric-vehicles-by-2030-2021-04-30/>.

November 2020, Grab Indonesia announced that they have deployed 5,000 EVs, consisting of two-wheelers and four-wheelers²¹. Grab Indonesia has utilized a number of Hyundai Ioniq to add to their on-line taxi, and their food delivery service also currently uses electric two-wheelers (moped type) for short distance deliveries. Grab Indonesia is using Kymco as their main electric two-wheelers, while Gojek prefers to use the local brand Gesit & Viar. In April 2021, Gojek announced their plan to make every car and motorcycle on its platform electric by 2030. This will be carried out in partnership with manufacturers and using favorable leasing arrangements.

Jakarta's BRT operator, TransJakarta, tested several electric buses in mid-2020 and has pledged to operate up to 100 EV buses starting in 2021 and progressively plans to continue the transition to electric mobility²². DAMRI, Indonesia's oldest state-operated public transport operator, plans to replace 500 of their old diesel buses with electric buses worth US\$ 150 million with support from ADB funding.²³ Electric bus trials are also underway in the city of Denpasar, Bali Province, a world-renowned tourist destination. The issue of EV deployment in public transport systems was discussed in a high-profile way during the electrification workshop, partly because several cities in Indonesia are piloting electric buses or are planning to introduce them.

Some government agencies have also pledged to use EVs as part of their operational vehicle fleets, and the electric two-wheelers category has been included within the government E-catalogue. Electric passenger vehicles will be included in the E-catalogue in the 2021–2024 period.²⁴

Regarding charging infrastructure, the number is very dynamic as public charging operators establish charging stations and as buildings, shopping malls, car dealers and parking facilities also provide EV charging stations on their premises. As of May 2021, there have been 122 charging stations available in Indonesia, concentrated mainly in the islands of Java and Bali.²⁵ However, the list does not give detailed information regarding type and charger capacity (in kW). Shell announced that the company has established one public charging station in Jakarta, using 50 kW fast charging.²⁶

Existing policy and strategic plans for EV uptake

National and local governments have issued several policies that favor the uptake of EV in Indonesia. These policies however, are not necessarily made exclusively for EV, but rather to address other issues such as air pollution, climate change mitigation, energy management and industry development. The majority of policies and strategic documents to support EV uptake are made at the national level. Sub-national level (provincial and municipal governments) policies and regulations tend to focus on segment-specific development, for example electric buses and electric two- and three-wheelers. The bullet points below provide summary of existing policies and strategic plans to support EV development. More detailed information can be found in the ICCT briefing paper that overviews Indonesia EV strategies and policies.²⁷

21 Ruly Kurniawan, "Grab Indonesia Klaim Sudah Operasikan 5.000 Kendaraan Listrik," Kompas, 2020, November 4, 2020, <https://otomotif.kompas.com/read/2020/11/04/140206115/grab-indonesia-klaim-sudah-operasikan-5000-kendaraan-listrik>.

22 "Land Transport Operators Signal Growing Interest in Electric Vehicles," *The Jakarta Globe*, August 15, 2020, <https://jakartaglobe.id/business/land-transport-operators-signal-growing-interest-in-electric-vehicles>.

23 Rinaldi Mohammad Azka, "DAMRI Siapkan US\$ 150 Juta untuk Beli 500 Bus Listrik," *Bisnis.com*, 2019, <https://ekonomi.bisnis.com/read/20190725/98/1128918/damri-siapkan-us150-juta-untuk-beli-500-bus-listrik>.

24 Arief Aszhari, "Mobil Listrik Akan Menjadi Kendaraan Dinas Pemerintah," *Liputan 6.com*, October 7, 2020, <https://www.liputan6.com/otomotif/read/4376542/mobil-listrik-akan-menjadi-kendaraan-dinas-pemerintah>.

25 "Sudah Ada 122 SPKLU Mobil Listrik di Indonesia, Ini Sebagian Lokasinya," *Kumparan*, May 20, 2021, <https://kumparan.com/kumparanoto/sudah-ada-122-spklu-mobil-listrik-di-indonesia-ini-sebagian-lokasinya-tvmPyG96H7M/full>.

26 Jobpie Sugiharto, "Inilah SPKLU Mobil Listrik Pertama Shell di Indonesia," *Tempo.co*, March 29, 2021, <https://otomotif.tempo.co/read/1447162/inilah-spklu-mobil-listrik-pertama-shell-di-indonesia/full&view=ok>.

27 Aditya Mahalana and Zifei Yang, *Overview of vehicle fuel efficiency and electric vehicle policies in Indonesia*, 2021, <https://theicct.org/publications/overview-indonesia-fuel-electrification-policies-jul2021>.

- » **National Master Plan for Industry 2015–2035.**²⁸ The Master Plan, which was enacted in 2015, provides guidance for domestic automotive industry development. The Automotive Industry Roadmap, which is used by the Ministry of Industry, encourages more synergy among automotive manufacturers. There are three different stages in the Master Plan. The first stage (2015–2019) aims to strengthen domestic manufacturing of automotive parts, more precise and efficient power trains, heavy equipment, and engines, of both conventional and electric motor. The second stage (2020 – 2024) and third stage (2025 – 2035) emphasize the development of electric motor and fuel cell engines.
- » **Presidential Regulation No. 55/2019 on Battery Electric Vehicle.**²⁹ This regulation, issued in late 2019, provided the battery electric vehicle industry with supports in four main areas: (i) leading ministries/agencies responsible for implementation, (ii) BEV definition and development of its technical specifications, (iii) BEV manufacturing capacity, and (iv) the market transition from ICE to BEV.
- » **Government Regulation No. 73/2019 on Luxury Tax for Automotive Products.**³⁰ Issued in 2019, the GR 73/2019 supersedes previous regulations governing the automotive luxury tax. For ICE vehicles, luxury tax rates are no longer calculated based on engine capacity alone, but instead take into consideration efficiency and emissions. This regulation clearly favors the transition to electric mobility by reducing the luxury tax rate for PHEVs, BEVs, and FCEVs to 0%.
- » **Ministry of Energy and Mineral Regulation No. 13/2020 on Provision of Charging Infrastructure for BEVs.**³¹ The Decree was issued in response to the PR 55/2019. It provides detailed requirements for charging stations and battery swap stations. Some of the requirements include legal aspects for charging and battery swap providers, reference for business model and electricity tariffs for charging and battery swap. It also includes incentives for operators.
- » **Strategic Plans of Line Ministries & Government Work Plans**, where these plans refer to the national mid-term plan but with more detailed items covering policy direction, regulatory frameworks and funding mechanisms of various line ministries. In response to the Presidential Regulation No. 55/2019, several line ministries have issued regulations to support EV, among others: The Ministry of Industry has issued Minister of Industry Regulation No 27/2020 on Specification, Roadmap for Development, and Calculation of Local Content for BEV³² and the Regulation No 28/2020 on Completely Knockdown (CKD) and Incompletely Knockdown (IKD) for BEV. The Ministry of Transport has issued the Minister of Transport No 45/2020 on Specific Vehicle Using Electric Motor.³³ The Ministry of Energy and Mineral Resources issued Regulation No 13/2020 on Charging Infrastructure for BEV.

28 The President of Republic of Indonesia, Peraturan Pemerintah Republik Indonesia Nomor 14 Tahun 2015 Tentang Rencana Induk Pembangunan Industri Nasional Tahun 2015–2035, <https://peraturan.bpk.go.id/Home/Details/5577/pp-no-14-tahun-2015>.

29 The President of Republic of Indonesia, Peraturan Presiden Republik Indonesia Nomor 55 Tahun 2019 Tentang Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai Untuk Transportasi Jalan, <https://peraturan.bpk.go.id/Home/Details/116973/perpres-no-55-tahun-2019>.

30 The President of Republic of Indonesia, Peraturan Pemerintah Republik Indonesia Nomor 73 Tahun 2019 Tentang Barang Kena Pajak Yang Tergolong Mewah Berupa Kendaraan Bermotor Yang Dikenai Pajak Penjualan Atas Barang Mewah, <https://peraturan.bpk.go.id/Home/Details/122493/pp-no-73-tahun-2019>.

31 The Minister of Energy and Mineral Resource, Republic of Indonesia, Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia No 13 Tahun 2020 Tentang Penyediaan Infrastruktur Pengisian Listrik Untuk Kendaraan Bermotor Listrik Berbasis Baterai, <https://jdih.esdm.go.id/storage/document/PM%20ESDM%20No.%2013%20Tahun%202020.pdf>.

32 The Minister of Industry, Republic of Indonesia, Peraturan Menteri Perindustrian Republik Indonesia No 27 Tahun 2020 Tentang Spesifikasi, Peta Jalan Pengembangan, Dan Ketentuan Penghitungan Nilai Tingkat Komponen Dalam Negeri Kendaraan Bermotor Listrik Berbasis Baterai, <https://peraturan.bpk.go.id/Home/Details/167009/permenperin-no-27-tahun-2020>.

33 The Minister of Industry, Republic of Indonesia, Peraturan Menteri Perindustrian Republik Indonesia No 28 Tahun 2020 Tentang Kendaraan Bermotor Listrik Berbasis Baterai Dalam Keadaan Terurai Tidak Lengkap dan Keadaan Terurai Lengkap, <http://jdih.kemenperin.go.id/site/template3/2675>.

» **Local government regulations.** Several local governments already issued regulations to support the uptake of EV. For example, since the beginning of 2020 the Government of Jakarta, has provided fiscal incentives for EVs through a 0% transfer tax for both two-wheelers and four-wheelers and non-fiscal incentives through exclusion of EVs from odd-even driving restrictions.³⁴ TransJakarta, the first and biggest BRT service in Indonesia, also aims to transition to electric buses in the near future and will start with 100 electric buses. West Java Province, which is the neighboring province of Jakarta, also provides transfer tax reductions for EVs and was also the first province to use EVs in daily operations.³⁵ The Province of Bali, one of the world's most popular tourist destinations, has also initiated an EV program. The city of Denpasar in Bali has started the trial of electric bus since November 2020 and the province aims to be the pioneer of electric public transport in Indonesia.³⁶

In 2019, the Parliament passed a new taxation policy for automotive products. Government Regulation No. 73/2019 introduces a CO₂ emission limit for passenger cars. The new regulation, which came into effect in October 2021, favors plug-in hybrid electric vehicle (PHEV), battery electric vehicle (BEV), and fuel cell electric vehicles (FCEV) as it could potentially exclude luxury tax for all EV types if they can achieve the minimum local content.

From the power sector, the state-owned electric company “Perusahaan Listrik Negara” or PLN has launched their roadmap for EV infrastructure, covering the period 2020–2024. By 2024 the number of charging stations across the country is expected to reach 3,853. However, there are still numerous issues that need to be addressed including high investment costs for charging stations, especially DC fast charge; the absence of standards for charging station operations; lack of land availability in strategic locations; and untested business models for charging/battery swap stations.

In short, the national government is keen to accelerate the uptake of EVs. This intention has been reflected in various national strategies and regulations and the launch of various policies. Local governments have also put their efforts into providing incentives for the public to purchase and use EVs. There are also ongoing policy-making efforts by other regulatory agencies on relevant issues. For example, the Ministry of Home Affairs is currently working to establish a guideline for local governments to promote EVs through various local regulations and policies. The Ministry of Finance is also working to address the issue of fiscal policies related to cleaner vehicles.

Key stakeholders

Presidential Regulation (PR) 55/2019 assigns responsibilities to key stakeholders to support BEV acceleration, including line ministries, governmental agencies, and state-owned enterprises (SOEs). The Coordinating Ministry of Maritime and Investment (MARVES) is tasked with leading coordination of the implementation of this PR. Furthermore, all relevant line ministries should develop implementing regulations for PR 55/2019. However, several officials with whom we spoke at several events identified a gap in coordination among those ministries, which could be improved. Table 4 summarizes responsibilities assigned by the PR 55/2019 and also several other institutions based on discussion with local stakeholders.

34 Jakarta applies an “odd-even” policy to restrict four-wheelers from going through most major arteries during rush hours (06:00 – 10:00 and 16:00 – 21:00) from Monday to Friday, except on public holidays.

35 CNN Indonesia, Gubernur & Wagub Jabar Mulai Gunakan Mobil Listrik Pekan ini, 2021, <https://www.cnnindonesia.com/teknologi/20210103003445-384-588824/gubernur-wagub-jabar-mulai-gunakan-mobil-listrik-pekan-ini>.

36 The Bali Sun, “New Electric Busses in Bali Officially Launch to Help Lower Pollution on the Island,” November 5, 2020, <https://thebalisun.com/new-electric-busses-in-bali-officially-launch-to-help-lower-pollution-on-the-island/>.

Table 4. Key stakeholders for EV development in Indonesia

Stakeholders	Role/function
The President	Issued PR No. 55/2019 and continues to promote EV uptake by providing instruction and direction toward electrification of the transport sector
Coordinating Ministry of Maritime and Investment (MARVES)	Takes a leading role in the coordinating committee set up by PR 55/2019
Ministry of Industry	Develops technical specification and roadmap for development and calculation of local content for battery electric vehicles ³⁷ and regulations concerning completely knock down and incompletely knocked down imports. ³⁸ MoI will still develop other regulations related to domestic EV production.
Ministry of Finance	Formulate and set up carbon tax and fiscal policies, incorporate EVs into the procurement catalogue for operational vehicles of various government agencies.
Ministry of Energy and Mineral Resource (MEMR)	In charge of charging infrastructure development; regulate electricity price; overall energy management, including to assure that renewable energy targets are achieved.
State Owned Electric Company (PLN)	Develop charging infrastructure for EV.
Agency for Technology Assessment and Application (BPPT)	Lead the assessment of various innovative technologies related to EV supporting infrastructure.
Ministry of Environment and Forestry	Issue regulations governing vehicle and power plant emission standards; monitor the environmental impact of used battery recycling.
Ministry of Trade	Provide import duty incentives
Ministry of Transport	Issue vehicle type approval, regulate periodic inspection and maintenance requirements, certify retrofit of conventional engine into electric
Ministry of Interior	Provide guidance for local governments on incentives and privilege for EV users
PLN	Responsible for charging infrastructure development
Police Corps	Provide special identification plate/sign for EVs and manage EV registration data
Automotive industry	Manufacture and distribute EVs to end users
Associations of vehicle industries	Four-wheeler manufacturer association (GAIKINDO) and two-wheeler manufacturer association (AISI) advocate for the interests of the auto industry
Local governments	Develop initiatives to promote the uptake of EVs within their jurisdictions
Civil society, university research centers and development partners	Collaborate with the government to support all dimensions relevant to the uptake of EVs.

The strategy development workshop also revealed that a key issue faced by EV manufacturers is the lack of coordination among agencies. Although MARVES has the main role to coordinate, synchronize and control line ministries that are responsible for maritime and investment issues, the institution was relatively new and the set up was based on the nomenclature adopted by President Joko Widodo's regime in late 2014. Until the first semester of 2021 there is no unifying strategic document that coordinates the actions from individual ministries. There is also a lack of implementation guidelines for officers in the field who are implementing EV-related policies, including Customs Indonesia (for issues related to import and duties), Ministry of Transport (related to type approval certification).

37 Ministry of Industry, "Peraturan Menteri Perindustrian No 27 Tahun 2020 Tentang Spesifikasi, Peta Jalan Pengembangan, dan Ketentuan Penghitungan Nilai Tingkat Komponen Dalam negeri Kendaraan Bermotor Listrik Berbasis Baterai," 2020, <https://m.hukumonline.com/pusatdata/detail/lt5f7c0c1c759c8/nprt/lt51a5dc754da75/peraturan-menteri-perindustrian-nomor-27-tahun-2020>.

38 Ministry of Industry, "Peraturan Menteri Perindustrian No 28 Tahun 2020 Tentang Kendaraan Bermotor Listrik Berbasis Baterai dalam Keadaan Terurai Lengkap dan Keadaan Terurai Tidak Lengkap," 2020, <https://www.hukumonline.com/pusatdata/detail/lt5f7c0ef8e4cb1/nprt/lt51a871ffb74f6/peraturan-menteri-perindustrian-nomor-28-tahun-2020>.

Indonesia-specific barriers and opportunities for electrification

Barriers

One of the missions of the strategy development workshop is to identify key barriers that could impede the uptake of EVs. The identified barriers range from policy contexts to specific technical issues and public awareness. Although some barriers are universal to most countries in their early electrification process, some barriers are more critical or special in the Indonesia context. All barriers are grouped into four main areas.

High cost of EV

- » The average cost of passenger cars using ICE technology is relatively low in Indonesia, which makes it difficult for EVs to be cost-competitive. The top 5 best-selling cars in 2020 in Indonesia range in cost from IDR 140 million to IDR 264.6 million (US\$ 9,585 to US\$ 18,120 using the April 2021 exchange rate)³⁹ whereas the cost of passenger EVs is around IDR 677 million (US\$ 46,641) for Hyundai Ioniq 38.8 kW⁴⁰ without fiscal incentives. An ICCT study shows that even with the introduction of the new luxury tax (GR 73/2019), the total cost of ownership (TCO) of a Nissan Leaf (BEV) is greater than the cost of its gasoline counterpart (1.8L Toyota Corolla)⁴¹.
- » For battery electric buses, apart from high taxation and import duties, the lifetime costs are still unfavorable to EVs due to a combination of much higher upfront costs and short contract periods. The contracts in Latin America success cases (Santiago and Bogota) are between 12 and 14 years. In Indonesian cities bus contracts normally have a three-year term, and Jakarta is considering increasing it to 8 years. Even at 8 years the total cost of ownership may not work for e-buses and preferential contract arrangements are needed. Regulation concerning maximum bus weight is also contributing to the high cost as it appears that additional costs may occur due to changes to the chassis and other components to reduce the body weight while keeping the battery size, however this theory still needs to be confirmed.
- » Most four-wheel EVs are still being imported to Indonesia, but the existing taxation scheme has not yet favored imported EVs. There is a tax benefit of imported parts, but an implementation guideline for importing EV components is still missing. High import duties for EV parts and components are a major constraint that contribute to high EV cost. Indonesia differentiates between vehicles imported as fully assembled units (CBU) and imported parts that are assembled locally (CKD), whereas the CBU import duty is 50% of the value while the CKD rate is only 10% of the value.⁴²
- » Diesel CN 48 and gasoline RON 88 are still subsidized through Presidential Regulation No. 191/2014, which was subsequently revised through Presidential Regulation No 43/2018. While consumption of gasoline RON 88 declined 63% during the period 2013 to 2018, the consumption of diesel CN 48 during the same period was by far the most dominant share.⁴³ Another disincentive is that the Euro 2 emission standard for diesel vehicles will still be effective until April 2022, a one-year delay from the original timeline. Although Indonesia is a G20 member, it is lagging behind its G20 peers as almost all G20 members have adopted cleaner engine standards. This provides further cost advantage to diesel vehicles.

39 Alza Ahdira, "Pikiran Rakyat, Simak Harga 5 Mobil Terlaris di Indonesia Tahun 2020, Termurah Mulai dari Rp 140 Jutaan, 2020," 30 December 2020, <https://www.pikiran-rakyat.com/otomotif/pr-011194926/simak-harga-5-mobil-terlaris-di-indonesia-tahun-2020-termurah-mulai-dari-rp140-jutaan>.

40 <https://hyundaimobil.co.id/pricelist> [accessed 21 July 2021]

41 Zhinan Chen, Zifei Yang, and Sandra Wappelhorst, *Overview of passenger vehicle taxation in Asian countries and the potential to drive low-emission vehicle purchase*, ICCT, 2021 (forthcoming)

42 Chen, et al., *Overview of passenger vehicle taxation in Asian countries and the potential to drive low-emission vehicle purchase*.

43 Yihao Xie and Marietta Harjono, *The retail fuels market in Indonesia*, ICCT Working Paper 2020-23, October 2020, <https://theicct.org/sites/default/files/publications/Retail-fuels-indonesia-oct2020.pdf>.

Product availability

- » Local EV production is still limited to electric two- and three-wheelers. A relatively high percentage of the components needed to produce these vehicles locally are imported, as there is an insufficient supply of domestic components.
- » Although PR 55/2019 provides provisions to stimulate BEV manufacturing capacity, in reality it has not been responded to sufficiently, nor strongly integrated into the priorities of other line ministries.
- » A long-term and unified EV uptake target is still lacking, which provides uncertainty to industry players to drive their resources and investment into EVs, EV components, and battery manufacturing across different segments.
- » High import taxes for EV components will slow down local manufacturing development until that is addressed.
- » Lack of support in terms for research and development (R&D) for EVs and also collaboration among government, universities, and the automotive industry.

Infrastructure and the service chain

- » As of end of 2020, infrastructure and “service chain”—all the services needed to operate a vehicle—are still in an early stage, with the most significant problem being the limited extent of charging infrastructure, although the government has tried to address this issue by assigning the Agency of Assessment and Application of Technology (BPPT) and the State-Owned Electric Company (PLN) to pioneer and develop charging infrastructure. PLN offers to cooperate with interested third parties to sell them electricity for EV charging at IDR 714 (5 US cents) per kWh (bulk price), which they could then sell for up to IDR 1,300 (8 US cents) per kWh.⁴⁴ However, good business models for setting up charging infrastructures do not exist yet.
- » For fleet operators, concerns over charging issues include: (i) long charging times (under current technology), (ii) questionable grid reliability and resilience, and (iii) high cost of charging, for public fleet companies that set up charging stations. Moreover, public fleet companies such as TransJakarta and Bluebird taxi are still finding the best solution on charging management, since the depot might not accommodate all the fleets that need to charge in the same time.
- » Electric two-wheelers that are domestically produced can be cost-competitive to conventional motorcycles if sold without batteries, but they would require mature battery swapping operations.
- » A harmonized information portal on charging stations or battery swap stations is still missing. Making charging information accessible to the public could reduce range anxiety and attract EV buyers.
- » There is a noticeable gap in the integration of EV charging and renewable energy sources, which creates specific barriers to achieving national targets for renewable energy.

Public awareness

- » The Indonesian public is not widely exposed to EV technology and not yet motivated to use EV as their primary mode. This was partly because of a lack of models offered (see Table 2).
- » Education regarding the benefits of using EV is lacking, despite efforts to promote it by government. For example, dissemination of information regarding the 0% transfer tax and exclusion from traffic restrictions in Jakarta has not significantly increased public awareness or attracted interest regarding EVs.

⁴⁴ Presentation of the Director of Technical and Environment, Ministry of Energy and Mineral Resources for “Kick-off meeting Jakarta E-buses and E-ride hailing projects under UKPACT,” 9 March 2021.

» The general public, even in major cities such as Jakarta, is not exposed to EVs in daily life and therefore might not be aware of the reliability of the technology and the benefits in terms of fuel saving and reductions in emissions of both air pollution and GHG.

Opportunities

Opportunities that could potentially address these barriers are summarized in Table 5.

Table 5. EV opportunities

Barrier	Opportunities
High cost of EV	<ul style="list-style-type: none"> • Create a taxation system that reduces the purchase price of EVs and create disincentives for ICE vehicle (e.g. through feebate system), where the revenue from higher ICE vehicle taxes can be used to finance EV supporting infrastructure. Reductions in the purchase price using targeted fiscal incentives would subsequently contribute to lowering the total cost of ownership of EVs. • Explore the possibility of introducing cap and trade-type policies to subsidize the direct purchase of EVs for public transit and private users. • Eliminate diesel CN 48 and Gasoline RON 88 fuel subsidies and adopt subsidies for electricity use on EVs. • Issue implementing regulations that set implementation detail emerging from higher regulations, including: <ul style="list-style-type: none"> • Guidelines on EV production (Ministry of Industry) • Guidelines on custom and high import duties (Ministry of Finance)
Product Availability	<ul style="list-style-type: none"> • Prioritize support for Research and Development as the Indonesia vehicle market has its own unique characteristics and preferences. Meeting these specific needs would be one of the keys to increase the numbers of EV. • Set a binding commitment to support the Indonesian Automotive Industry Roadmap • Develop stringent fuel efficiency standards. A stringent fuel efficiency standard could catalyze the growth of EV manufacturing as it is one of the technology pathways to achieve fuel efficiency standards. • Conduct technology assessment to determine the specific needs of Indonesia • Mandatory targets for EV adoption (share of new vehicles) in public transit fleets (buses and taxis), as well as government institutions
Infrastructure & service chain	<ul style="list-style-type: none"> • Incentives given for EV purchase could stimulate the development of infrastructure and service chain • Support from both national and local governments to develop charging stations • State-owned enterprises (SOEs) could help to start initiatives to enhance the existing EV market • Develop a harmonized information portal for navigating through charging stations and battery swap stations
Public awareness	<ul style="list-style-type: none"> • Improve public outreach regarding incentives and benefits of EVs in order to incentivize purchase of an EV • Provide an EV education program and platform

In addition to opportunities listed in Table 5, there is a good opportunity for alignment of policies, mainly targeting the national level, to review and possibly harmonize other existing regulations (e.g., the bio-fuel target in the General Energy Plan and fuel subsidy, particularly diesel CN 48) to better support the transition to electric mobility.

Recommended mid-term action plans

High-level decision makers have presented their intention to encourage the uptake of EVs. A variety of regulations and policies have been issued or are in the pipeline to support this transition. Nevertheless, the vision of electrification and the supportive policies are not yet clear enough or strong enough to speed the transition. Given the current EV market share in Indonesia, it may take several years for EVs to enter the market at scale. There is a clear need for effort and investment from different parties to contribute to this transition.

The recommended actions could be considered catalysts to help Indonesia achieve its ambition to become an EV hub. Based on the status quo and stakeholder inputs, this

document identifies 7 areas of intervention that can be prioritized for philanthropic investments. Table 6 summarizes the recommendations under this strategy document.

Table 6. Summary of recommendations

Area of intervention	Recommended actions/initiatives
Coordination in making a binding commitment to achieve electrification targets	<ul style="list-style-type: none"> • Support the Coordinating Ministry of Maritime and Investment (coordinating ministry for the implementation of PR 55/2019) in engaging other line ministries and stakeholders • Establish platform and set up policy dialogues • Contribution to political and policy dialogues • Facilitate the setup of financing pool
Development of regulatory and fiscal policies and guidelines that spur demand for and supply of electric vehicles and technologies	<ul style="list-style-type: none"> • Develop/revise the implementing regulation for PR 55/2019 • Develop technical guidelines for fiscal policies • Develop vehicle fuel economy standards and incentives for EVs • Formulate more favorable electricity tariffs for EV users
Research and development that builds up domestic manufacturing and service capacity	<ul style="list-style-type: none"> • Conduct research for technology options and pathways • Establish a platform to facilitate communication among key stakeholders • Establish partnerships among research agencies • Provide expert opinions and international experiences to Ministry of Research
Strengthen charging infrastructure	<ul style="list-style-type: none"> • Conduct technical assessments of charging options • Support the State-Owned Electric Company (PLN) to assess charging needs for electric two-wheelers/electric three-wheelers • Support development of implementation guidelines for electricity tariff • Establish an ad-hoc multistakeholder forum • Support charging infrastructure development plan at local level
Increase consumer awareness to support EV uptake	<ul style="list-style-type: none"> • Organize outreach campaigns • Establish a platform for knowledge sharing • Engage and mobilize local stakeholders • Navigate international experiences and resources to support grassroots groups
Accelerate EV deployment in public and private fleets	<ul style="list-style-type: none"> • Document best practices from electric bus trials • Establish a mandate for public fleet EV procurement • Develop public vehicle procurement guidelines • Create preferential operational environment for electric fleets • Support the Ministry of Transport's "buy-the-service" scheme for electric buses • Make the case to encourage electrification of private fleets with feasible financial solutions • Make the case to electrify two-wheelers fleets used by on-demand services • Design innovative business models
Establish pilot projects in cities and replicate success cases to other cities	<ul style="list-style-type: none"> • Collaborate with cities with strong electrification intention to develop electrification strategies • Create/enhance reward and recognition for leadership in promoting EVs • Develop an EV guidebook for cities • Demonstrate the adoption of low-emission zone and congestion charging as means of promoting EV uptake • Engage the private sector to support pilot projects • Promote peer learning among cities

Coordination in making binding commitment to achieve electrification targets

Currently not all government agencies are of the same view regarding electrification for the transport sector. As mentioned earlier, development of EVs is already being accommodated via several strategic documents such as PR.55/2019 and solidified through the roadmap of automotive industry development set by the MoI (see Table.1). Nevertheless, implementation of this roadmap would require more engagement and support from related ministries as there is a lack of strong and unified commitment toward electrification. Other ongoing initiatives include central government facilitation of the establishment of the Indonesian Electric Vehicle Industry Association (Periklindo in Bahasa) in April 2021, where the Chief of Staff to the president was elected General Chairman of Periklindo⁴⁵. Although it is a challenging and complicated task to align environmental, climate change, and energy targets with the roadmap of automotive industry development, some actions can be taken to facilitate this process:

- » Support the Coordinating Ministry of Maritime and Investment (MARVES) to play a more engaged role and develop a strategic plan across all ministries, inviting stakeholders to the discussion. Establish a platform and set up policy dialogues among key government stakeholders to agree on an implementation plan to accelerate EV uptake and synergize the efforts toward electrification.
- » Contribute to political and policy dialogues by providing expert opinions, engaging key stakeholders, and sharing global experiences on cooperation among various stakeholders. To further motivate these stakeholders, such dialogue should also be complemented by documentation of the positive benefits of vehicle electrification such as fuel savings, GHG reductions, decreasing air pollution, new investment in industry, and green job creation.
- » Prove the benefit and necessity of setting up a financing pool and facilitate the setup of a process, e.g., through the green climate fund, to electrify the public transport sector (buses and taxis) and new mobility such as ride hailing/ride sharing, mainly at the city and regional levels. NGOs with good access to national and local governments and experiences in finance could play a leading role in this initiative.

Development of regulatory and fiscal policies and guidelines that spur demand and supply of electric vehicles and technologies

While general regulatory frameworks that favor the uptake of EV have been available, they have not yet addressed the critical aspects needed to jumpstart the transformation to electric mobility, especially those that are regulating technical aspects. The following recommendations could be considered to address gaps in the existing regulations.

- » Develop new implementing regulations or reform existing regulations to support the implementation of the PR 55/2019, which includes 14 fiscal policies and 3 non-fiscal policies for EVs. To date, there have been some regulations in place to stimulate investment for EV manufacturing facilities and some fiscal incentives to encourage EV purchases. However, the existing fiscal incentives are insufficient to close the cost gap between EVs and ICE vehicles. Research is needed to determine the prioritization and design of other policies (e.g. direct subsidy, feebate, fuel/electricity pricing), taking into account policy cost-effectiveness, available resources, and the readiness of relevant implementing agencies. Non-fiscal incentives could be offered in order to attract private fleets. This could include special license plates for EVs that ensure EV exemption from vehicle restriction policies, congestion charges, low-emission zones, etc.

⁴⁵ VOI Indonesia, "Electric Vehicle Industry Association Declared at IIMS, Moeldoko Becomes Its General Chairman," April 26, 2021, <https://voi.id/en/news/46867/electric-vehicle-industry-association-declared-at-iims-moeldoko-becomes-its-general-chairman>.

- » Support the development of technical guidelines for implementing fiscal policies. The technical guidelines aim to help customs officers and other relevant authorities to better recognize and differentiate EV components and parts from ICE vehicles. This is important as EV components may receive some privileges in terms of reduced import duties; however in practice, the implementing authorities lack the knowledge of the technologies to determine which ones qualify for incentives. As this was discussed quite extensively in the strategy development workshop, it could be considered a priority, along with developing tax deduction or tax exemption policies.
- » Develop vehicle fuel economy/CO₂ emission standards and provide incentives to EVs when designing compliance measures to accompany fuel economy standards. The General Plan for Energy calls for the development of a fuel economy standard by the end of 2019; however, to date such a standard has not been developed. Groundwork to develop the fuel economy standard for all vehicle segments could be immediately carried out and aligned with the automotive industry roadmap.
- » Formulate more favorable electricity tariffs for EV users. The latest MEMR regulation covers charging stations and battery swap stations. To stimulate more EV purchases by the public, electricity tariffs could be made more favorable, both for the direct customer who charges their EV at home and for charging station and battery swap operators. This action would require engagement of the government, the private sector, state-owned enterprises, and NGOs.

Research and development that build up domestic manufacturing and service capacity

Research and development (R&D) is important to Indonesia in enabling the country to become an EV manufacturing and assembling hub. The EV production capacity and charging infrastructure are still at a nascent stage. Building the technological foundation and domestic manufacturing capacity for EVs and batteries will reduce the cost of EV purchase and operation. The PR 55/2019 provides an opportunity for universities and other research agencies to be involved in the process, however as of now, strong and targeted support still needs to be developed. EV R&D support could cover all aspects of EV production and charging station development. Domestic supply chains could have greater market share, consistent with the PR 55/2019 call for mandatory local content for EV production. The following recommendations could be considered to encourage R&D for EVs, and enable stakeholders to innovate in EV development, thereby allow for mass production and market penetration of EVs.

- » Conduct research that identifies and estimates electrification technology options and pathways for different vehicle modes, which will provide guidance to investment in the field. For example, the battery requirement and selection of power train and controller for electric two-wheelers/electric three-wheelers are very different from four-wheeler passenger EV and electric bus. The charging needs and technologies may also be different for electric two-wheelers/electric three-wheelers. This initiative would subsequently create common standards that best fit the Indonesian market in terms of technology and production. This initiative is best suited for philanthropic agencies due to their neutral position.
- » Establish platforms or mechanisms to facilitate communication among manufacturers, suppliers, and service providers within the domestic supply chain. The objective is to provide market players with the opportunity to stay informed of opportunities and challenges, connect with like-minded businesses, and develop an in-depth understanding of the latest developments in the EV space. Multilateral institutions or NGOs are in a better position to lead this initiative due to their advanced network, not only in Indonesia but also at a global level.
- » Establish partnerships among research agencies, universities, NGOs, and think tanks to improve knowledge exchange among experts, scientists, and decision-makers.

The aim of such partnerships is to provide industry players with fresh and innovative ideas that could be put into practice. There are already several research centers that are specializing in developing both EV (electric two-wheelers) and battery/energy storage for EVs. Encouraging these research agencies to collaborate with other and provide them with the initial support, e.g., forum or expo is expected to generate momentum for the establishment of such partnerships. This initiative also requires leadership from multilateral institutions.

- » Provide expert opinions and international experience to the Ministry of Research/ National Research and Innovation Agency to inform and influence their decisions on EV policy research priorities. This can be done through a series of events/fora and by inviting influential people from domestic and international entities to share their experiences and to get their advice for further advancing EV research in Indonesia. This initiative could have the combined support of multilateral institutions and philanthropic agencies. The rationale for this is that a joint effort could better address the gap in the existing policy and implementation plan.

Strengthen charging infrastructure

Even before the rollout of PR 55/2019, BPPT made several assessments of issues related to charging infrastructure, and found that the challenges are mainly situated around the national electricity system. Furthermore, most of the technology for charging infrastructure is still being imported from outside the country. The recommendations below could be used to strengthen policies related to charging infrastructure.

- » Conduct technical assessment to identify feasible and economical charging options for different vehicle modes in Indonesia. This will build the foundation for the government (i.e. BPPT) to give technology clearance and facilitate technology innovation and transfer. Since the public transport sector (i.e. bus fleet) and taxi operators have been leaders in electrification, charging solutions for these fleets can be prioritized for assessment, feasibility study, and exploration of business models. All these activities will support the roadmap for EV charging infrastructure that was launched by the MEMR in August 2020. Support for building the EV ecosystem could also be synergized with support for R&D.
- » Support PLN to assess the charging needs of electric two-wheelers/electric three-wheelers. Charging for electric two-wheelers/electric three-wheelers could be done more easily at home by using household electricity connections or battery swapping. PLN has offered several kinds of incentives for charging at home, including discounts for connection upgrades, special tariffs for charging at night, and the option of separate electricity bills for household and charging. Third parties could contribute by assessing more specific needs of electric two-wheelers/electric three-wheelers users, such as how much saving from charging is necessary to improve the cost competitiveness of electric two-wheelers/electric three-wheelers. For electric two-wheelers/electric three-wheelers sold without a battery, research could explore the kind of battery swapping solutions or business models that are feasible in Indonesia.
- » Support development of implementing guidelines regarding special electricity tariffs for charging to reduce EV operation cost. External parties such as NGOs could help in the development process, e.g., by conducting a public survey of desired electricity tariffs and to identify options for further reducing electricity tariffs for EV charging. Philanthropic support could also be channeled to make non-biased TCO evaluations with a particular focus on charging costs.
- » Establish an ad-hoc multi-stakeholder forum to coordinate the involvement of stakeholders to address EV charging issues, especially among relevant government agencies (MEMR, SOEs, BPPT), industries, and associations. The forum aims to serve as a communications platform among key stakeholders in order to facilitate joint development of a roadmap and implementation plans.

- » Support charging infrastructure development plans at the local level and bridge the efforts between national and local governments. While policies related to energy and charging technology may be addressed at the national level, land availability for charging, especially in strategic locations—for example, at business centers, shopping malls, and other public space/parking areas—are in the hands of local governments. For larger cities (e.g., those with populations exceeding 1 million inhabitants), the municipal government could also consider undertaking an EV charging requirement that best fits the local circumstances.

Increase consumer awareness to support EV uptake

Consumer awareness could be key to the uptake of EV in Indonesia as the buying power of average Indonesians increases over time. However, it should be made clear that a consumer awareness-raising campaign is different from a marketing or advertising campaign by automakers. The consumer awareness campaign aims to provide a comprehensive package of information to eliminate potential misconceptions or myths regarding EV use. Public surveys related to EVs reveal that most of the concerns regarding EVs are related to driving range, battery lifetime, upfront cost, resale price, etc. Those issues were also discussed in detail during the electrification workshop. It was also discovered that public awareness of government incentives for EV purchases is limited, thus creating a gap in the public's understanding of the economic benefit of an EV transition. Several groups of consumers could potentially be the target of consumer awareness campaigns, however a potentially fruitful group is EV early adopters, who are often willing to share their knowledge and experiences, and to talk about EV technology with interested peers or other consumers. Recommended actions to increase consumer awareness include:

- » Organize an outreach campaign with a focus on raising awareness among consumers about EV technology and incentive programs through printed media, video, radio, social media, and public events. Such a campaign could be taken at both the national and local levels and follow campaign experience in other leading EV markets. The outreach campaign could take advantage of social media and online platforms, as well as traditional media and events.
- » Establish platforms for knowledge sharing through public websites, social media accounts or an internet portal to propagate reliable and clear information related to EVs in Indonesia. The information portal is to raise awareness regarding EV availability, incentives, total cost of ownership, battery characteristics, charging arrangements, safety etc.
- » Engage and mobilize local stakeholders in identified regions for EV demonstrations, such as ride-and-drive events, electric ride-sharing programs, fleet transition, and exhibitions for the public.
- » Review international experience and resources and apply them to support and train grassroot groups to carry out EV campaigns that target potential EV early adopters. One example of such an organization is “Plug-in America”.⁴⁶ NGOs with access to international resources could establish stronger relationships with grassroot groups that have the same intention of promoting low-carbon transportation. These grassroot groups have the potential to be “influencers” on social media, which could be an effective and efficient way to increase consumer awareness, as internet penetration in Indonesia is increasing over time.

Accelerate EV deployment in the fleets

As demonstrated by ongoing practices in Indonesia, electrification of public and private fleets is ahead of the electrification of individual vehicles. This condition has

⁴⁶ <https://pluginamerica.org/about-us/>

made EV deployment for public and private fleets a key recommendation emerging from stakeholder discussions. While public bus systems such as TransJakarta BRT and DAMRI are managed by state-owned enterprises, taxi and other on-demand services are operated by the private sector. It should also be noted that two-wheelers are the dominant fleets for on-demand services, both for passenger and non-passenger services, e.g., goods delivery and food services. Such a focus can increase EV uptake while achieving economies of scale. From the production side, several bus manufacturers, domestic and foreign, have begun exploring the domestic electric bus market. BYD, Skywell, Mobil Anak Bangsa, and INKA are some of the brands that have already delivered electric bus prototypes. For this strategy, public fleets can be defined as any commercial public entity that operates the transportation services of both conventional mode and non-conventional modes, such as ride hailing and on-demand transport, while private fleet is used to describe the set of vehicles with individual users. Recommendations to accelerate EV deployment in fleets include:

Public fleet:

- » Document best practices from various trials of electric bus fleets in Jakarta, Bali, as well as other cities that have introduced electric buses and disseminate the lessons to other cities. Those initiatives should also receive support from the Ministry of Home Affairs in terms of developing a standardized guideline for urban bus fleet electrification. This initiative could also be combined with an integrated approach to calculate the reduction of GHG emissions and other harmful pollutants from the use of diesel buses.
- » Establish a mandate for public fleet EV procurement. As more and more cities in Indonesia start to introduce electric buses, the central government could use the momentum by setting EV procurement targets for public fleets starting from the bus fleet. The targets can later expand to vehicles owned by government and government-owned enterprises. This initiative would require support from the Ministry of Home Affairs as they have the authority to develop such a mandate for local governments.
- » Develop public vehicle procurement guidelines that ensure that EVs are competitive with ICE vehicles. This would require procurement criteria that rely on vehicle life-cycle costs, instead of the traditional upfront costs (CAPEX). In addition, procurement selection criteria must look at the environmental aspects and provide additional points to zero emission technologies and the least points to traditional ICE options.
- » Create a preferential operation environment for electric fleets. In cities where electric buses are already in operation, provide preferential lane access especially for high-occupancy routes in order to attract more passengers. Research could be carried out to assess and identify high-occupancy routes and the requirements and benefits for establishing preferential lane access (in terms of bureaucracy, land acquisition, construction cost, and other social and economic factors).
- » Support the Ministry of Transport's "buy-the-service" scheme for electric buses. In mid-2020 the MoT rolled out this program in five Indonesian cities (Palembang, Surakarta, Yogyakarta, Denpasar and Medan) and the Ministry plans to add six more cities in 2021.⁴⁷ The scheme is being funded completely by the central government through MoT, therefore other funding opportunities could be explored in order to maximize the benefit of the initiative. The program is expected to run only three years. Three years represents 25% of the lifetime of an electric bus operating on a public transit system. Thus, extending the program or finding long term support resources is paramount for e-bus deployments.

⁴⁷ Nidia Zuraya, "Kemenhub: Buy The Service Sudah Angkut 1,2 Juta Penumpang," *Republika*, November 19, 2020 <https://republika.co.id/berita/qk00i1383/kemenhub-embuy-the-serviceem-sudah-angkut-12-juta-penumpang>.

- » Design innovative business models that split the financial risks among a wider range of stakeholders. The adoption of alternative business cases for public transit fleets allowed Santiago de Chile and Bogota to accelerate e-bus deployments. In those cities, the traditional business model where the bus owner is also the operator shifted to one where fleet ownership and operation are fulfilled by different parties. That also allows for tailoring incentives for capital investments or for operations (pay-by-km subsidies like the BTS program). This would also require longer contract periods to recover larger capital investments.

Taxi and ride-hailing fleets:

- » Build the case for encouraging electrification of private fleets with feasible financial solutions, e.g., remove surcharges such as parking and dispatch charges for EV taxis and on-demand/ride hailing services. This measure could potentially attract taxi and on-demand/ride hailing providers to add their EV fleets while reducing the cost for customers.
- » Build the case for electrifying two-wheeler fleets used by on-demand services. two-wheeler fleets are the primary vehicles used in the majority of on-demand services such as Grab and Gojek, both for carrying passengers and for delivery. There have been several TCO analyses conducted by these companies for two- and four-wheelers; however, more efforts may be needed to convince drivers, since the business model of these on-demand services is largely to rely on drivers to select the type of vehicles to be used.

Established pilot projects at the local level and replicate success cases

International experience and ongoing electrification activities suggest that cities have great potential to lead early EV uptake, as city-level policies can be more flexible and innovative and often require less time and fewer resources to navigate. With strong political support from city governments and taking into consideration sustainability-centered planning and decision making, pilot projects in cities could be the entry point for nationwide EV uptake. Furthermore, battery electric vehicles in general are considered to be more suitable for urban use due to short trip distances, light duty usage, and availability of charging stations or battery swap stations. Recommendations for establishing pilot projects in cities and for replicating success cases in other cities include:

- » Collaborate with cities interested in electrification to develop electrification strategies to stimulate EV uptake at the city level. Candidate cities include Jakarta, Denpasar, Medan, Bandung, and Surabaya. These cities have already made efforts to incentivize electrification and have also received support from MoT through “buy the service” schemes, where the MoT provides funds for electric bus operators to run the service (not for capital, or purchase). Establishing strong collaboration among these cities and MoT, Ministry of Internal Affairs, and other key Ministries will ensure that these cities have access to key resources and knowledge for developing their own electrification strategies. Meanwhile, capacity building for relevant city agencies could be added to better support the uptake of EV at the city level.
- » Create or enhance reward and recognition for leadership in promoting EVs, e.g., award schemes for cities that successfully promote the use of EVs within their jurisdictions. For example, MoT regularly gives the Wahana Tata Nugraha or WTN Award, which goes to cities that have successfully managed public transportation by taking into consideration environmental and sustainability issues, and also other public interest dimensions e.g., inclusion of people with disabilities. Similar rewards could aim to improve environmental performance of urban transport system provided by city association such as APEKSI (Association of Indonesia Municipalities).
- » Develop an EV guidebook for cities that includes best practices from cities in Indonesia and across the world. The guidebook could provide a ready-made

template for implementation by city governments and provide tools and evaluation that can guide cities in calculating benefits and costs for EV deployment in public fleets. The action can be supported by the Ministry of Transport and Ministry of Home Affairs and APEKSI.

- » Demonstrate the adoption of low-emission zone (LEZ) policies and congestion charges as means of promoting EV uptake. An example of this is the implementation of the LEZ in Jakarta. Access to LEZs should be restricted, allowing only vehicles that pass stringent emission standards, or electric vehicles. The restriction is ideally not only for four-wheelers, but two-wheelers as well, as most of Indonesian cities have significant two-wheeler fleets. LEZs are also seen as an effective measure for reducing private vehicle use and increasing public transport utilization in many cities across the world. Adoption of LEZs could also be combined with the introduction or expansion of a congestion charging policy in which a fee is charged for using certain roads to reduce congestion. Jakarta had previously planned to introduce electronic road pricing (ERP); however, the plan was delayed in 2020 due to the COVID-19 pandemic.⁴⁸ Jakarta's ERP policy is aiming to take fees for roads with high traffic loads. These policies could provide benefits to EV users and could be tested for their impact on EV uptake at the local level.
- » Engage the private sector, including energy companies, infrastructure providers, property developers, and tech companies to support pilot projects, as they have the resources, know-how, and technical expertise to support city governments in addressing various issues such as parking, charging, battery swapping, and grid upgrade. For example, PLN has launched its Charge.IN app to help EV users to locate the closest charging stations; it also serves as a payment gateway that could be integrated with smart parking systems in public buildings, business centers, or shopping centers.
- » Promote peer learning among cities with the aim of advancing best practices related to all aspects of electrification of the transport sector at the city level, including its supporting infrastructure. This initiative could be led by city networks or the Ministry of Home Affairs and could be supported by non-governmental organizations and civil-society organizations.

Implementation partners

Recommendations made in this strategy document are aimed to guide NGOs, civil society organizations, and academics to support the acceleration of EV uptake in Indonesia and to help the philanthropic community to identify priorities for investment in this area.

Through the electrification workshop and conversations with local stakeholders, we have made connections with organizations that support transport electrification efforts. Table 7 lists some partners that have the capacity and resources to assist in implementing the strategy.

⁴⁸ Muhammad Choirul Anwar, "Jalan Berbayar Jakarta dan Sekitar Dipastikan Batal di 2020, CNBC Indonesia, 2020," August 5, 2020, <https://www.cnbcindonesia.com/news/20200805145753-4-177643/jalan-berbayar-jakarta-dan-sekitar-dipastikan-batal-di-2020>.

Table 7. Core partners for strategy implementation

Core Partners	Area of work
International Council on Clean Transportation (ICCT)	International organization with rich experience in research on transportation decarbonization, emission reduction, and vehicle electrification, including technical analysis and capacity building.
Institute for Essential Services Reform (IESR)	Think-tank agency working in the intersection of energy and environment
Joint Committee for Leaded Gasoline Phase-Out (KPBB)	Local NGO with extensive network with both government and NGOs related to the issue of air pollution, vehicle fuel efficiency and electrification
Coaction Indonesia	Local NGO working to accelerate renewable energy transition in Indonesia
Institute for Transportation and Development Policy (ITDP) - Indonesia	International NGO working to support better policy making for sustainable transport in many countries including Indonesia
C40 Cities	Network of mega-cities around the world that promotes collaboration to address the issue of climate change
Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ)	International development agency from Germany, working with the Government in Indonesia to promote cross-sectoral issues including sustainable transport, renewable energy, urban development, and capacity building
ICLEI - Indonesia	Network of local governments working to promote sustainable urban development
Climate Policy Initiative (CPI)	CPI works to support climate goals set by the Government of Indonesia and the area of expertise lies in climate finance and innovation, covering both energy and land-use issues
World Resources Institute (WRI)	International research institute for sustainable socio-economic development, with focuses on forestry, climate, energy, urban and transport, governance, and maritime issues
NIRAS Consulting	Consulting company that uses multi-disciplinary engineering to achieve sustainability
Indonesia Transport Society (MTI)	A network of professionals working on the issue of transportation and actively supporting policy making related to transport issues at the national and local levels.
WWF Indonesia	International NGO working to promote conservation efforts in line with sustainable development goals.

Among the potential partners, international organizations could focus their efforts on providing technical assistance to the government, while also supporting capacity building for local key NGOs in the area of policy advocacy and technical analysis.

KPBB, IESR, and Coaction—local NGOs that have been quite active in advocating clean energy, fighting air pollution, and promoting electric vehicles—could be key players in coordinating the activities. ITDP with their close ties to high-level decision makers in the transport sector could also contribute the know-how and expertise required to implement the strategy. All these NGOs could potentially be engaged to review and update the strategy periodically, while at the same time bringing in more NGOs and other grassroot actors.

C40 and GIZ are in a good position to build political engagement, facilitate the establishment of roadmap and strategy, and secure commitment toward electrification. They can also coordinate international experts and efforts to support local electrification campaigns.