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CLIMATE TECHNOLOGY CENTRE & NETWORK

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Policy Recommendations for Electric Vehicle Implementation in Indonesia

Supporting Jakarta's Transition to E-mobility Project

October 2020

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List of Abbreviations

BAPPENAS	Ministry of National Development Planning
BAU	Business As Usual
BBN KB	Vehicle Ownership Transfer Fee
BEV	Battery Electric Vehicle
BI	Bank of Indonesia
BKPN	Investment Coordinating Board
BPDLH	Environmental Fund Management Agency
BPPT	Agency for the Assessment and Application of Technology
BRT	Bus Rapid Transit
BUMD	Regional-owned Enterprise
BUMN	State-owned Enterprise
CBD	Center Business District
CKD	Completely Knocked-Down
CNG	Compressed Natural Gas
CSR	Corporate Social Responsibility
DAMRI	Djawatan Angkoetan Motor Repoeblik Indonesia (an Indonesian state-owned public transit bus company
DC	Direct Current
EV	Electric Vehicle
FAME	Faster Adoption and Manufacturing of Electric Vehicles
FCEV	Fuel Cell Electric Vehicle
GESI	Gender Equality and Social Inclusion
GHG	Greenhouse Gases
GoI	Government of Indonesia
GoJ	Government of Jakarta
HEV	Hybrid Electric Vehicle
HOV	High Occupancy Vehicle

ICE	Internal Combustion Engine
IKD	Incompletely Knocked-Down
KEN	National Energy Policy
KLIK	Direct Construction Facility
KWh	Kilowatt Hour
LCEV	Low Carbon Emission Vehicles
LEZ	Low Emission Zone
lge	Liter Gasoline Standard
LKPP	National Product Procurement Agency
Molina	National Electric Car
NDC	Nationally Determined Contributions
NGO	Non-Governmental Agency
OEM	Original Equipment Manufacturer
OJK	Financial Service Authority
PHEV	Plug-in Hybrid Electric Vehicle
PLN	State Power Company
PPP	Public-Private Partnership
PPnBM	Sales Tax of Luxurious Goods
RAD-GRK	GHG Reduction Regional Action Plan
RAN-GRK	GHG Reduction National Action Plan
RITJ	Greater Jakarta Transport Main Plan
RPJMD	Regional Mid-term Development Plan
RPJMN	National Mid-term Development Plan
RPJPD	Regional Long-term Development Plan
RPJPN	National Long-term Development Plan
RTRW	Regional Spatial Plan
RUED	Regional Energy Plan
RUEN	National Energy Plan
SDG	Sustainable Development Goals
SISTRANAS	National Transport System

SPM	Minimum Service Standard
TCO	Total Cost Ownership
TKDN	National Localization Rate
UNFCCC	United Nations Framework Convention on Climate Change
xEV	Any electric vehicle
ZEV	Zero Emission Vehicle
ZEZ	Zero Emission Zone

Executive Summary

1. **The development of electric vehicles across the world is moving fast and Indonesia is keen to keep up with the pace by issuing Presidential Regulation No. 55/2019 on Battery Electric Vehicle (BEV) Acceleration Program.** Given the general nature of Presidential Regulations, derivative policies to provide implementation details of all the elements mentioned in the Presidential Regulation No. 55/2019, including incentive schemes, need to be issued by relevant ministries. Yet, several of the needed derivative policies are still missing, rendering the mandates unactionable.

2. **Coordination between government counterparts both between national institutions and between the national and local institutions is crucial to establish comprehensive policy packages.** Many governmental stakeholders are involved in the BEV adoption acceleration program, which include at least 12 ministries at the national level and multiple local government agencies. There are still divided views even within the government institutions and external parties regarding the decision to directly focus on BEVs as opposed to also include hybrid electric vehicles. This issue, if remained addressed, will hamper the envisioned BEV adoption.

3. **A comprehensive policy package on e-mobility adoption should tackle both macro- and micro-level challenges.** Macro-level challenges revolve around the directive challenges i.e. missing targets and mandates on BEV adoption, especially on the public transport fleet; the institutional setup challenges; and the on-going environmental issues such as high carbon mix and battery waste. On the other hand, it is also important to take an action plan to resolve micro-level challenges, such as BEV demand issues, supply (manufacturing) difficulties, and lack of charging infrastructure provision. The challenges are mapped on Figure A.

4. **The policy recommendations to tackle macro-level challenges are as follows.**
    a. ***On tackling directive challenges:*** Create national and city-level BEV penetration roadmaps, focusing on public transport and motorcycle electrification, tied in with GHG reduction objectives. Not only establishing new regulations, several existing documents also need to be adjusted to incorporate BEV targets and plans, such as Indonesia's NDC, RPJMN and RPJPN, SISTRANAS and other transport master plans, National Energy Policy (KEN), National GHG Reduction Action Plan (RAN-GRK) and Local GHG Reduction Action Plan (RAD-GRK), National General Energy Plan (RUEN), and Local General Energy Plan (RUED).
    b. ***On tackling institutional setup challenges****:* Clearly define the BEV national task forces' (the Coordination Team and Policy Working Group's) responsibilities and establish city level task force accordingly.
    c. ***On tackling environmental challenges:*** Introduce more aggressive renewable energy mix policies and incentives for renewable energy operators, ensure consistency of

policies, by also issuing a fuel economy standard and pollutant regulation in accordance to BEV adoption programs; mandate li-ion battery recycling; and encourage and incentivize rooftop solar use at charging stations and bus stops or facilities.

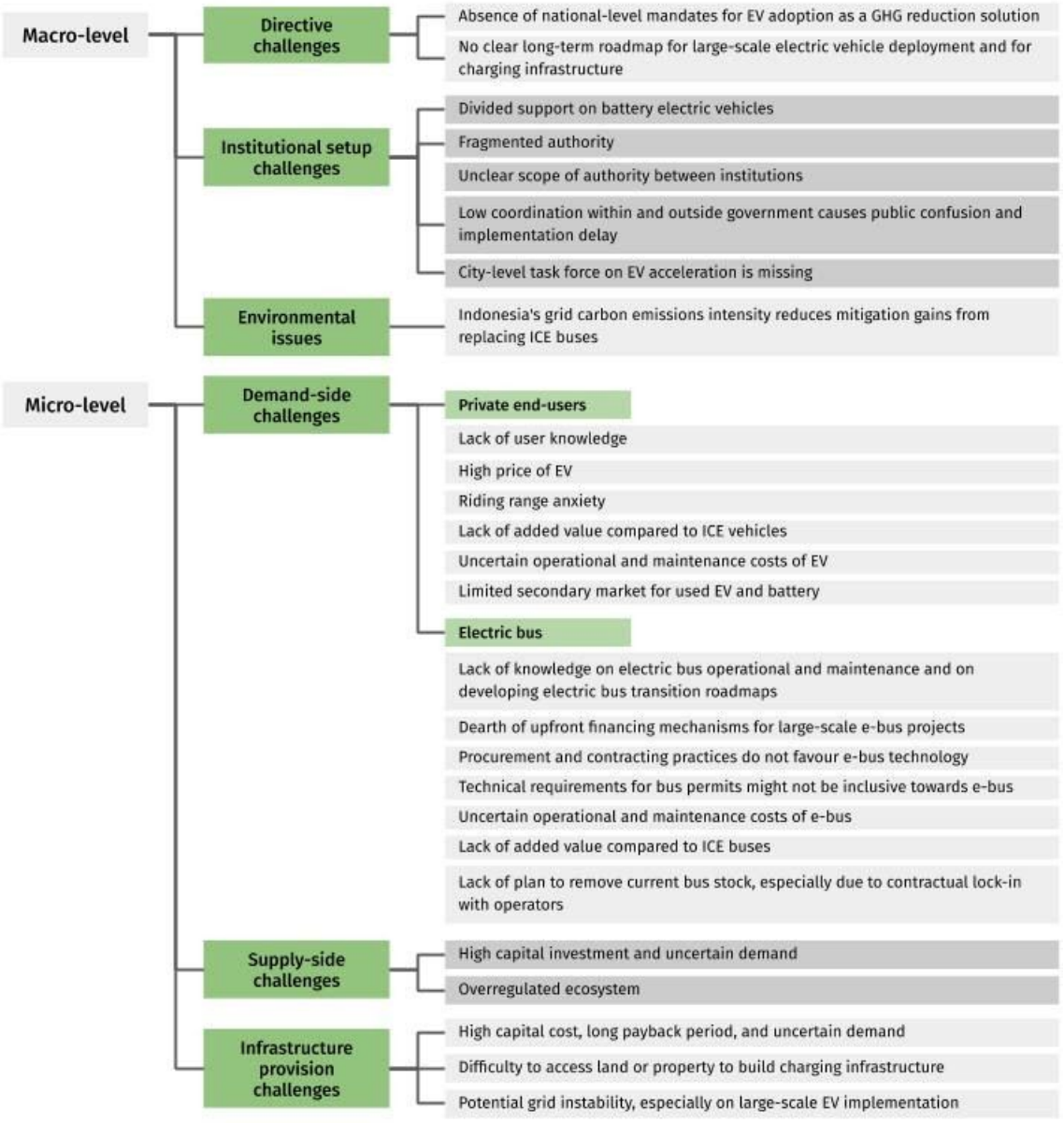


Figure A. EV implementation challenges

5. **The policy recommendations to tackle micro-level challenges are as follows.**
   a. ***Introduce demand creation policies.*** Demand creation policies are crucial in the early stages of BEV adoption. A combination of fiscal incentives for BEV (e.g. vehicle

purchase subsidies, tax reductions, preferential electricity tariff at low-peak period, preferential credit schemes, discounted vehicle insurance rate for BEVs, and ICE vehicles trade-in scheme for BEVs) and fiscal disincentives for conventional vehicles (e.g. increase ICE vehicle taxes, increase fossil fuel price which is currently still subsidized, and carbon tax) should be put in place to make the purchase price of BEV on par with conventional vehicles. It has to be noted that although subsidies are effective to encourage BEV adoption by reducing the CAPEX difference between BEV and ICE, they should be designed carefully. The subsidy policy design can be a powerful tool to direct the course of BEV adoption to certain vehicles or user segments. It is necessary to ensure that the subsidies are given to effectively benefit the widest user group possible, not to just enable a handful of upper-class society members to purchase luxury BEVs. Therefore, it is recommended to set several subsidy eligibility requirements to promote equitable BEV adoption.

Issuance of policies which enable various business models for BEVs, such as battery leasing and vehicle leasing, could also reduce the capital costs. Non-fiscal incentives (e.g. low or zero emission zones, preferential parking fee, highway toll or road pricing discounts or waivers, improved vehicle emission limits and mandate emission testing) could also support the growth of BEV demand.

In addition to fiscal and non-fiscal incentives, fleet electrification programs starting from government vehicles and public transport fleets can provide the initial demand needed for BEV adoption to gain traction. For public transport fleet electrification, the government through transport agencies could prioritize electric buses in public route tendering, offer higher subsidies for electric buses, or offer longer contracts for electric bus fleet operators.

The government can also take charge in developing the initial charging infrastructure network and creating a secondary market for BEVs and batteries. Last but not least, as a "soft" approach, public awareness campaigns, e.g. through a comprehensive BEV information portal and offline BEV showcase events, should be started by the government to educate the public and eradicate negative preconceptions about BEVs.

b. ***Introduce supply support policies.*** To further support BEV adoption by increasing BEV model options and reducing production costs, and also to achieve the national industry objectives, the government needs to promptly formulate policies targeting and supporting the BEV industry players. Several policy measures to support domestic BEV supply are production mandates through a credit system, preferential loan offer and tax reduction schemes for local manufacturers, and ensure lower import duty for BEV components and raw materials. Not only financial incentives on the production process, permit regulation streamlining and infrastructure support for BEV industry complexes are also needed. Furthermore, strong support by the

national government in the R&D sector should be made to create competitive BEV industries in the long run.

c. ***Introduce infrastructure provision support policies.*** Charging infrastructure deployment is a crucial factor of large-scale BEV adoption, hence incentives should be made available to boost charger provisions, especially Level 2 and DC fast charging stations. Fiscal incentives and subsidies on charging stations, providing spaces for public charging stations on government-owned assets or at least ensuring a streamlined process of land acquisition for public charging station developments, and amending building regulations to allow charging stations are parts of the policy package which should be issued to accelerate widespread public chargers. Establishment of a single plug in standard is also important not only to reduce the investment costs of charger provision but also to provide certainty for BEV manufacturers to produce BEVs with a specific interface.

1. Introduction

In 2019, the President of Indonesia signed Presidential Regulation No. 55/2109 on the Battery Electric Vehicle Acceleration Program, which aims to provide a legal framework and direction on Battery Electric Vehicle (BEV) development in Indonesia. Through the document, the government has set the course to directly focus on the development of fully electric vehicles or BEV, instead also including hybrid vehicles as part of the transition from ICE vehicles to electric vehicles.

In addition to underlining the Government of Indonesia (GoI)'s support on BEV adoption, the regulation also provides directives to accelerate BEV-related industry development in the country. To accelerate BEV industry development, the regulation has mentioned several options for fiscal and non-fiscal incentives targeted to various stakeholders of the BEV ecosystem which could be provided by the GoI or local governments. The regulation also mentions other basic aspects related to BEV adoption, including charging infrastructure development and charging tariffs, BEV technical requirements, and battery waste management with varying levels of detail. Last but not least, the regulation mandates the development of a coordination team on the BEV acceleration program ("Coordination Team") which will consist of several ministries. A timetable of a gradually increasing percentage of manufacturing localization for two- to four-wheelers to protect the budding domestic BEV and BEV components manufacturing industry.

Given the general nature of Presidential Regulations, derivative policies to provide implementation details of all the elements mentioned in the Presidential Regulation No. 55/2019, including incentive schemes, need to be issued by relevant ministries. Yet, several of the needed derivative policies are still missing, rendering the mandates unactionable. In addition to the introduction of derivative policies, several amendments to existing policies need to be introduced to encourage the development of BEVs and tackle the issues hampering the implementation of the BEV acceleration program.

This report analyzes the policy gaps and provides policy recommendations on battery electric vehicles (BEV) in Indonesia. The report also recommends several policies needed to accelerate the adoption of electric buses by public transport operators. Public transport electrification, in addition to two-wheeler electrification, has been identified as one of the main entry points for mass BEV penetration[1], including in a stakeholder consultation workshop conducted for this project.

The remainder of this report is organized as follows: firstly, we outline our methodology to derive proposed recommendations. Secondly, a brief discussion of the stakeholder consultation workshop results is presented. Thirdly, we discuss the BEV implementation challenges identified from the workshop and desk research. Following that, we propose a

[1] IESR (2019)

regulatory framework for categorizing and discussing BEV policies in a structured manner. Finally, we discuss our policy recommendations aligned with the target and objectives of electric vehicle programs.

2. Methodology

To develop a comprehensive set of policy recommendations for policymakers to accelerate electric vehicle adoption, we performed a desk study of the existing policies related to EVs and supporting infrastructure and conducted benchmarking analysis on the EVs policies from other countries, such as India, China, and the US. Results of the desk study and benchmark analysis were presented at a stakeholder consultation workshop on BEV policy conducted in August 2020 with relevant GoI and Government of Jakarta (GoJ) agencies, as well as practitioners such as transit operators and electric bus manufacturers and also several non-governmental organizations. Follow up interviews regarding challenges of implementation and plans for upcoming regulations on BEV development at the national and local levels were also conducted with the stakeholders mainly at the national level.

The resulting policy review from the desk study, as discussed in Deliverable 2.1, and the identified implementation challenges and list of new and upcoming regulations from the workshop, as elaborated in Deliverable 2.2, became the input for our analysis in this report. Another desk study to benchmark policies from leading cities in electric bus implementation was also conducted to gather policy options that remained unaddressed from the workshop. An analysis was done to identify the gaps in Indonesian and local BEV policies to deploy electric vehicles and to derive a set of policy recommendations for policymakers both from the GoI and local governments. A regulatory framework was then used to sort the proposed recommendations.

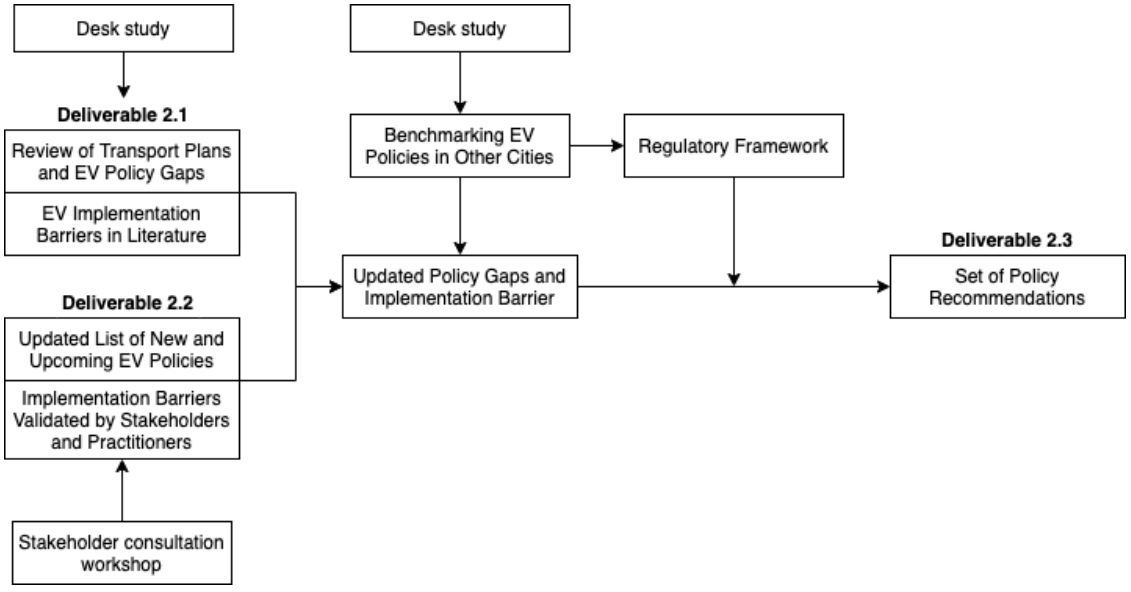


Figure 1. Research methodology

3. Stakeholder Consultation

A virtual consultation workshop was conducted from August 26, 2020, to August 28, 2020, to gain inputs from stakeholders on e-mobility development in Indonesia. Both national and local stakeholders play a huge part in developing the e-mobility ecosystem in Indonesia and therefore were included as the workshop's key participants.

There were 192 high-level local and international participants and 32 local and international key organizations involved in the workshop. 95 participants were from government organizations, such as national ministries, agencies, local government, or government-owned enterprises. The rest of the participants were from private companies or local or international non-governmental organizations working on e-mobility.

Based on the terms of reference for this project, the workshop was one of the deliverables related to the engagement of stakeholders on e-mobility issues. Only a brief recap of the workshop is presented here. For further reference, a complete report of the workshop can be found in Deliverable 2.2.

The stakeholder consultation workshop was followed by a series of discussions with key public institutions present in the workshop to get a more thorough understanding of their perspectives and immediate action plans.

3.1 Workshop Methodology

Each day of the workshop had a distinctive theme to discuss. The theme of the first day was the introduction to e-mobility, the second day was charging infrastructure, and the last day covered the challenges of electric bus deployment.

The workshop included presentation sessions from e-mobility experts and discussion sessions. The presentation sessions became the main talking points of the discussion sessions. The experts presented facts, data, and policies related to e-mobility as the supporting elements for the discussion sessions. The discussion sessions allowed the participants to share their experiences and insights on e-mobility.

The presentation sessions in the workshop were as follows.

- Introduction to E-mobility
    - Background information on why the transition to e-mobility is essential
    - Opportunities and the challenges of e-mobility implementation
- E-mobility Policies in Indonesia
    - Existing and actual policies on e-mobility in Indonesia
    - Policy gaps on e-mobility to cover
- Charging Infrastructure Policies and Best Practice
    - Required policies supporting the charging infrastructure

    - Strategies on how to implement charging infrastructure on a massive scale
- Challenges for Electric Bus Deployment
    - Technology options for electric bus deployment
    - Investment plan and business scheme for bus operators and manufacturers

3.2 Findings

The findings of the workshop and the stakeholder consultation sessions are as follows.

3.2.1 General view on EV

The multinational speakers shared their views regarding battery electric vehicle adoption in Indonesia and EV development in general. Lessons learned from China and other cities were also presented. The general insights gathered include:

1. **Efforts to overcome high EV prices are needed.** EV prices will continue to drop as technology improves. In the long run, electric vehicles will be more economical than conventional vehicles, such as diesel, petrol, and compressed natural gas (CNG) vehicles. Nevertheless, financial aids such as subsidies and other fiscal incentives are needed especially in the early stages of EV adoption. The incentive package should also include non-fiscal incentives.

2. **Focus on buses and urban trucks.** Bus and urban trucks should be prioritized for electrification since they are the main contributor to carbon dioxide (CO_2) in the transport sector.

3. **Charging infrastructure development is critical for EV development.** Charging compatibility issues need to be addressed in the early stages of EV adoption, and deployment of charging infrastructure has to match the charging needs. As a lesson from China, government involvement in land acquisition to set up charging infrastructure is needed.

4. **Long term grid planning is needed.** Electricity demand management is needed in the next stages of EV adoption since, due to high concentrations of EVs in some areas, the demand can be much higher on localized grids.

5. **Technological choices affect the operational and financial aspects of electric buses.** Hence, they should be one of the key considerations to make in the initial deployment of electric buses.

6. **The current subsidy for petroleum fuel affects the slow electric mobility adoption in Indonesia.** With the presence of a petrol subsidy, one of the main selling points of using electric vehicles, which is lower operating costs, will not be optimally achieved.

Some perspectives from the government institutions on EVs were also captured during the workshop and further clarified at the discussion sessions, such as:

1. **Government support for BEVs is present, although divided.** The government's support for EV development, in particular BEVs, has been formalized in the Presidential Regulation No. 55/2019. According to the Ministry of Energy and Mineral Resources representative, in addition to greenhouse gas (GHG) emission reductions, EV adoption is important for utilizing PLN's power surplus especially in Java where the grid is already stable. The Coordinating Ministry of Maritime and Investments views BEV adoption as a strategic opportunity to develop the domestic vehicle manufacturing industry which until now is dominated by foreign ICE vehicle companies.

   Nevertheless, it is important to note that there are still divided views within the government institutions and external parties regarding the decision to directly focus on BEVs as opposed to also include hybrid electric vehicles. This issue, if remained addressed, will hamper the envisioned BEV adoption.

2. **Focus on two-wheelers and buses.** Two-wheeler electrification is one of the government's initial strategies for electric mobility development due to the massive number of motorcycles in Indonesia and their large contribution to air pollution and GHG emissions. In support of this strategy, the government will support battery swap technology for e-motorcycles, which will be initially targeted for ride-hailing motorcycles. The commercial fleet (e.g. taxis and ride-hailing fleet) and public transport fleet segment can be major players in the initial BEV market.

3. **Support on the supply side.** Support in the form of incentives and mandates for BEV usage is crucial for the domestic BEV manufacturing industry to advance. Battery industry development becomes one of the government's key focuses in order to establish the domestic BEV industry. The plan to focus on the battery industry is seen as a more strategic step to take than the BEV industry itself, since 1) batteries are a major price component of the overall BEV price, 2) batteries have a wider market (is also needed by hybrid vehicles rather than only BEV) and there are already regional markets as the demand, and 3) Indonesia has the biggest nickel reserve in the world.

3.2.2 Policy updates

Based on the discussion sessions in the workshop, several updates on EV policy development were identified:

1. **Policies on BEV:** The Ministry of Industry is developing a ministerial decree on the BEV industry, which addresses BEV categorization, localization rate (TKDN) calculation, and a roadmap. The decree is undergoing the approval process through The Ministry of Law and Human Rights and is targeted to be issued by the end of October 2020.

2. **Policies on charging infrastructure:**

a. The Ministry of Energy and Mineral Resources has recently issued a regulation on charging infrastructure, which includes both charging stations and battery swap stations. The regulation addresses charging infrastructure interface standardization, charging infrastructure provision business schemes, fiscal incentives for charging infrastructure operators, a mandate for PLN to initiate charging infrastructure provision in cities, and a preferential electricity tariff policy for charging infrastructure operators and public transport operators.
b. In collaboration with PLN, the Ministry is developing a charging infrastructure development roadmap.

3. **Policies on incentives:**
    a. The Ministry of Home Affairs has set a policy on maximum vehicle and title transfer tax for the local governments.
    b. The Ministry of Finance, through the Fiscal Policy Agency, is developing a policy to support the BEV manufacturing industry, including electric buses.
    c. The Bank of Indonesia (BI) has provided a 0% down payment program for BEVs, which has been in effect on October 1, 2020.
    d. A Ministerial Decree on CKD (Completely Knock Down) and IKD (Incompletely Knock Down) BEV industry development, which will provide an import tax incentive for CKD and IKD import by investors who invest in BEV manufacturing industries.

4. **EVs as state vehicles:** BEVs will be included in the National Product Procurement Agency (LKPP) e-catalog.

5. **Local regulations:** The Ministry of Home Affairs has issued a mandate letter for local governments to develop local actions to support BEV penetration and include the plans to RAD-GRK. The Government of Jakarta has created a task force called the Project Implementation Unit (PIU) to monitor and evaluate the progress of electric bus projects which currently supported by C40-CFF program focuses on pilot e-bus deployment and CTCN program focuses on the development of timetable and roadmap for electrification of all Transjakarta buses in 2030.

3.2.3 Challenges of EV adoption

In addition to policy development updates, several challenges to EV adoption were highlighted by the stakeholders, both from the public and also the private sector.

From the **regulatory perspective,** there are still many gaps to be addressed by the GoI. EVs have yet to be included in the national GHG reduction plan and therefore have not yet been tied directly with national environmental goals. A national roadmap on BEVs has yet to be issued, which hinders the finalization of the charging infrastructure roadmap. Furthermore, many derivative policies, especially on fiscal and non-fiscal incentives by the government, are

either still in development or not yet addressed. The gaps in the national-level policies hinder local governments from taking corresponding actions.

On the other hand, although the gaps are important to address, overregulation and overlapping regulation are also viewed as a factor which holds back the development of the BEV industry and derivative regulations at the local level.

From the **user perspective,** the price difference between electricity and petrol fuel is not attractive enough considering the higher purchasing cost of EVs with the current petrol fuel subsidy scheme. According to DAMRI, a state-owned public transit bus company, the incentive from the current preferential electricity tariff set by the Ministry of Energy and Mineral is barely sufficient for electric bus operational feasibility.

From the **industry perspective,** actionable measures from the government are needed in addition to policies to boost the demand needed by the industry to flourish. Although several policies have directed support to be given, such as the 0% down payment and the circular letter from OJK for conventional banks to provide financing for BEV[2], private sectors who are willing to offer credits and insurance for BEV, especially electric buses, are scarce. Initiatives from government-owned enterprises can be done to set precedence on supporting BEV for the private sector to follow.

Regarding the **infrastructure provision,** the development of charging infrastructure has high capital expenditure and a long payback period, which poses major challenges for charging infrastructure provision by investors. In addition, there are multiple charging interfaces required to be provided by infrastructure operators, which increase the capital cost required.

The challenges are further elaborated on in Section 4.

[2] https://www.liputan6.com/bisnis/read/4347865/ojk-permudah-industri-mobil-listrik-dapat-kredit-dari-bank

4. Implementation Challenges

Key implementation challenges need to be identified in order to develop policy recommendations and other strategies to accelerate BEV uptake in Indonesia. In addition to the challenges highlighted by the participants at the stakeholder consultation workshop, a literature study was conducted to identify potential key challenges.

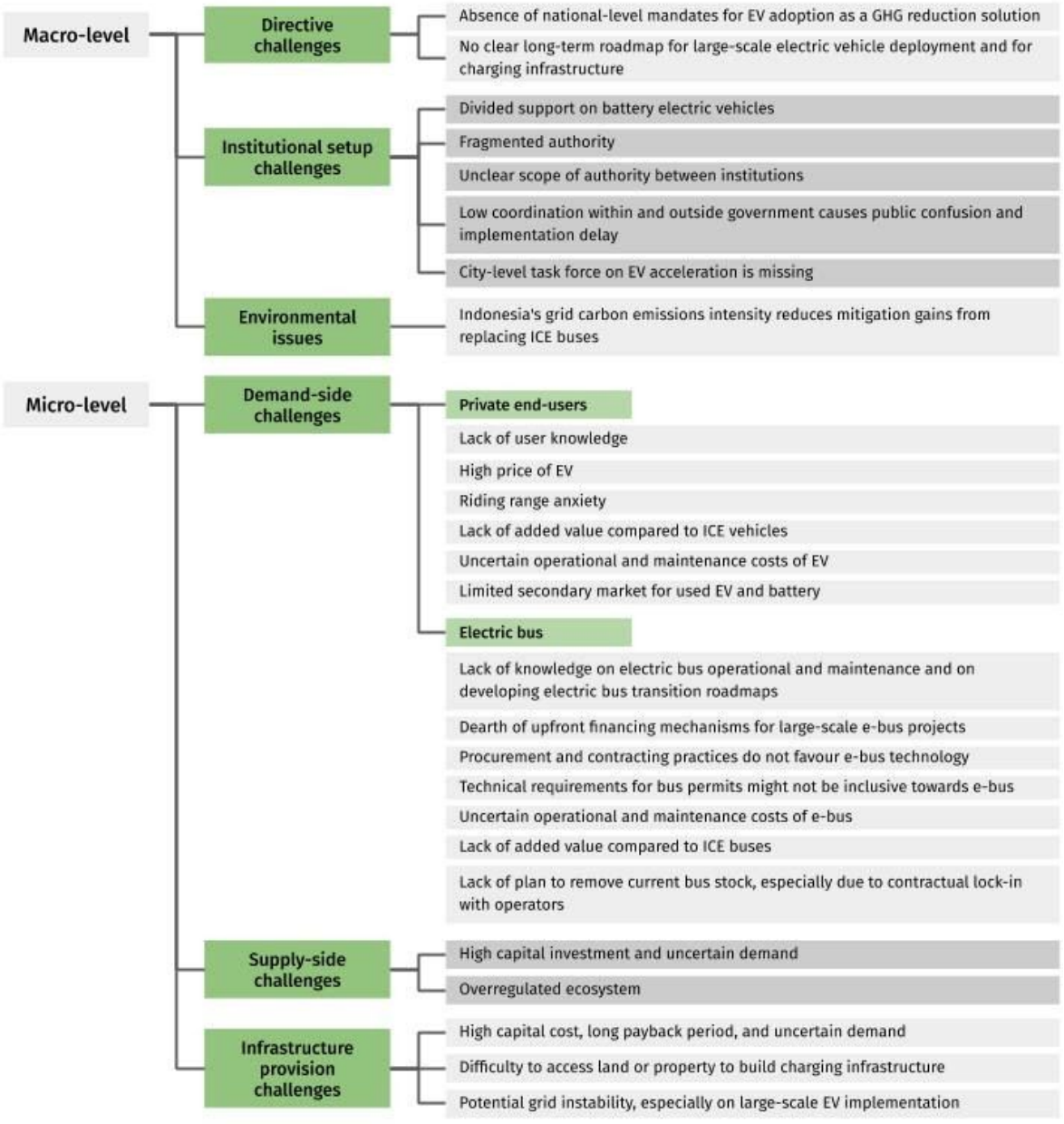


Figure 2. EV implementation challenges

The identified challenges are grouped into macro- and micro-level challenges. Micro-level challenges are the market challenges, i.e. factors that affect supplier and consumer preferences for BEVs, such as concerns related to the nascent technology of BEVs and operational performance[3]. Meanwhile, macro-level challenges refer to the more strategic issues, such as the institutional and socio-political factors that may hinder effective development and implementation of policies to overcome the micro-level challenges[4].

4.1 Macro-level challenges

The macro-level challenges are categorized into three groups: directive challenges, institutional challenges, and environmental issues. The challenges identified are as follows:

4.1.1 Directive challenges

1. *Absence of national-level mandates for EV adoption as a GHG reduction solution*

Presidential Regulation No. 55/2019 on the BEV Acceleration Program is the main policy outlining the GoI's intention to adopt BEVs. However, the regulation does not have any direct reference to national statements on GHG reduction efforts such as Indonesia's First Nationally Determined Contributions (NDC) submitted to UNFCCC and in Presidential Regulation No. 61/2011 on National Action Plan for GHG Emission Reduction (RAN-GRK). In the stakeholder consultation workshop, a representative from the Ministry of Environment and Forestry raised their concern about the lack of statements on electric mobility in NDC, which instead mandates the use of biofuels, and in related national or ministerial regulations.

2. *No clear long-term roadmap for large-scale electric vehicle deployment and for charging infrastructure*

The National General Energy Plan (RUEN) is the national planning document that contains the most direction on EV development. Presidential Regulation No. 22/2017 on the National General Energy Plan (RUEN) has provided targets on vehicle electrification (by 2025, there should be 2,200 units of electric four-wheelers and 2.1 million units of electric two-wheelers, and 10% of urban public transport fleets should be electrified).

Nevertheless, a more detailed BEV roadmap and action plans, including battery-electric bus adoption targets, are not yet issued. Subsequently, the development of the charging infrastructure roadmap is delayed.

Plans on BEV adoption have also not yet been embedded in the National Mid-term Development Plan (RPJMN) 2020-2024. This renders the directive on BEV adoption unaligned with most of the national plans and thus has not yet become a part of national priority issues.

RUEN does not provide a clear roadmap of which low carbon transportation technologies will be adopted in the future. In general, petroleum fuels will still dominate the energy source in

[3] Li et al. (2018)
[4] Ibid.

the transport sector with a share of 84% of the total energy consumption in 2025 and 73% in 2050, while the usage of the energy sources using electricity share is only 2% in 2050[5].

4.1.2 Institutional challenges

1. *Divided support on battery electric vehicles*

Presidential Regulation No. 55/2019 has cemented the GoI's focus on BEVs as the e-mobility technology of choice. However, it appears that the notion to support BEV penetration exclusively, as opposed to other low carbon emission vehicles (LCEV) such as HEV or PHEV, is not collectively shared by all government institutions.

In addition, given the current revenue structure, most local governments currently acquire a significant part of their revenue from vehicle taxes. This might cause reluctance from them to offer minimal taxes for BEV users.

2. *Fragmented authority*

The establishment of a Coordination Team and a Policy Working Group on BEV acceleration has been mandated in Presidential Regulation No. 55/2019, and one of the team's responsibilities is to coordinate and derive action plans on BEV adoption. However, the authority to develop, issue, and implement policies on electric mobility adoption is still fragmented across various government institutions which might have different priorities and agendas. As a result, bottlenecks on action are present in the policy development efforts.

3. *Unclear scope of authority between institutions*

In Presidential Regulation No. 55/2019 there is no clear responsibility and authority scoping between government institutions, which further amplifies the drawbacks of the fragmented authority issue.

4. *Low coordination within and outside government causes public confusion and implementation delay*

From the private sector's point of view, the unclear scope of authority between public institutions and vague policies often induce a "wait and see" behavior to switch to electric vehicles.

5. *City-level task force on BEV acceleration is missing*

Local government plays an important role in promoting BEV uptake, especially by providing incentives for the users and carrying out national-level programs in their areas. However, since the national-level task force establishment and scope of work is still vague, no city-level task force has been established yet.

[5] IESR (2020)

4.1.3 Environmental issues

The carbon emissions intensity of Indonesia's grid reduces mitigation gains from replacing ICE buses. Experts in the stakeholder consultation workshop identified energy security and emissions reductions as direct benefits of electric mobility[6]. However, the current power source mix for electricity generation in Indonesia makes the net benefits suboptimal[7]. In addition, the mass adoption of BEVs will result in large amounts of battery waste which is another environmental issue on its own.

4.2 Micro-level challenges

The micro-level challenges are divided into demand-side challenges faced by users or BEV consumers, supply-side challenges faced by BEV suppliers such as manufacturers, and challenges with providing charging infrastructure. The challenges include:

4.2.1 Demand-side challenges

The demand-side challenges are factors hindering the end-users, both private vehicle users and fleet operators, to shift to BEVs.

Private end-users

The demand-side challenges from private vehicle users include:

1. *Lack of user knowledge*

As with any other nascent technology, lack of awareness of electric vehicle technology often makes ICE vehicle users reluctant to shift. Since BEVs are still scarce in Indonesian cities, consumers, especially private users, might be concerned about the safety and reliability of the vehicles as the technology seems not yet "proven." They may be concerned about short circuits in the event of floods and power consumption during traffic jams. In addition, the absence of a comprehensive information bundle regarding BEV benefits and incentives makes it difficult for consumers to realize the advantages of using BEVs.

2. *The high price of BEVs*

The purchasing price of BEVs in Indonesia is still considerably more expensive than conventional vehicles. The high purchasing price of BEVs is one of the main factors hampering EV adoption in Indonesia, especially electric cars[8]. Even for motorcycles, the cost parity of electric motorcycles will only be achieved in 4.5 years[9]. Limited availability of models and the absence of subsidy schemes contribute to the high purchasing price.

[6] Morrison (2020); Kim (2020)
[7] Grutter (2020)
[8] Solidiance (2018)
[9] Grab Indonesia (2020)

3. *Riding range anxiety*

Indonesian drivers are strongly concerned about the limited range of electric vehicles, especially when the charging facilities are still scarce[10]. Riding range is also one of the main factors which hinder the adoption of electric vehicles by ride-hailing drivers, who drive longer kilometers than private users and do not want to spend much downtime charging their vehicles[11].

4. *Lack of added value compared to ICE vehicles*

There is an abundance of cheap ICE vehicle options in Indonesia, and in addition, there is still a petrol and diesel fuel subsidy scheme. The subsidy reduces the operational savings of BEVs relative to gasoline vehicles. In addition, there are still limited non-fiscal perks of using BEVs available for private vehicle users.

5. *Uncertain operational and maintenance costs of BEVs*

Potential end-users still face the uncertainty of operational costs due to the unknown charging tariff at public charging stations and also lack of certainty on the maintenance costs, including battery replacement costs.

6. *The limited secondary market for used EVs and batteries*

There is still a very limited market for used EVs and used batteries. Therefore, the selling price of used BEVs and their used batteries, which contributes to a large percentage of the BEV initial purchase price, is unknown. The opposite is true for ICE vehicles in Indonesia, where owners can predict the selling price of their vehicles in certain years. The inability of potential customers to forecast the future valuation of their vehicles and also their most expensive component makes them reluctant to buy BEVs in the first place. In addition, value uncertainty also may hamper financing institutions to finance BEVs.

Electric bus fleet operators

On the other hand, the demand-side challenges for fleet operators, especially electric buses, are also present, as follows:

1. *Lack of knowledge on electric bus operations and maintenance and on developing electric bus transition roadmaps*

The lack of knowledge and limited local precedence is also hindering public transport operators to transition to electric buses, especially on:

a. Operating and maintaining the electric buses. Since the technology of electric buses is relatively new in Indonesia, there is a gap in knowledge on operating and maintaining electric buses, which prevents operators from shifting. Electric bus operation has several significant differences from that of conventional buses and it will take some time for the bus operators to adjust to the electric bus technology.

[10] Solidiance (2018)

[11] Grab Indonesia, personal communication, September 22, 2020

b. Developing a roadmap of bus electrification. The transition to electric fleets will not be easy for those that are too reliant on diesel or CNG buses.

2. *The dearth of upfront financing mechanisms for electric bus projects*

Massive capital investment for electric vehicles, especially electric buses, is a major challenge for many bus operators. The initial cost of purchasing an electric bus is significantly higher than the conventional bus using diesel or CNG. An electric bus can be twice more expensive than the diesel or CNG bus to buy. Given the large capital needed to finance electric buses on a large scale, transit operators or local governments might rely on loans from local financial institutions or multilateral development banks.

Funding from multilateral development banks is inaccessible for local governments and non-SOE operators given the existing regulation, hence they have to depend on local financing institutions. Although there has been an incentive package formulated by OJK for financing institutions to provide financing for BEV[12], the banks are still reluctant to approve BEV financing requests due to the nascency of the technology and uncertain future valuation. Moreover, the requirement of large asset collateral for the financing request to be considered by the banks further hampers the procurement process, especially for smaller operators. Additionally, according to an electric bus industry player, private insurance companies are also reluctant to offer insurance schemes for the expensive and nascent electric buses, which further limit credit approval.

Other fleet owners, such as private or state institutions, also face similar financing difficulties to procure electric buses for their corporate fleets. This huge initial investment and lack of financing scheme put the operators and other fleet owners in a difficult situation and therefore may continue to opt for the cheaper choices, e.g. diesel or CNG bus.

3. *Contracting practices do not favor electric bus technology*

Currently, contracts from the Ministry of Transportation to bus operators are limited to single-year contracts. The contracts are extended per year as needed. The uncertainty of contract extensions makes financial institutions hesitant to provide long-term financing for bus operators to procure electric buses and build charging infrastructures. In addition, the higher capital expenditure needed to purchase electric bus fleets makes the option unfavorable without any green procurement scheme mandated by the government.

4. *Technical requirements for bus permits might not be inclusive of e-buses*

The process of applying for an operational permit for electric buses is still unclear since electric buses are a new technology that may not be relevant to the current regulations. The standards of electric bus specifications, such as dimensions, powertrains, and other components, generally differ from the conventional bus standard. The testing standards, including the type test and the routine test of electric buses, will also have different methods compared to those of diesel or CNG buses.

[12] https://www.liputan6.com/bisnis/read/4347865/ojk-permudah-industri-mobil-listrik-dapat-kredit-dari-bank

5. *Uncertain operational and maintenance costs of electric buses*

The operational and maintenance costs of electric buses depend highly on the technological choices used for the fleet. On the other hand, the technological choices of electric buses should be tailored to the route conditions.[13] Therefore, operational and maintenance costs of electric buses on different routes might vary and require a more complex planning process than conventional ICE buses. In addition, due to a lack of advancement in battery industries for electric vehicles in Indonesia, there is a chance of logistical problems for replacing batteries in electric buses. The battery component is proven to be one of the most important and also the most expensive aspects of electric buses. Thus it will be a major issue if the battery replacement process is problematic.

6. *Lack of added value compared to ICE buses*

According to DAMRI, the economical feasibility of electric buses is still barely sufficient even with the preferential electricity tariff offered by the government. On the other hand, the operator stated that switching to electric buses does not give them any justification to increase the passenger fare, since the service the passengers get remains similar to ICE buses. This introduces a financial constraint for bus operators to operate electric buses.

7. *Lack of plan to remove current bus stock, especially due to contractual lock-in with operators*

Current contracts with bus operators may need to be changed if the electric bus transition is imminent. The future of current fleets running on diesel and CNG engines are still unclear if the electric buses come to replace it.

4.2.2 Supply-side challenges

The supply-side challenges concern the obstacles faced by industry players to develop BEVs and the EV manufacturing industry, which is not yet mature in Indonesia. A number of obstacles have been identified. However, they will be discussed briefly due to the scoping of the project which puts greater focus on BEV adoption in the country.

1. *High capital investment and uncertain demand*

High costs associated with new manufacturing plant establishments, combined with the uncertain demand for electric vehicles in Indonesia, may hinder the development of the domestic electric vehicle industry. Without incentives, the domestic electric vehicle manufacturing industry will take a long time to mature.

2. *Overregulated ecosystem*

The overregulation in Indonesia was cited as one of the factors hindering investors to establish manufacturing plants and other industries in the supply chain, such as the battery industry.

[13] Grutter (2020)

4.2.3 Infrastructure provision issues

There are several issues which may hamper the large-scale provision of charging infrastructure, such as follows:

1. *High capital cost, long payback period, and uncertain demand*

Charging facility setup may take a significant amount of capital cost, especially for fast chargers. Some charging facilities may even need more capital costs for land acquisition, power upgrade, electricity access wiring, and other utility installation costs. Thus, there will be a high investment in charging facilities, including the provision of charging stations, charging pods, grid networks, and other components. Given the large capital expenditure and the presence of an electricity price cap for all charging infrastructure providers, a long payback period is expected. The long payback period will deter the operators from running the charging infrastructure for public goods, such as electric buses. Without any support and incentive from the government, private investments in infrastructure will not be attractive for investors and difficult for bus operators to provide.

2. *Difficulty to access land or property to build charging infrastructure*

One of the biggest challenges with charging infrastructure provision is the location of charging stations. For private electric vehicles, the provision of charging facilities may be less complicated today since the majority of residential property is landed housings.

Since the electric bus operations will depend on the distance traveled, it will be difficult to procure charging stations far from the operational area. Meanwhile, the operational area may involve several central business districts where vacant lands are scarcely available.

3. *Potential grid instability, especially on large-scale implementation of BEVs*

Although the overall grid supply is in excess, especially in Java, large-scale BEV adoption will cause localized strain on the grid. The issues of instability will hamper the development of electric vehicles without grid infrastructure improvement. Large scale electric buses implementation will require reliable grid stability to bring proper service without any issues.

5. Policy Recommendation

A comprehensive package of policy recommendations is needed to address and overcome the EV adoption challenges identified in the previous section and kickstart EV penetration (ICCT, 2018). The policy recommendations should include both national and local level policies to be implemented by policymakers. A framework is developed to provide a structure to discuss the policy package. Both macro- and micro-level challenges need to be addressed by the policies.

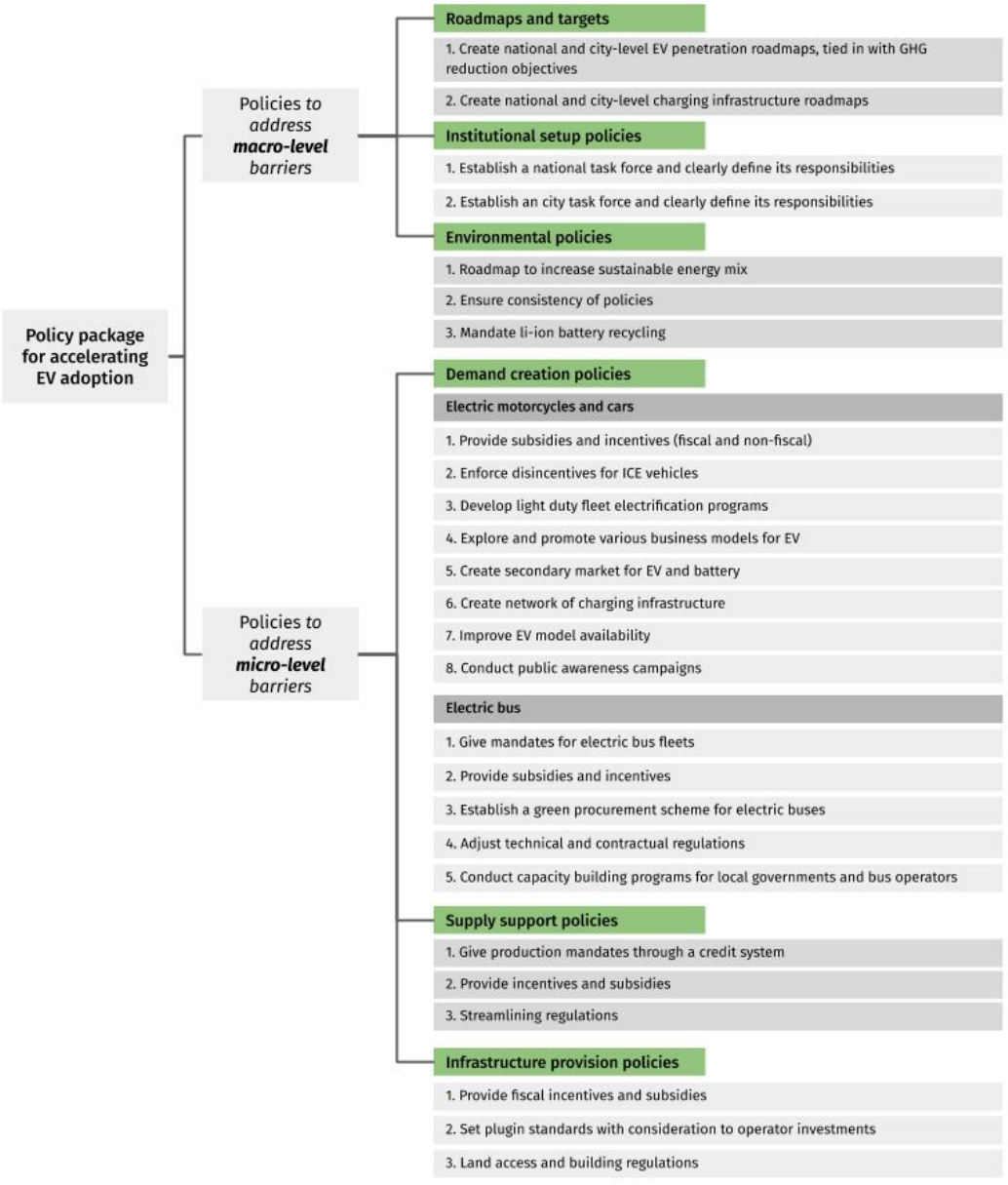


Figure 3. EV policy components

In the following sections on policy recommendations, examples of relevant policies from leading and emerging EV markets are also discussed for each policy component as a reference.

5.1 Policies addressing macro-level challenges

The policies to overcome macro-level challenges are categorized into three groups: roadmaps and targets, institutional setup policies, and environmental policies to address well-to-wheels emission reduction and battery waste.

5.1.1 Roadmaps and targets

1. *Create national and city-level BEV penetration roadmaps, tied in with GHG reduction objectives*

Related regulators: Coordinating Ministry of Maritime and Investments, National Planning Agency, Ministry of Industry, Ministry of Transport, Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry, Ministry of Home Affairs, local governments

A clear national target and roadmap on large-scale BEV uptake are needed to push relevant public institutions as well as the private sector to take action. The lack of clarity on BEV regulations has been cited as one of the major challenges in accelerating BEV uptake in Indonesia[14].

Electric vehicles should be recognized as one of GHG emissions reduction solutions and BEV adoption plans should be mentioned in national planning documents and policies on GHG reduction action plans. The table below shows how several countries and cities embed EV adoption into their national plans[15]:

Government	EV in national planning documents				Acknowledgment of EV as GHG emissions mitigation solution
	Target	Source	Year issued	Regulator	
Country-level					
Canada	100% EV sales by 2040	Canada National Budget Plan 2019[16]	2019	Department of Finance Canada	• Canada's First NDC (updated 2017)[17] • Decarbonizing Transportation in Canada[18]

[14] Solidiance (2018)
[15] ICCT (2020); SLOCAT (2020)
[16] https://www.budget.gc.ca/2019/docs/plan/budget-2019-en.pdf
[17] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Canada%20First/Canada%20First%20NDC-Revised%20submission%202017-05-11.pdf
[18] Senate of Canada (2017)

Chile	Increase of EVs by tenfold between 2017-2022 and 40% passenger car EV by 2050	Estrategia Nacional de Electromovilidad (National Strategy of Electromobility)[19]	2018	Chile Ministry of Energy	Chile's First NDC (updated 2020)[20]
China	25% EV sales by 2025	China New Energy Vehicle Industry Development Plan (2021-2035), first draft[21]	2019	Chinese Ministry of Industry and Information Technology	National Plan For Tackling Climate Change 2014-2020[22]
Japan	• 20-30% BEV and PHEV sales, in addition to 30-40% HEV and 3% PCEV by 2030 • 100% xEV sales by 2050	Next-Generation Vehicle Strategy 2010 [23]	2010	Japanese Ministry of Economy, Trade and Industry	-
The Netherlands	100% electric passenger car by 2030	Dutch Climate Agreement (Klimatakkoord) 2019[24]	2019	Dutch Government	Dutch Climate Agreement (Klimatakkoord) 2019[25]
Norway	100% electric passenger car and light-duty vans by 2025, 75% electric long-distance coaches and 50% e-trucks by 2030	National Transport Plan 2018-2029[26]	2017	Norwegian Ministry of Transport and Communication	Norway's First NDC (updated 2020)[27]
United	100% ZEV sales by	The Road to	2018	UK Department	The Road to Zero[29]

[19] www.minenergia.cl/archivos_bajar/2018/electromovilidad/estrategia_electromovilidad-27dic.pdf

[20] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Chile%20First/Chile%27s_NDC_2020_english.pdf

[21] http://www.miit.gov.cn/n1146285/n1146352/n3054355/n3057585/n3057589/c7552776/content.html

[22] https://climate-laws.org/geographies/china/policies/national-plan-for-tackling-climate-change-2014-2020

[23] https://www.a3ps.at/site/sites/default/files/conferences/2011_eco-mobility2011/2011_Eco-Mobility_01_04_Miura.pdf

[24] https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/klimaatakkoord

[25] https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/klimaatakkoord

[26] Ibid.

[27] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Norway%20First/Norway_updatedNDC_2020%20(Updated%20submission).pdf

[29] Ibid.

Kingdom	2040	Zero[28]		of Transport	

Government	EV in national planning documents			
	Target	**Source**	**Year issued**	**Regulator**
City or State level				
British Columbia	10% ZEV light-duty vehicle sales by 2025, 30% by 2030, and 100% by 2040	Zero-emission Vehicle Act[30]	2019	Provincial Government of British Columbia
California	1.5 million ZEV by 2025 and 5 million ZEVs by 2030	ZEV Action Plan 2016[31]	2016	Governor's Interagency Working Group on Zero-Emission Vehicles
Delhi	25% BEV sales by 2024	Delhi Electric Vehicle Policy[32]	2020	Government of National Capital Territory of Delhi
Hainan	100% EV by 2030	Hainan Province Clean Energy Vehicle Development Plan [33]	2018	Hainan Provincial People's Government
London	100% zero-emission cars and LGV sales by 2030	Mayor's Transport Strategy 2018	2018	City of London

a. Adjust existing documents:

In Indonesia, a number of directives on alternative fuels should be adjusted to align electric vehicle acceleration programs.

1. **Indonesia's NDC:** The use of electricity as a vehicle fuel should be mentioned along with biofuels as one of the mitigation plans. Article 4.9 of the Paris Agreement stipulates that successive NDCs should be communicated every five years. The addition could be made in the updated NDC for the next NDC cycle, which should be submitted no later than the end of 2020 by the Ministry of Environment and Forestry.
2. **RPJMN and RPJPN:** In addition to mandates for electric mobility research, GoI's plan for electric mobility adoption, including electric buses, should be incorporated into

[28] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf
[30] https://www.bclaws.ca/civix/document/id/complete/statreg/19029
[31] https://static.business.ca.gov/wp-content/uploads/2019/12/2018-ZEV-Action-Plan-Priorities-Update.pdf
[32] https://transport.delhi.gov.in/sites/default/files/All-PDF/Delhi_Electric_Vehicles_Policy_2020.pdf
[33] https://www.hainan.gov.cn/hainan/xnyzcwj/201907/cb9368c30a0f42e7a4cae7dad6651a09.shtml

RPJMN as Indonesia's main planning document. A more general plan to shift to alternative fuels should also be incorporated in the RPJPN.

3. **SISTRANAS and other transport master plan documents:** The Ministry of Transport should define the role of BEVs in achieving a sustainable transport system and incorporate BEV adoption plans into its national transport system plan, and local transportation agencies should translate the national plans to more detailed local action plans. Without the ministry set up a formal plan, it will be difficult for local transportation agencies to develop local implementation actions.
4. **KEN:** Presidential Regulation No. 79/2014 on National Energy Policy (KEN) Article 18 Section 2(b) has mentioned electric vehicles as one of the alternative measures to diversify energy consumption. However, amendments need to be made especially on Article 12 to also include electricity, especially from renewable sources, to be utilized in the transportation sector to reduce dependency on petrol fuel.
5. **RAN-GRK:** The RAN-GRK in Presidential Regulation No. 61/2011 will become obsolete by 2020. The National Planning Agency (BAPPENAS) has to develop a successive RAN-GRK for the years after 2020 and beyond. In the next RAN-GRK, there should be an action plan on urban transportation electrification in addition to the action plan on CNG vehicle fuels (Annex I Primary Action Plans), including the targets, timeline, and the institution in charge of the implementation.
6. **RAD-GRK:** Local-level action plans on vehicle electrification as one of the measures to decarbonize the transport sector should be incorporated in the local GHG action plan document.
7. **RUEN:** The plan in RUEN implies that Indonesia will remain to be highly dependent on fossil oil, with the petroleum fuel consumption for transportation is still expected to increase for the next 30 years. Currently, there is no clear focus on developing any of the alternative fuels for vehicles and the plan to use electricity as new energy sources for vehicles is still very limited.
8. **RUED:** Although BEV targets have been incorporated into RUEN, derivative local energy plans (RUED) should also support the national plan of BEV adoption. To date, there are only 18 provinces that have completed their RUED and only one of them (D.I. Yogyakarta) has included plans for BEVs.

b. Focus on public transport and motorcycle electrification

Policies on EV adoption can be tailored to prioritize support to certain vehicle segments over others[34], considering the scale of impact of their electrification. Based on vehicle type, motorized vehicles in Indonesia can be broadly categorized into two-wheelers (motorcycles), three-wheelers (auto-rickshaws/*bajaj* and similar vehicles), light passenger cars, buses, and trucks. Another classification method based on fleet type can also be used to set electrification priority, such as private vehicles, commercial vehicles (for example ride-hailing vehicles and taxis), public transport fleets, state vehicles, and corporate fleets[35].

[34] ICCT (2019)
[35] Ibid.

In Indonesia, it is recommended that motorcycles and public transport be the first initial market for BEVs. The factors below provide some context on motorcycle electrification:

1. Motorcycles are the vehicle type with the highest population in the market. In 2018, there are 120 million motorcycles in Indonesia or more than 80% of all the vehicles on the road (Korlantas Polri, 2019). The growth of motorcycles significantly exceeds other vehicle types in the last two decades. Tapping into this wider market will potentially accelerate EV adoption in Indonesia.

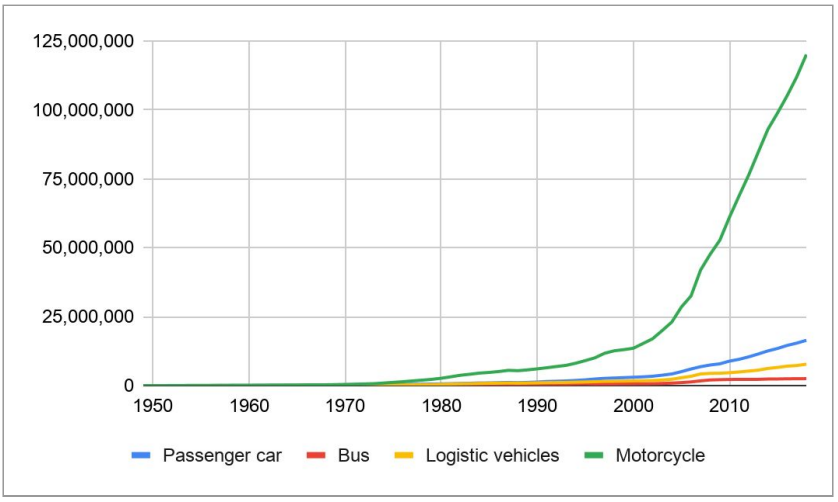


Figure 4. Vehicle ownership in Indonesia 1950-2018
(Source: Korlantas Polri, 2019)

2. Given the large number of motorcycles, the mode is a major contributor to air pollution and GHG in cities. In Jakarta, it currently contributes to almost 45% of the air pollution and 15% of GHG emissions from the transport sector[36].
3. Although the cost of BEVs is expected to continually decline, the price difference between electric motorcycles and ICE motorcycles is lower than the difference between electric and ICE cars. An average motorcycle in Indonesia costs around IDR 16-20 million, while a locally manufactured electric motorcycle with a 60-kilometer range costs around IDR 18 million[37]. On the other hand, a 4-seater small car can be purchased at around IDR 145 million, while the price of a battery-electric car starts from around IDR 430 million[38].
4. The rise of ride-hailing provides an opportunity to scale-up the adoption of electric motorcycles through ride-hailing fleet electrification. Each ride-hailing motorcycle has more vehicle kilometers traveled than private motorcycles, and there are millions of ride-hailing drivers currently in Indonesia. Targeting the ride-hailing fleet as the first step of motorcycle electrification will contribute to achieving the economies of scale needed by domestic electric motorcycle manufacturers and other supporting

[36] https://metro.tempo.co/read/1236898/kpbb-motor-sumbang-45-persen-polusi-udara-jakarta-per-hari
[37] https://oto.detik.com/motor/d-4893109/mau-beli-motor-listrik-pilihan-harga-mulai-rp-11-jutaan
[38] https://oto.detik.com/mobil/d-5006083/mobil-listrik-masih-langka-segini-harga-dan-pajak-hyundai-ioniq-di-ri

industries. Large-scale adoption of e-motorcycles by ride-hailing fleets will also provide concrete precedence of EV operational reliability for private users.

At the same time, public transport fleet electrification can also be considered a priority. Heavy-duty vehicles such as buses and trucks emit more GHGs than other vehicle types, as with the case in Jakarta where 45% of the city's transport sector GHG emissions are produced by buses[39]. ITDP estimates that if Transjakarta, the city's road-based public transport operator, achieves 100% fleet electrification by 2030, they will reduce their GHG emissions by 925,757 metric tons CO_2 equivalent compared to their BAU scenario. Furthermore, public transport fleet electrification can also provide the large demand needed by the domestic bus manufacturing industry to achieve economies of scale.

A number of countries and cities have set targets or roadmaps for public transport electrification, and some examples can be seen in table below[40]:

Government	**Public transport electrification target**	**Source**	**Year Issued**	**Regulator**
Country-level				
Chile	100% electric public transport by 2040	Estrategia Nacional de Electromovilidad (National Strategy of Electromobility)[41]	2018	Chile Ministry of Energy, Ministry of Transport and Telecommunications, and Ministry of Environment
Costa Rica	70% zero-emission buses by 2035 and 100% by 2050	Alcance n° 209, Ley Incentivos Y Promoción Para El Transporte Eléctrico (Incentives And Promotion Law For Electric Transportation)[42]	2017	Government of Costa Rica
The Netherlands	100% electric bus for all new public bus sales by 2025 and all-electric bus fleets by 2030	Coalition Agreement 2017: 'Trust in the Future (Regeerakkoord 2017: 'Vertrouwen in de toekomst)[43]	2017	Government of the Netherlands
Norway	100% electric bus sales by 2025	National Transport Plan 2018-2029[44]	2016	Government of Norway
City or State level				

[39] https://metro.tempo.co/read/1236898/kpbb-motor-sumbang-45-persen-polusi-udara-jakarta-per-hari

[40] IEA (2020); ICCT (2020)

[41] https://www.apecchile2019.cl/apec/site/docs/20190604/20190604193408/estrategia_electromovilidad_27dic.pdf

[42] www.imprentanacional.go.cr/pub/2017/08/28/alca209_28_08_2017.pdf

[43] www.rijksoverheid.nl/regering/documenten/publicaties/2017/10/10/regeerakkoord-2017-vertrouwen-in-de-toekomst

[44] www.ntp.dep.no/English/_attachment/1525049/binary/1132766?_ts=1571e02a3c0

California	100% electric bus sales by 2029, 100% electric public transport buses by 2040	Innovative Clean Transit Regulation[45]	2019	Government of California (California Air Resources Board)
Delhi	Procure 1,000 pilot BEV buses by 2020	Delhi Electric Vehicle Policy[46]	2020	Government of National Capital Territory of Delhi
Hainan	No gasoline or diesel vehicle sales by 2020, no gasoline or diesel vehicle stock by 2025	Hainan Province Clean Energy Vehicle Development Plan[47]	2018	Hainan Provincial People's Government
London	100% zero-emission fleet by 2037, including operator-run buses	Mayor's Transport Strategy 2018[48]	2018	City of London

A unique case is found in India, where a national target of 100% BEV urban bus sales by 2030 is set by the private sector, i.e. the national association of automobile manufacturers[49].

To support public transport fleet electrification, national and local-level roadmaps on electric bus adoption should be made starting by adjusting the policies below:

1. **Presidential Regulation No. 55/2019:** Incorporate plans and a vision for electric public transport electrification in the decree.
2. **RUEN:** In addition to the CNG adoption roadmap, a national electric bus adoption roadmap should also be mandated to be developed by the Ministry of Transport. Although a public transport electrification target has been set in RUEN, it should be ensured that the public transport fleets mentioned in the document do not include ride-hailing services. Therefore, 10% by 2025 target shall focus on electric buses.
3. **SISTRANAS and Ministry of Transport's strategic plan:** The roadmap of the electric bus transition should be incorporated in the SISTRANAS and the Ministry of Transport's strategic plan. The 10% public transport electrification target set in RUEN should also be clarified in the Ministry of Transport's strategic plan by setting a city or provincial level target. Subsequently, the ministry together with the Ministry of Home Affairs should mandate local transportation agencies to develop local-level public transport electrification roadmaps.
4. **Local planning documents:** At the local level, local governments should ensure that public transport electrification goals and targets are included in their next Long-term

[45] https://ww2.arb.ca.gov/sites/default/files/2019-10/ictfro-Clean-Final_0.pdf
[46] https://transport.delhi.gov.in/sites/default/files/All-PDF/Delhi_Electric_Vehicles_Policy_2020.pdf
[47] https://www.hainan.gov.cn/hainan/xnyzcwj/201907/cb9368c30a0f42e7a4cae7dad6651a09.shtml
[48] https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf
[49] SIAM (2017)

Regional Development Plans (RPJPD) to lock in long-term commitment across political periods, and RPJMD to ensure mid-term focus on electric bus acceleration.

2. Create national and city-level charging infrastructure roadmaps

Related regulators: Coordinating Ministry of Maritime and Investments, National Planning Agency, Ministry of Energy and Mineral Resources, BPPT, Ministry of Home Affairs, local governments

National and city-level charging infrastructure roadmaps should be developed and aligned with BEV adoption roadmaps. Studies in EV leading cities in the US, Europe, and China have shown that sufficient provision of charging infrastructure is a major driving force of EV uptake[50] . Ease of access to public and workplace charging or battery-swapping stations, in addition to residential chargers, is crucial to eliminate users' range anxiety, which is a major barrier of EV uptake in Indonesia[51]. An EV penetration modeling study in Indonesia predicted that achieving a ratio of 16 charging stations per vehicle could triple passenger car BEV market share[52]. In addition, the study also suggested that before price parity is reached, tax exemption measures will fail to kickstart electric motorcycle penetration without widespread provision of public charging stations.

As a rule of thumb, a ratio of 1 public charging station per 10 electric vehicles is recommended [53], although the number can vary based on the availability of private home chargers in the city. The charging infrastructure target can be based on absolute numbers of chargers, chargers to EV ratio, chargers per square kilometer, or chargers per kilometer of road[54].

The table below shows charging infrastructure targets in several countries and cities[55]:

Government	Charging infrastructure provision target	Source	Year Issued	Regulator
Country level				
China	• 88 pilot cities are required to provide 1 charging station per 8 EVs, and should be able to be accessed within 1 kilometer from any given point in the city center area • Other cities are	Guide to the development of electric vehicle charging infrastructure 2015-2020 [56]	2014	Chinese Ministry of Industry and Information Technology and Ministry of Housing and Urban-Rural Development

[50] ICCT (2017); ICCT (2018); ICCT (2020); Kim & Heo (2019); Sierzchula et al. (2014)
[51] Solidiance (2018)
[52] IESR (2020)
[53] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0094&from=en
[54] ICCT (2019)
[55] ICCT (2017); SLOCAT (2020)
[56] https://www.ndrc.gov.cn/xwdt/ztzl/cjnjtzzcwj/201606/t20160607_1033476.html

	required to provide 1 charging station per 15 EVs			
France	• 7 million public and private charging points for electric vehicles by 2030 • One charging station per 10 electric vehicles	• French Law no 2015-992 of 17 August 2015, "Law on Energy Transition for Green Growth" (LTECV)[57] • Contrat stratégique de la filière Automobile 2018-2022 (Auto sector strategic contract 2018-2022)	2015	French Ministry of Sustainable Development
Germany	1 million public chargers by 2030	Masterplan Ladeinfrastruktur der Bundesregierung (Masterplan for charging infrastructure for the Federal Government)[58]	2019	Federal Ministry of Economics and Technology
City or State level				
Delhi	Providing accessible public charging facilities within 3 km travel from anywhere in Delhi	Delhi Electric Vehicle Policy[59]	2020	Government of National Capital Territory of Delhi
Hainan	• One public charging station per 7 electric vehicles by 2025 • By 2025, the average service radius of the charging network in key leading areas will be less than 1 km, the priority development area will be less than 3 km, and the area will be actively promoted to be less than 5 km	Hainan Province Clean Energy Vehicle Development Plan[60]	2018	Hainan Provincial People's Government

[57] https://inis.iaea.org/search/searchsinglerecord.aspx?recordsFor=SingleRecord&RN=47032259
[58] https://www.bmvi.de/SharedDocs/DE/Anlage/G/masterplan-ladeinfrastruktur.pdf?__blob=publicationFile
[59] https://transport.delhi.gov.in/sites/default/files/All-PDF/Delhi_Electric_Vehicles_Policy_2020.pdf
[60] https://www.hainan.gov.cn/hainan/xnyzcwj/201907/cb9368c30a0f42e7a4cae7dad6651a09.shtml

5.1.2 Institutional setup policies

1. Establish a national task force and clearly define its responsibilities

Related regulator: Coordinating Ministry of Maritime and Investments

The responsibilities of both the Coordination Team and Policy Working Group have been stated in at least two policies. In Presidential Regulation No. 55/2019, the Coordination Team has the responsibility to coordinate, develop roadmaps, overcome challenges, and supervise the BEV acceleration program. However, a subsequent regulation to provide detailed working procedures and responsibilities of the coordination team has yet to be issued by the Coordinating Ministry of Maritime and Investment. The regulation should be published soon, not only to provide clarity for relevant national government institutions' tasks and responsibilities on the BEV acceleration program, but also for local governments to devise implementation actions.

Meanwhile, based on Coordinating Minister of Maritime and Investment Decree No. 102/2020, the Policy Working Group is responsible for coordinating and monitoring derivative policy development by government institutions and local authorities, supporting data collection for policy development, assisting policymakers in overcoming challenges, evaluating derivative policies, and providing periodic reports to the Coordination Team.

To overcome the identified implementation challenges, a number of additional responsibilities should be assigned to the Policy Working Group, as follows:

- **Creating an integrated action plan on BEV adoption**, including electric buses, which will serve as a guideline for the relevant government institutions in developing derivative policies. The action plan can be issued as a Presidential Regulation.
- **Scoping the authority of government institutions to develop BEV policies,** to prevent overlapping or missing policies. The scopes of authority can be issued together with the collective action plan as a Presidential Regulation.
- **Evaluating and providing recommendations to amend existing policies and planning laws** to identify opposing legislations. The Policy Working Group proposes policy changes to the relevant institutions as necessary.
- **Identifying current progress and measures taken by local governments** to accelerate EV adoption, including electric buses.
- **Conducting stakeholder engagement events** periodically or as needed, inviting the national and local public and private stakeholders to update on current policies and the ones in the pipeline, as well as experts to share their insights and experience on the event's subject.

A policy should be in place and issued by the President or The Coordinating Minister of Maritime and Investment to allow the Policy Working Group to implement the above responsibilities.

2. Establish a city task force and clearly define its responsibilities

Related regulators: Coordinating Ministry of Maritime and Investments, Ministry of Home Affairs, local governments

A city-level task force will help the national Coordination Team to push BEV penetration in cities. The city coordination team has local advantages and experiences to implement the electric mobility concept at the city level.

The establishment of city-level task forces could be mandated by the Ministry of Home Affairs. Interagency city level task force creation, especially for bigger cities, should follow shortly after the national-level task force (the Coordination Team) is formally established and its responsibility clarified. To reduce redundancy of positions and to keep a lean government structure, representatives from relevant agencies could be appointed as task force members.

In addition, private sector entities (e.g. public transport, taxi, ride-hailing, and other commercial vehicle operators, motor and public transport associations, and NGOs) should also be included in the city coordination team. Public and private institutions, including communities and local industries, will potentially bring more experiences and knowledge to maintain and evaluate the deliverables of the electric mobility projects.

As a reference for city-level task force establishment in Indonesian cities, a breakdown on task forces' attributes from other cities can be seen below[61]:

Case study	**Philadelphia EV Taskforce**	**Mayor of London's EV Infrastructure Taskforce**
Task force focus	Encourage EV adoption	Scale-up charging infrastructure
Leading entity	City of Philadelphia's Office of Transportation and Infrastructure (oTIS) and Philadelphia City Council	Deputy Mayor for Environment and Energy
Members	Public sector: Legislative body members, transport and infrastructure agency, sustainable development agency, street department, parking authority, licenses and inspection agency, fleet management agency, regional planning agency, the public transport authority Private sector: *1. Citizens:* EV-owning private citizen representatives *2. Sustainable development NGO and local community organizations*	Public sector: Mayor, transport agency, Office for Low Emission Vehicles (OLEV), Office of Gas and Electricity Markets (Ofgem), local government representatives Private sector: *1. Associations:* Electrotechnical and vehicle manufacturers, energy companies, small businesses, freight transport, and automobile *2. Business:* Energy sector companies *3. Sustainable development NGO*

[61] Mayor's Electric Vehicle Infrastructure Task Force (2019); City of Philadelphia oTIS (2018)

		4. Professionals: Royal Institution of Chartered Surveyors (RICS)
Responsibilities	• Develop policy recommendation to encourage EV adoption • Conduct stakeholder engagement events with policy, research, and private industry experts • Identify opportunities and challenges of EV charging infrastructure development • Conduct a public consultation event to gather feedback on the policy recommendation	• Evaluate and analyze charging infrastructure requirements • Identify barriers and issues based on workshops and policy analysis • Map the role of public and private sectors • Develop EV infrastructure delivery plan • Share, promote and gain stakeholder commitment to the delivery plan • Knowledge sharing
Outputs to date	Policy recommendation document	Medium-term planning document (EV Infrastructure Delivery Plan 2025)

5.1.3 Environmental policies

One of the strongest rationales for electric vehicle development is its ability to mitigate emissions in the transport sector. Policies related to the environmental aspect could impact BEV development and vice versa. BEV development should be part of environmental goals and regulations set by the national government to send a strong signal for all stakeholders to start shifting towards BEV.

1. Roadmap to increase sustainable energy mix

Related regulators: National Planning Agency, Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry

Stricter policies to reduce emissions from the power generation sector should also be employed to achieve the broader objective of GHG reductions. Emission reduction measures should be done through a well-to-wheel approach. Therefore, it is crucial to also ensure the reduction of upstream emissions from electricity generation by introducing more aggressive renewable energy mix policies and incentives for renewable energy operators. Several interventions that the government should impose are as follows:

- Stipulate new and attractive feed-in tariff (FiT) for renewable energy power producers to draw more investment
- Balance the risk allocation between PLN and renewable energy power producers
- Incentivize local manufacturing RE industries to help them compete with cheaper imported components. For solar projects, the relaxation of local content requirements is needed in some cases, such as in small to medium (<10 MW) solar projects
- Finish the agenda to issue the New and Renewable Energy Bill, which should contain the incentive scheme for renewable energy, to provide long-term security for the renewable energy market

- Maximize the role of the existing Environmental Fund Management Agency (BPDLH), which is expected to help finance clean energy development

2. Ensure consistency of policies

Related regulators: Coordinating Ministry of Maritime and Investment, Ministry of Environment and Forestry, Ministry of Transport, Ministry of Home Affairs

Countries around the globe have proven that appropriate environmental regulation could significantly impact the level of EV penetration in their respective country. For example, the fuel economy standard is considered an effective tool, not only to increase overall vehicle efficiency but also to help accelerate EV adoption. Studies pointed out that implementation of fuel economy standards will increase EV penetration[62]. Since EV already has high energy efficiency, the manufacturers would opt for EV instead of improving its conventional vehicles' efficiency when the cost to do the latter becomes too expensive. Indonesia has yet to enforce a fuel economy standard, and data in 2017 shows that Indonesia's fuel consumption for passenger cars was quite high at 7.9 lge/km compared to other emerging economies and global average at 7.5 and 7.2 lge/km respectively. This begs intervention from the government to establish a national fuel economy standard.

Another environmental policy that could act as a support for EV development is pollutant regulation. As of now, the standard adopted for passenger cars is Euro IV and for motorcycles, Euro III is used. However, these standards are behind other G20 countries like Brazil, China, India, Russia, and Mexico[63]. Indonesia would need stricter pollution standards, to indirectly disincentivize manufacturers and consumers to produce and use conventional vehicles, thus shifting the demand to electric vehicles. In conjunction with that, Indonesia will also need better quality fuel to adhere to the standards.

3. Mandate li-ion battery recycling

Related regulators: Ministry of Environment and Forestry, Ministry of Trade

Battery recycling policies should also be issued by the Ministry of Environment and Forestry and coordinated with the Ministry of Trade for used lithium batteries. Not only to address environmental concerns of the toxic waste but also to secure lithium sources from the used batteries to be recycled as BEV batteries in support of the domestic battery industry.

4. Encourage and incentivize rooftop solar use at charging stations and bus stops or facilities

Related regulators: Government of Jakarta, Ministry of Energy and Mineral Resources

The GoJ has released Gubernatorial Instruction No. 66/2019 on air quality control in which GoJ pushes for stricter emission standard, control and monitoring. In the instruction, GoJ also mandates the use of rooftop solar PV at regionally-owned buildings such as public schools and

62 Kodjak & Meszler (2019); Meszler et al. (2016); Sen et al. (2017)

63 Du & Miller (2017)

medical facilities starting in 2019 until 2022. In order to encourage the use of rooftop solar, GoJ can also extend the mandate at bus charging stations, bus stops, and depots.

Furthermore, GoJ can also work with the Ministry of Energy and Mineral Resources (MEMR) to formulate an incentive for using rooftop solar by giving a preferential net metering scheme for public transportation. Current net metering policy that is regulated in the MEMR Decree No. 49/2018 only allows export of excess electricity to PLN's grid only at 65% value (1:0.65 ratio). In order to incentivize the use and the economic value of the investment for rooftop solar, this ratio can be increased to 100% (1:1 ratio).

5.2 Policies addressing micro-level challenges

In general, there are three main players in the EV market ecosystem: end-users, industry players, and infrastructure providers. Comprehensive policy packages should be developed to target not only one but all of the players in order to effectively accelerate EV adoption in Indonesia.

5.2.1 Demand creation policies

Demand creation policies are those tailored to stimulate demand from individual users, fleet operators, or even the government as state vehicle owners. In countries where the automotive industry is not yet mature, such as in Indonesia, demand-side incentives are more useful to develop the initial EV market[64]. After 2025 or after BEV usage has gone through the large-scale adoption phase, the taxes, fees, and traffic demand measures should then be reintroduced gradually.

Electric motorcycles and cars

1. Provide subsidies and incentives (fiscal and non-fiscal)

From existing regulations, policies to incentivize EV usage have been introduced yet there are gaps to be filled, especially by the government. The introduction of vehicle ownership fee incentives is useful for electric vehicle users but other incentives are definitely still needed to promote large-scale adoption.

The competitiveness of total cost ownership (TCO) of BEV to ICE vehicles should be considered when determining the amount of subsidies and fiscal incentives. Price parity between BEVs and ICE vehicles is a determining factor in large-scale adoption. In Norway, the country with the highest EV share, the retail price of an EV is comparable to that of an ICE vehicle[65].

a. Vehicle purchase subsidies

Related regulators: Ministry of Finance, Ministry of Industry, Ministry of Home Affairs, local governments

[64] IESR (2020)
[65] IEA (2018)

Upfront BEV price discounts directly overcome the barrier of the high purchase price, which largely hampers the penetration of EV not only in Indonesia,[66] but also in other early adopter markets. This type of policy is also highly visible and simpler to understand by the market compared to a tax credit subsidy scheme[67].

The Ministry of Finance and The Ministry of Industry could jointly develop an EV purchase subsidy scheme and earmark funds to roll out the scheme. In addition to subsidies from the national government, local governments can also offer complementary subsidies to further reduce the price of BEVs. Below are some examples of the amount of budget allocated by other governments to subsidize EV purchase price:

Government	Scheme	Implementation Year	EV purchase subsidy budget for 2W and 4W	Amount of subsidy per vehicle
Country level				
Canada	Incentives for the Zero-Emission Vehicles (iZEV) Program[68]	2020-2023	IDR 3 trillion	*Four-wheelers:* IDR 27.7 million (PHEV) - IDR 55 million (BEV)
China	New Energy Vehicle subsidy[69]	2009-ongoing	IDR 72.4 trillion (2009-2015)[70]	*Four-wheelers:* IDR 17 million - IDR 47 million, determined based on the formula below[71]: $Subsidy = min\{Subsidy_{ER}, Subsidy_{BC}\} \times F_{BD} \times F_{EC} \times F_{OS}$ $Subsidy_{ER}$ = base subsidy determined by electric range $Subsidy_{BC}$ = base subsidy determined by battery capacity F_{BD}= battery energy density multiplier F_{EC} = electric energy consumption multiplier F_{OS} = ownership type multiplier
India	Faster Adoption and Manufacturing of Electric Vehicles (FAME) I[72]	2015-2019	IDR 1.1 trillion (62% of the total budget allocated for the scheme)[73]	*Two-wheelers:* IDR 360,000 (PHEV <250W) - IDR 5.8 million (advanced BEV >250W) *Four-wheelers:* IDR 2.6 million (small car with PHEV <250W) - IDR 27.7 million (>4 meters advanced BEV

[66] Solidiance (2018)
[67] ICCT (2019)
[68] https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles
[69] http://jjs.mof.gov.cn/zhengcefagui/202004/t20200423_3502975.htm?from=timeline&isappinstalled=0
[70] ICCT (2017)
[71] ICCT (2020)
[72] https://pib.gov.in/PressReleasePage.aspx?PRID=1577880
[73] Including demand incentive for light commercial vehicles and buses, since no distinction is made in the regulation

				>250W)
	FAME II[74]	2019-2022	IDR 13.6 trillion (52% of the total budget allocated for the scheme)	IDR 2 million per KWh, capped at 20% of the total vehicle cost
City or state level				
California	Clean Vehicle Rebate[75]	2010-ongoing	IDR 11 trillion (2010-2019), and another IDR 3.5 trillion approved for the fiscal year 2019-2020	*Two-wheelers:* IDR 11 million *Four-wheelers:* IDR 14 million (PHEV) - IDR 29.4 million (BEV)
Delhi	Delhi Electric Vehicle Policy[76]	2020-2025	Unknown	*Two-wheelers:* IDR 1 million per KWh, capped at IDR 6 million per vehicle *Four-wheelers:* IDR 2 million per KWh, capped at IDR 30 million per vehicle

Although the nominals might seem gigantic, to put things into perspective, the national government has to provide IDR 96.5 trillion as compensation for Pertamina to cover the below-market price of petrol fuel between 2017-2019[77].

The subsidy policy design can be a powerful tool to direct the course of BEV adoption to certain vehicles or user segments. It is necessary to ensure that the subsidies are given to effectively benefit the widest user group possible, not to just enable a handful of upper-class society members to purchase luxury BEVs. Therefore, it is recommended to set several subsidy eligibility requirements to promote equitable BEV adoption. Some examples of common prerequisites in BEV subsidy schemes are as follows:

1. **BEV price cap.** The price of BEV eligible for subsidy is capped at a certain price to avoid funding luxury BEV purchases. This requirement can also affect OEM's BEV retail price, as with the case in China where Tesla cuts down the retail price of one of its products to meet the price ceiling requirement[78].
2. **Income cap.** Only buyers with income below the specified threshold are eligible for the subsidy. Another variation of this mechanism is to provide additional incentives for

[74] https://fame2.heavyindustry.gov.in/content/english/11_1_PolicyDocument.aspx
[75] https://cleanvehiclerebate.org/eng
[76] https://transport.delhi.gov.in/sites/default/files/All-PDF/Delhi_Electric_Vehicles_Policy_2020.pdf
[77] https://www.cnnindonesia.com/ekonomi/20200629121628-85-518572/total-utang-pemerintah-ke-pertamina-rp965-triliun
[78] https://www.cnet.com/roadshow/news/tesla-model-3-prices-china-ev-subsidies/#:~:text=Tesla's%20Model%203%20simplifies%20the%20EV&text=China%20now%20requires%20a%20sale,end%20support%20for%20EV%20purchases.

lower-income groups, such as in California[79]. However, this scheme could be more complicated than the BEV price cap scheme since there is an additional step to verify the buyer's stated income.

3. **Different budget allocation for each vehicle type.** Certain types of vehicles can get a higher subsidy and fund allocated than the others to drive the market's preference, based on the government's objective on BEV adoption. For example, India's FAME II scheme allocates almost eight times more funds to subsidize two-wheelers than four-wheelers, since it is the government's priority to accelerate electric motorcycle adoption. In addition to the vehicle's physical type, the policy can also be designed to focus on certain fleet types. For example, India's FAME II four-wheelers subsidy is only eligible for commercial vehicles (taxi and ride-hailing) instead of also financing private users.
4. **Technology requirement.** In order to focus on the BEV market, the government can exclude other EV types from the subsidy as has been suggested in Presidential Regulation No. 55/2019. Other technology requirements which can also be a multiplier factor in determining the amount of subsidy can include range (km), energy efficiency (km traveled/KWh), level of emission (CO_2/km), and battery energy density (Wh/kg) to push OEMs to produce better BEVs, as well as maximum speed requirements to also tackle road safety issues.
5. **Minimum domestic component requirement.** Minimum domestic component requirements can be set as one of subsidy eligibility requirements, as has also been suggested in Presidential Regulation No. 55/2019. This policy is also to support the creation of the domestic BEV industry.
6. **Area requirement.** The national subsidy scheme could be designed to only be applicable in certain priority cities, for example, cities with higher GHG emissions or metropolitan areas. Nevertheless, additional mechanisms should be put in place to ensure the effectiveness of this requirement.
7. **Other requirements.** Other requirements, such as setting a minimum warranty period including that of the battery and requiring the manufacturers to have adequate facilities for after-sales service for the life of the vehicle to provide security for end-users can also be applied. A requirement for the vehicles to be fitted with suitable monitoring devices to know the mileage of vehicles to determine the total fuel savings on a real-time basis is also required in India's FAME II scheme to measure the policy's performance in saving fossil fuel and GHG emissions.

It is recommended to evaluate the amount of subsidy each year, considering the traction of BEV uptake, availability of funds, and BEV price decline over time. A cap on the number of vehicles subsidized each year could also be put in place. The subsidy scheme should also consider vehicles that are sold separately with the battery, i.e. those which employ a battery-swap system. A mechanism to distribute the subsidy between vehicle owners and energy operators who bear the costs of the batteries should be put in place.

[79] https://cleanvehiclerebate.org/eng/income-eligibility

In India and China, end-users get upfront rebates when purchasing EVs, and reimbursements are made to OEMs based on submitted sales claims on a monthly basis[80]. However, based on lessons learned from China, risks of fraud should be considered in designing the subsidy scheme. Typical fraud by the OEMs includes[81]:

1. Overstating the number of vehicles sold to receive more subsidy, by registering vehicles illegally. Certain manufacturers bribed local vehicle registration authorities to produce vehicle licenses (which was the data used by the subsidy regulatory agency to verify the sales) for vehicles that do not exist. The fraud usually concerns non-private vehicles, since owners of private vehicles register their vehicles themselves.
2. Using smaller batteries in the sold vehicles, compared to the one used in the vehicle type test. Since the amount of subsidy per vehicle is subject to its battery capacity, some OEMs install larger batteries in testing vehicles while actually selling vehicles with smaller, cheaper batteries.
3. Selling vehicles to themselves. On paper, there are indeed transactions being made, however, the vehicles never reach any end-user on the road.

On the current subsidy scheme, China has added a number of anti-fraud measures such as[82]:

1. The government verifies proof of sale, instead of only vehicle registration data, prior to issuing any subsidy.
2. Random checks by a government authority or a third party.
3. Subsidies for non-private EVs will only be given after the vehicles demonstrated at least 30,000 of accumulated mileage in their odometers or through other data.
4. Requiring all new EVs to be equipped with an on-board monitoring system to allow real-time data monitoring.
5. Enforce administrative, fiscal, and civil penalties such as revoking production license, confiscation of the paid subsidies and other illegal income, and civil charges.

It has to be noted, however, that in the long term direct subsidies will not be sustainable for the government to offer, hence the need to also establish a vast network of charging stations, develop non-fiscal incentives and strong disincentive policies for ICE vehicles, as well as to build a strong domestic manufacturing industry to achieve EV-ICE vehicle price parity on the longer horizon.

b. Fiscal incentives

Related regulators: Ministry of Finance, Ministry of Industry, Ministry of State-Owned Enterprises, Ministry of Home Affairs, OJK, BI, local governments

Fiscal incentives for BEV users can be provided as tax and import duty exemptions. In Indonesia, the early procurement of BEVs, especially four-wheelers, will depend on international manufacturers since there is no strong electric vehicle industry in-country yet. A

[80] https://fame2.heavyindustry.gov.in/content/english/11_1_PolicyDocument.aspx
[81] https://theicct.org/blogs/staff/subsidy-fraud-reforms-china-ev-market
[82] Ibid

number of tax regulations which could be adjusted to provide fiscal incentives for BEV are as follows:

1. Central taxes (tax regulations under the jurisdiction of the national government):
    a. **Import duty.** The import fee is one of the key elements in the cost of an electric vehicle and can be as high as 50% of the unit price. Import fee exemption, similar to the policies in Iceland and Seychelles, can reduce the cost of BEVs significantly. To protect the domestic industry, the import fee can be reintroduced after a certain time period.
    b. **VAT.** The VAT plays a significant impact on the cost of a BEV. Although the costs are not as high as the import fee, the VAT can contribute an additional cost of up to 10% of the unit price. Reducing or waiving the VAT would significantly lower the acquisition cost of BEVs, especially for potential buyers.
    c. **Luxury goods tax for motorized vehicles.** PHEVs, BEVs, and FCEVs have been exempted from luxury goods tax based on the Jakarta Government Decree No. 73/2019.
2. Local taxes (tax regulations under the jurisdiction of provincial or city government):
    a. **Annual vehicle tax.** Annual vehicle tax exemption will also be needed to attract consumers. In the Minister of Home Affairs Regulation No. 8/2020 the annual vehicle tax for BEVs has been capped at 30% from the base tax calculation.
    b. **Vehicle title transfer tax.** In the Minister of Home Affairs Regulation No. 8/2020 the annual vehicle tax for BEVs has been capped at 30% from the base tax calculation.
    c. **Parking tax.** Local regulations on parking tax could incorporate waiver for BEVs, which in turn can support mandates for parking operators to offer preferential parking fees for BEVs as a non-fiscal incentive discussed in the next section.

Given the local autonomy, the values of local taxes are still determined by local governments although the national government can set the ranges. To date, only three provinces (Jakarta, Bali, and West Java) have issued tax reductions for BEVs. Local governments might have reservations on lowering the taxes since it will affect their revenues, since vehicle taxes are one of the biggest revenue sources for many local governments. The national government should also consider the other revenue streams for the local governments to compensate the loss of local revenues.

Other fiscal incentives that can be explored further include:

- **Preferential electricity tariff at low-peak period.** Giving a lower price to charge BEVs at low peak periods (dynamic tariff), usually during the nighttime, will further widen the fuel costs gap between BEVs and ICE vehicles. In addition, the higher induced demand from BEV charging will absorb the excess grid supply, which will be a win-win situation for the power provider.
- **Preferential credit.** In addition to taxes, fiscal incentives can be given in the form of minimum down payment removal for BEV purchases, which has been issued by BI, and

incentives for debtors to provide preferential credit rate for BEV purchases, issued by OJK. The Ministry of State-Owned Enterprises should mandate government-owned banks and insurance companies to initiate the financing schemes for BEV purchases. A lease-to-own financing scheme can be developed in particular for commercial fleets or privately-owned public transport fleets. For example, in Delhi, electric rickshaw drivers are only required to pay 5% of the vehicle price upfront, and pay the remainder of the cost with a low interest rate over 36 months[83].

- **Discounted vehicle insurance rate for BEVs,** which could be regulated by OJK.
- **ICE vehicles trade-in scheme for BEVs,** to encourage a shift to BEV instead of increasing the number of vehicles owned per household. The scheme is currently connected in France[84], where the government offers an extra IDR 86 million rebate (€5,000) on top of the upfront price subsidy for EV buyers who trade in their old ICE vehicles.

Several of the fiscal incentives above have been mentioned in the Presidential Regulation No. 55/2019, however the derivative regulations have yet to be issued. These fiscal incentives should be implemented as soon as possible in this early development stage.

c. Non-fiscal incentives

Related regulators: Ministry of Transport, Ministry of Home Affairs, local governments

Non-fiscal policies are policies, programs, and incentives that do not directly reduce the operation costs of BEV operation but can still encourage BEV adoption. Non-fiscal incentives should also be bundled with the monetary incentives to increase the value proposition of BEVs.

Presidential Regulation No. 55/2019 has set the non-fiscal incentives for BEVs. The incentives can be a form of free access, production rights, and security. However, these incentives may not bring significant benefits to the deployment of electric vehicles without more detailed programs from ministries and local agencies. The government should start exploring non-fiscal incentives on BEVs in more practical manners.

An array of non-fiscal incentives have been implemented in various markets. Some measures which can be implemented in Indonesia include:

1. **Preferential parking fee.** Free parking has been proven to work in several countries promoting EVs, like Norway, the United States, and other European countries. A preferential parking fee for BEVs in privately-owned parking facilities can be mandated by local transport agencies as the fare regulator, which should be backed by a waiver of EV parking tax for the parking providers.
2. **Highway toll or road pricing discounts or waivers.** In the United States, free HOV lane access to EVs is one of four policy types that are statistically significant predictors of BEV market share in the US.

[83] ICCT (2017)

[84] https://www.largus.fr/actualite-automobile/voitures-electriques-neuves-ou-occasion-jusqua-12-000-e-daides-10321409.html

3. **Special road access.** The odd-even policy exemption for EVs in Jakarta is an example. Users of electric vehicles will get the incentives to use the areas regulated in the odd-even policies without any zonal restriction.
4. **Exemption from the need for a driver's license** for electric two-wheelers under a certain power and speed threshold.

2. Enforce disincentives for ICE vehicles

Related regulators: Ministry of Energy and Mineral Resources, Ministry of Finance, Ministry of Transport, Ministry of Environment and Forestry, Ministry of Home Affairs, local governments

A tax increase for ICE vehicles and non-fiscal disincentives should be introduced to curb the demand for conventional vehicles. The introduction of increased or new taxes is also a policy to finance tax rebates for BEVs and make the overall incentive scheme fiscally neutral.

a. Increase ICE vehicle taxes

As opposed to offering waivers for BEVs, the introduction of higher taxes for the more polluting vehicles is another way to make the TCO of BEV comparatively lower. The decision of the national government to base the luxury goods tax rate based on vehicles' tailpipe emission is a good starting point.

For local governments, to compensate for the lost revenue from BEV tax waivers, annual vehicle tax, and title transfer tax could be raised by around 2.5 times for conventional vehicles, thus increasing their purchase price by about 40%.

b. Increase fossil fuel price

The price of fossil fuel in Indonesia is significantly lower than most countries due to the subsidy given by the government, both by giving direct price subsidy or by giving below-market price compensation to Pertamina. Having cheap fossil fuel available is counterproductive to the BEV acceleration program. Although it has been implied in the Presidential Regulation No. 55/2019 that a policy of fossil fuel subsidy transfer to BEV subsidy will be developed by the Ministry of Finance, the derivative regulation has yet to be realized.

As a short-term measure, the vehicle fuel tax can be increased by local governments. In many local jurisdictions, the vehicle fuel fee is still set below the 10% ceiling stipulated in Law No. 28/2009. An increase of fossil fuel tax would further create disincentives for conventional vehicles while maintaining BEVs' competitiveness, although not quite as drastically as removal or reduction of fossil fuel would.

c. Introduce carbon tax

A carbon tax can be one of the effective options to reduce our carbon emissions. Currently, there is no carbon tax involved in the fossil fuel industry, creating a dependent market on this type of energy source. By introducing an effective carbon tax on fossil fuels, the electric energy can be a sensible alternative to the market thus it will boost the usage of electric energy including in the transport sector. A carbon tax can disincentivize the public and the industry

from using fossil-fuel-based vehicles and lead to the transition to more sustainable vehicles, such as electric vehicles.

d. Establish Low Emission Zones (LEZ) or Zero Emission Zones (ZEZ)

Low emission zones or zero-emission zones established to improve air quality in cities, for example as regulated in RITJ 2030, are one of the programs that could be helpful to be initiated soon. Local governments can develop their own LEZ or ZEZ, prioritizing areas with dense traffic and poor air quality. CBD areas can be initial places that can be expanded to other areas with packed private vehicle uses, such as commercial, market, or school areas. BEVs are exempt from the access restriction since they do not have any tailpipe emissions.

e. Improve vehicle emission limits and mandate emission testing

The Ministry of Environment and Forestry has issued regulations on vehicle emission standards, however, the issue lies in the implementation. In Indonesia, vehicle emission testing has yet to be mandatory. Currently, only one-off testing is mandatory which is done at the vehicle type test. Although there has been a discussion on introducing periodic mandatory emission testing, the notion is not visible in the Law No. 22/2009 revision draft[85].

Obligating vehicle owners to have their vehicle tested for their emissions periodically, such as per three to five years, will accelerate phasing out of polluting vehicles. Local governments actually are able to take advanced action by mandating the measures in their own jurisdictions, such as done by DKI Jakarta which obligates three-year-old vehicles to do emissions testing.

3. Develop light-duty fleet electrification programs

Related regulators: Ministry of Finance, Ministry of Industry, Ministry of Transport, OJK, local governments

Mandates could be given to corporate fleets, commercial fleet operators, such as taxis and ride-hailing companies, privately-owned public transport fleets (such as microbus or “angkot”), and also public institutions as state vehicle owners, to electrify their fleets. Electrification of fleets is also expected to have a higher impact on GHG reduction due to their higher mileage.

Providing gradual mandatory targets for these fleets to be electric will give the scale needed for BEV adoption to gain traction from two points of view: Firstly, private vehicle users will see the large adoption of BEV in fleets as precedence of BEV reliability, since fleet vehicles typically have higher mileage or serve a variety of purposes[86]. Secondly, the higher and constant demand prompted by the mandate will provide a strong signal needed by BEV manufacturers to invest more in BEV production. Furthermore, large procurement of BEVs for public fleets will create a secondary market of BEVs in a few years[87].

[85] Pusat Perancangan Undang-Undang Badan Keahlian DPR RI (2020)
[86] Palm and Backman (2017)
[87] Ibid.

Public procurement can be an important initiator to stimulate BEV adoption[88], since the commitment is made by the government itself. On the other hand, the electrification mandate for private sector fleets should be bundled with incentive programs, for example:

- **For privately-owned public transport:** Can be bundled with fleet renewal programs, where the government provides subsidies or loan programs for the individual fleet owners who renew their vehicles with BEV, or permit fee exemption.
- **For corporate fleet and commercial fleets, including taxi, ride-hailing, or delivery vehicles:** Can be bundled with financing support programs or permit fee exemptions. A designated waiting zone placed at more strategic locations at airports, stations or other buildings, or provision of other priority when picking-up passengers, can be provided for electric fleets[89]. A policy to allow corporate social responsibility (CSR) funds to be used to procure electric fleets for companies' corporate or commercial fleets can also be issued.

A number of countries and cities have developed programs to specifically electrify light duty vehicle fleets, as follows:

Government	Target Fleet	Scheme	Year Issued	Regulator
Country level				
China	State fleet	At least 30% of state fleets purchased in year between 2014-2016 are new energy vehicles	2014	National Government Offices Administration (NGOA), the National Development and Reform Commission, the Ministry of Finance, the Ministry of Science and Technology, the Ministry of Industry and Information Technology
France	State fleet	50% low-emission vehicles for fleet renewal in the national level and 20% in the local level[90]	2015	French government
India	Commercial fleet	Only commercial fleets are eligible for the four-wheeler segment of the subsidy[91]	2019	Indian Ministry of Heavy Industry and Public Enterprises
City or state level				

[88] IEA (2018)
[89] ICCT (2017)
[90] https://www.iea.org/policies/8737-law-on-energy-transition-for-green-growth-ltecv
[91] https://fame2.heavyindustry.gov.in/content/english/11_1_PolicyDocument.aspx

California	State fleet	Through the normal course of fleet replacement, at least 10% of the light duty state vehicle purchases should be ZEV by 2015 and at least 25% by 2020[92]	2012	California Governor
Santiago	Commercial fleet (taxi)	Over IDR 122 million subsidy for 70 taxi drivers to renew their fleet to EV	2015	Chilean Ministry of Transport and Telecommunications
Delhi	Commercial fleet (delivery vehicles)	All delivery service providers that commit to convert 50% of their fleet to electric by 2023 and 100% by 2025 is eligible for financing support from the Delhi Finance Corporation (DFC)[93]	2020	Government of National Capital Territory of Delhi

4. Explore and promote various business models for EVs

Related regulators: OJK, Ministry of Trade

One of the biggest obstacles to BEV adoption is that BEV capital costs are higher than for ICE vehicles. A few business models which can be explored include:

- **EV leasing.** A leasing scheme could be explored and promoted by the government and OEMs to spread the capital costs over the life span of the BEV[94]. The business model will make the yearly cost of a BEV on par to an ICE vehicle due to BEV's lower fuel and maintenance costs, and the owners do not have to worry about the future valuation of their vehicles. This scheme can also be targeted for fleet vehicles.
- **Battery leasing.** The battery is a major price component of a BEV, accounting for almost 40% of the total price. Leasing batteries separately could alleviate some of the capital cost burden for the BEV users, and the OEMs can sell used batteries to a secondary market such as the power storage market. The practice of leasing batteries for a five-year lease term can add an $1,000 additional revenue for the OEM[95].

5. Create secondary market for EVs and batteries

Related regulators: Ministry of Industry, Ministry of Energy and Mineral Resources, Ministry of Trade

Battery repurposing is a way to increase the value of used batteries and hence reduce the capital cost barrier of BEVs. The most common choice is to reuse them as energy storage

[92] https://www.ca.gov/archive/gov39/2012/03/23/news17463/index.html
[93] https://transport.delhi.gov.in/sites/default/files/All-PDF/Delhi_Electric_Vehicles_Policy_2020.pdf
[94] Grutter and Kim (2018)
[95] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/making-electric-vehicles-profitable

systems. The GoI should develop policies promoting the development and use of large scale energy storage systems by utility companies to secure a secondary market for the batteries.

In addition to large-scale energy storage systems for utility companies, an emerging practice is to use the used batteries to power DC fast charging stations during periods of high demand, drawing the power stored in the batteries at peak solar hours[96]. The practice has been commercialized in California by a fast-charging station operator.

After the lifecycle of batteries has been spent, the batteries can be recycled by extracting its valuable raw materials such as lithium, nickel and cobalt[97]. A policy should later be put in place to allow sales of second hand batteries and ensure its quality control.

6. Create network of charging infrastructure

As range anxiety is one of the most prominent concerns prior to adopting EV, a network of chargers should be established especially in city centers to ensure convenient access. Policies to promote charger provisions will be discussed in the Infrastructure Provision Policies section.

7. Improve BEV model availability

The availability of various BEV models will capture a wider range of market opportunities. To boost domestic BEV sales, OEMs have to be encouraged to produce more BEV models, which will be discussed more in the Supply Support Policy section.

8. Conduct public awareness campaigns

Related regulators: Coordinating Ministry of Maritime and Investment, Ministry of Industry, Ministry of Transport, local governments

As discussed in previous sections, public awareness can play a significant role in the deployment of electric vehicles. In Indonesia, survey respondents indicated that they were unlikely to purchase an e-motorcycle even though 63% of respondents were aware of them[98]. Among reasons stated, they noted a negative perception of the model, size, and readiness of charging infrastructure for e-motorcycles.

Leading cities, in conjunction with regional and national governments, utilities, manufacturers, and advocacy organizations, have created consumer awareness and education programs to improve knowledge and generate greater interest in electric vehicles. Education and awareness policies can include a variety of different supporting programs, such as[99]:

- **Develop a comprehensive information portal (website) about BEVs.** Even in leading regions, many people remain unaware or misinformed regarding BEVs. A single information hub by the national government should be made accessible, compiling

[96] https://www.prnewswire.com/news-releases/evgo-announces-nations-first-grid-tied-public-fast-charging-system-with-second-life-batteries-300678315.html

[97] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/second-life-ev-batteries-the-newest-value-pool-in-energy-storage

[98] Solidiance (2018)

[99] ICCT (2017)

information from different ministries and other institutions involved. Some useful information which should be presented in the website includes:

- Benefits of BEVs compared to ICE vehicles
- Incentives available, including the steps to apply and eligibility requirements (if any), for:
  - End-users (private users and fleet owners)
  - Investors
  - OEMs
- Government's existing policies, plans and programs on accelerating BEV adoption, to provide a sense of assurance for potential users to procure BEVs
- Available BEV models and their specifications
- Map and real-time availability of charging stations
- GHG emissions reductions and other environmental benefits achieved by BEV deployment in the area. The data can be gathered by tracking the mileage of each EV deployed in the country. India's FAME website[100] can provide a good example of a government EV website which highlights the environmental objective achievements of EV programs deployed.
- Other frequently asked questions, for example how BEVs operate, how to plug in BEVs to chargers, the option to charge BEVs at home, safety concerns of short circuits in the event of floods and range anxiety during traffic jams, etc.

The website should be regularly maintained and the information adopted.

- **Conduct public outreach activities**

  Campaigns through public events, social media outlets, print, and other communication channels should be planned and coordinated. An example of public events can include test-drive events in collaboration with OEMs or local dealerships.

- **Showcase BEV through special labelling, plate numbers, and consistent markings**

  In order to familiarize people with BEVs by increasing their visibility on the road, a distinctive label could be designed for BEV fleets and private BEV vehicles. The label could be mandated to public transport and commercial fleets, and serve as a marker for the BEV owners to claim perks such as lower parking fees or exemptions from road pricing schemes or road restrictions.

Since 2011, Shanghai has designated an EV Demonstration City and hosts an EV Demonstration Zone where businesses and visitors can learn about electric vehicles, take test drives, and discover emerging technologies. The zone is supported by manufacturers, the State Grid, universities, and the national government. Amsterdam has taken a more broad-based approach, including the promotional campaign "Amsterdam elektrisch," which includes electric vehicle events, highly publicized integration of electric buses and taxis at the Schiphol Airport, and a comprehensive city website with real-time information about the city's charging network.

[100] https://www.fame-india.gov.in/

Proper dissemination of information increases consumer awareness of and knowledge about a policy or program that can have a more permanent impact on consumer behavior than incentive programs alone.

Electric buses

Bus fleet electrification could have major potential to increase the pace of vehicle electrification. For many, an electric bus could be the first electric vehicle they ride and encounter. Furthermore, the government could have little to no roadblocks in implementing a fleet electrification policy as it could be easier for the government to support public fleet electrification such as through mandates, than private market adoption.

A number of policies which could accelerate electric bus deployment are as follows:

1. Give mandates for electric bus fleets

Related regulators: Ministry of Transport, Ministry of Home Affairs, local governments

Mandates to phase out ICE buses and to exclusively procure electric buses gradually can be issued, especially when the buses are government-owned fleet. As an example, there is a lesson learned in relation to the impact of massive electric bus fleets from China. In 2017, the city of Shenzhen targeted to electrify all public buses and all taxis by 2018. Today, China owns the largest fleet of electric buses worldwide.

China began electrification as the government started to take serious action against air pollution. One electric bus is estimated to prevent the equivalent of emissions from thirty-three gasoline vehicles and save sixty tons of carbon emissions annually. Electric buses not only reduce emissions, but they also offer high-cost savings. Thanks to its electric fleet, China is estimated to save $5 billion on oil imports each year. In California, the Antelope Valley Transit Authority saves an average of $46,000 per electric bus compared to its diesel counterpart.

Other countries are also starting to electrify their public fleets. California, through its Innovative Clean Transit regulation, mandates transit operators to have a percentage of their fleet purchases to be electric, and also requires each transit operator to have a Zero-emission Bus Rollout Plan. The rollout plan includes the transit operator's roadmap to achieve a fully electric fleet by 2040, identification of the technology which is planned to be used, schedule of supporting infrastructure and facilities construction, schedule of zero emission bus purchases and leases, plans to deploy electric buses in disadvantaged areas, training plan for their maintenance and repair staffs, and identification of possible funding sources.

Fleet electrification planning has not been limited to developed economies. Several island countries, including Jamaica and Barbados, have made strides to electrify their fleets. While Jamaica is currently exploring options, Barbados will begin to operate electric bus fleets by the end of 2019. Additionally, Barbados announced plans to have an all-electric fleet by 2030.

2. Provide subsidies, incentives, and ICE vehicle disincentives

Related regulators: Ministry of Transport, Ministry of Finance

Not unlike other vehicle types, upfront purchase subsidies and incentives are important accelerators of electric bus adoption. In addition, directing policies to disincentivize the use of ICE buses is also an important move to improve the value proposition of electric buses and phase out ICE buses.

Incentive policy packages for the adoption of electric buses in public transportation fleets can include:

1. **Upfront purchase subsidy.** Through the FAME II scheme, India allocated a large share of its demand incentive budget (41%) to subsidize the procurement of 7,090 electric buses. The price cap of the partial subsidy is also higher for buses, which is 40% of the total purchase price compared to the 20% subsidy cap for two- and four-wheelers. The national subsidy is further complemented by local subsidies from the state governments. Strong subsidies for electric bus procurement is also a strategy in China to accelerate the transition to electric fleets.
2. **Offer longer contracts for bus fleet operators.** In Santiago, fleet operators that operate electric buses are contracted for 14 years, rather than ten years if they operate ICE buses[101].
3. **Prioritize electric buses in public route tendering.** Give extra credit for electric buses in public route tendering, or require new routes to be operated by electric buses[102].

On the other hand, increasing diesel price and taxes can be applied to disincentivize new procurement of ICE buses by operators and corporate fleet owners[103]. A policy to allow corporate social responsibility (CSR) funds to be used to procure electric bus fleets for companies' corporate fleets can also be issued.

3. Establish a green procurement scheme for electric buses

Related regulator: Ministry of Finance, Ministry of State-Owned Enterprises, Ministry of Environment and Forestry, OJK

Given the large capital costs associated with electric bus procurement, as well as the costs for the development of its charging infrastructure and other supporting facilities, electric buses might not become feasible to be procured under conventional public procurement schemes. In Indonesia currently, green procurements are still not the default practice.

Initiatives from government-owned financial institutions, such as conventional banks and infrastructure financing institutions, as well as insurance companies to provide financing and offer insurance schemes for the expensive and nascent electric buses are also needed to enable procurement of electric buses by corporations as their corporate fleets. The Ministry of

[101] IEA (2020)
[102] Grutter and Kim (2019)
[103] Ibid.

SOE should mandate government-owned banks and insurance companies to do so, since evidently there is still huge reluctance from the private sector. The example set by the SOEs or ROEs in offering credit and insurance schemes is needed by the private sector to follow.

4. Adjust technical and contractual regulations

Related regulators: Ministry of Transport, local governments

Several technical and contractual regulations need to be adjusted to accommodate electric bus deployment, such as the contract period for bus operators. The contract period needs to be aligned with the operational life of electric buses to justify the investments made to procure the buses. For example, multi-year contracts between the Ministry of Transport and bus operators must be made possible to provide more security for investors and financial institutions to finance the fleet and infrastructure, because returns on investment cannot be made in one year.

5. Conduct capacity building programs for local governments and bus operators

Related regulators: Ministry of Transport, local governments

Capacity building programs for local governments and transit operators to familiarize them with electric bus benefits, operations, and planning for transition from ICE vehicles should be conducted regularly. Provision of incentives such as reimbursement for employee or staff training can also be offered to transit institutions to improve the capacity of their resources to plan, operate, and maintain electric bus fleets.

5.2.2 Supply support policies

Policies targeting BEV suppliers or OEMs will stimulate EV rollout by manufacturers, in addition to firm targets on BEV adoption set by the governments and demand creation actions discussed previously.

1. Give production mandates through a credit system

Related regulators: Coordinating Ministry of Maritime and Investment, Ministry of Industry

Mandates for OEMs to produce and sell EVs, especially passenger car EVs, have been issued in various leading EV markets. A credit system is used as the policy mechanism of the mandates in California and China. In China, this minimum EV production requirement is a central policy to promote EVs[104].

In a credit system, an OEM is required to fulfill a certain EV production or sales credit target per year. Credit achievement by each OEM should be made transparent and publicly accessible. Some attributes of the credit system include:

- **Target phasing**. The credit targets should be increased gradually over a period of time.
- **Transferability.** Credits are often tradeable, meaning that an OEM with a surplus EV credit can sell them to other OEMs and vice versa, and bankable, meaning that excess

[104] IEA (2019)

credits from a previous year can be claimed for future years within the program's period.

- **Penalty.** OEMs which are unable to meet the target are subject to financial or administrative penalties, such as pending type approval for new vehicle models until the deficit credits are fulfilled[105].
- **Condition-specific requirements.** For example, a lower credit target can be applied for small manufacturers.

The amount of credits obtained per vehicle can vary based on:

- **The type of EV:** Pure electric vehicles (BEV) obtain more credit than hybrid vehicles. In California's credit system, the maximum credit for a BEV is almost four times the maximum credit for a hybrid vehicle.
- **Vehicle range:** The amount of credit per vehicle is a function of the vehicle's all-electric range. A threshold of minimum all-electric range is set to earn credits. Since this requirement relates to the performance of batteries, it also stimulates battery manufacturers to produce better batteries.
- **The amount of tailpipe GHG emission** (g/km).

2. Provide incentives and subsidies

Related regulators: Coordinating Ministry of Maritime and Investment, Ministry of Industry, Ministry of Finance, Ministry of Research and Technology, BPPT, local governments

As a strategic step to achieve the national BEV acceleration program, GoI could invest in BEV industry players, which include BEV, BEV components, battery, and charger manufacturing companies. Currently, a number of fiscal incentive options have been stated in Presidential Regulation No. 55/2019 and a derivative regulation from the Ministry of Finance should be in the pipeline. Financial incentives which should be made available for the BEV and charger manufacturing industry are as follows:

a. **Preferential loan offer.** Low-interest or interest-free loans can be a monetary incentive which could attract investors to build BEV, battery, and charging infrastructure manufacturing industries in Indonesia. Currently direct loans from the national government are eligible for infrastructure projects in Government Regulation No. 63/2019 on Government Investment. It has to be ensured that the loan scheme is eligible for all BEV and BEV components OEMs, including two-wheelers. The scheme also has to support BEV industry players of all scales, including smaller manufacturers. A dedicated budget allocated for loan schemes for BEV industry players can send a strong signal of the government's commitment to push domestic BEV production.

b. **Loan guarantees.** A mechanism for BEV industry players to obtain loan guarantees from the national government should be developed. A loan guarantee scheme, on top

[105] ICCT (2019)

of liquidity support, for OEMs has been made available by the government of South Korea to boost the domestic BEV manufacturing industry.

c. **Tax holiday and tax allowance.** As mentioned in the Presidential Regulation No. 55/2019, tax incentives are also eligible for BEV industry players. On a speech by the Minister of Finance[106], tax holidays can be provided for the BEV and battery industry and tax allowance can be provided for the vehicle components industry, which is a good starting point.

d. **Import duty relaxation.** Presidential Regulation No. 55/2019 has put a clear direction on import fee reduction or exemption for electric vehicles in early adoption. Import fee exemption will be a key incentive for electric bus operators and manufacturers that will need imported goods for their machinery, some raw materials, or some components. In the early years, the exemption of the import fee will speed up the usage of technology and thus it will benefit the operators and manufacturers to learn to produce it locally.

e. **Research grants.** Local knowledge and technology advancement on BEVs and their components should be accelerated by providing directives and targets for electric bus technology development and operational research in the Ministry of Research and Technology's strategic planning document and RPJMN. In addition to directives and targets, fiscal incentives such as grants can also be offered for universities and researchers to conduct research on electric buses, and also tax reduction for domestic manufacturers who are developing electric bus technologies. The research funds could also be in the form of startup funds, which are made available for startups working on BEV research and development projects.

f. **Domestic skill training.** Partial reimbursement of expenses related to skill training, including BEV, battery, and charger maintenance, repairment, and other relevant skill sets could be made available to incentivize institutions to improve their employees' capabilities. Stipends for the trainees over the course of the training period could also be offered.

g. **Competitive raw materials price.** Price competitiveness has to be ensured in the whole supply chain of BEV and BEV components to benefit the local production and operations, including the price of raw materials. Subsidy or price regulation of critical materials, such as nickel for batteries, could be offered to cut down production costs and enable domestic industry to be competitive in the global market. Supply of the critical raw materials, including lithium, should also be ensured for the battery industry to flourish by mandating used lithium batteries to be recycled to harvest the raw materials, as has been mentioned previously in the Environmental Policies section.

Although many incentive options are potentially available for BEV and battery industries, most of the incentives are also applicable to ICE vehicle manufacturers. For example, all "pioneering industries", including ICE and ICE components manufacturing industry, are eligible for the tax

[106] https://www.gaikindo.or.id/wp-content/uploads/2019/07/00.-Menkeu_GIAC_20190724_PPT_GIIAS_2.pdf

holiday incentive scheme[107]. To boost the growth of the domestic industry players involved in the whole supply chain, the incentives and requirements for the industries related to BEV should be made more attractive than those related to ICE vehicle manufacturing, which could include but not limited to the policies below:

- **Lower the barrier of entry for small to medium BEV and battery manufacturing industry players,** for example by setting a lower minimum investment requirement to obtain tax holidays and tax allowance for domestic capital BEV, BEV components, battery, and charging infrastructure manufacturing companies.
- **Provide longer tax incentive periods as well as larger incentives** compared to ICE vehicle manufacturers
- **The tax allowance and tax holiday scheme should also be eligible for the industries in the supply chain** of BEV, battery, and charging infrastructure manufacturing.
- **Ensure lower import duty for BEV components** compared to ICE vehicle components. The import duty schemes should also be adjusted to ensure products with higher TKDN can be produced at much cheaper costs than CBU vehicles.

In addition to fiscal incentives, other policies which will support domestic BEV industry include:

a. **Establishment of a research council.** A dedicated research council should be established by the Ministry of Industry, Ministry of Research and Technology and BPPT to foster collaboration and knowledge sharing on electric vehicle technologies. The council can be part of the current research council of electric cars ("Molina" or "Mobil Listrik Nasional") which comprises several universities. A separate council can also be established to focus on electric buses and should include members from the industry and the public sector.
b. **Patent transfer.** Domestic BEV manufacturers also need help in terms of patent transfers. Patent transfer will not only boost the scale of production but also improve the knowledge of the whole EV industry.
c. **Infrastructure support.** Industrial complexes dedicated to the BEV industry, including battery, manufacturing and research hubs, should be made available by the national and local governments. Quality infrastructure, such as power, water, sewage treatment, testing facilities, should also be provided to support the manufacturing process. The industries can also be exempted from land and building tax for a limited period of time.

3. Streamline regulation

Related regulator: Coordinating Ministry of Maritime and Investment, Ministry of Industry, BKPM

Investment and the permit issuance process should be streamlined and transparent. The Investment Coordinating Board (BKPM) has provided a Direct Construction Facility (KLIK) to streamline investment. Similar policies are recommended to be issued, without relaxing

[107] Minister of Finance Decree No. 150/2018

environmental boundaries. In addition, overlapping regulations related to activities in the whole supply chain of BEV, BEV components, and battery industries should be aligned.

5.2.3 Infrastructure provision policies

Charging infrastructure deployment is a crucial factor of large-scale BEV adoption, hence incentives should be made available to boost charger provisions, especially Level 2 and DC fast charging stations. As illustrated in the figure below from a study by ICCT (2017), the numbers of charging stations available per capita in Norway and Netherlands, two countries which have high EV sales shares, are significantly higher than other leading markets.

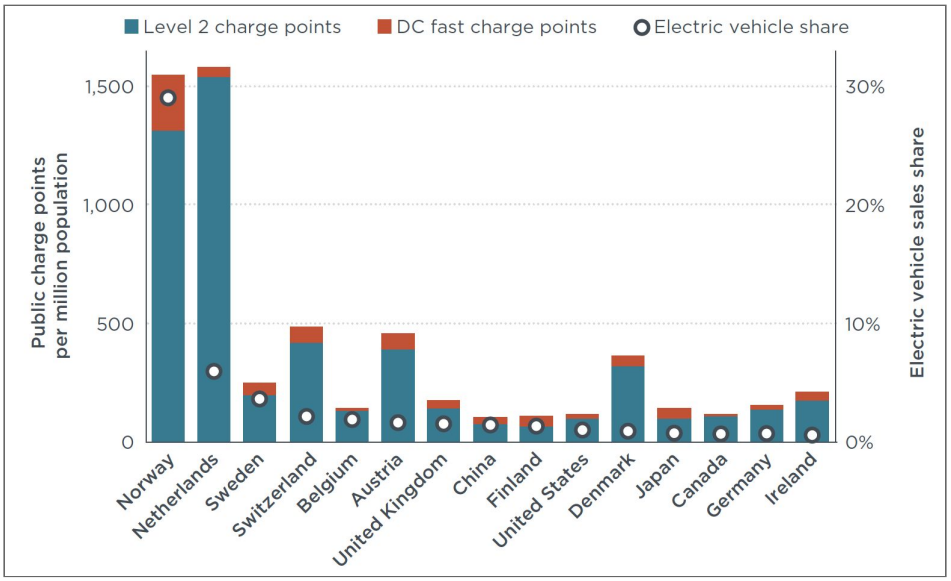


Figure 5. Number of charging stations per capita and EV sales share in leading markets (Source: ICCT, 2017)

The study also highlights four key takeaways from charging infrastructure development trends around the world, as follows[108]:

1. The availability of Level 2 and DC fast charging is correlated with EV uptake in 350 metropolitan areas.
2. The ratio of EVs to public charging infrastructure depends on the accessibility of private (home) chargers.
3. Collaboration between government institutions from multiple levels and the private sector, such as distribution of funding to local governments, public-private partnerships (PPP) schemes, and coordination with utility companies as well as responding to EV users' needs, are crucial for successful charging infrastructure deployment.

[108] ICCT (2017)

4. The main barriers to charging infrastructure deployment in other cities include lack of consistent standards of the charging interface and inconsistent data availability. Addressing these barriers could boost charger market development.

A number of policies could be implemented to support charging infrastructure deployment, as follows:

1. Provide fiscal incentives and subsidies

Related regulators: Ministry of Energy and Mineral Resources, Ministry of Finance

Fiscal incentives and subsidies are not only crucial to create demand and stimulate BEV production, but also to kickstart charging infrastructure provision. Subsidies and derivative regulations on other fiscal incentives for charging infrastructure should be soon issued by the national and local governments. To date, although it is a good start, only a policy on a preferential electricity tariff for charging infrastructure operators has been issued by the Ministry of Energy and Mineral Resources.

In addition to subsidies and the preferential electricity tariff, some fiscal incentives which have been discussed in the previous Supply Support Policy section can also be offered for both charging station operators and battery swap station operators, such as:

- Preferential loan offer
- Tax holidays and allowance
- Import duty exemptions
- Land and building tax exemption

Some examples of charging infrastructure programs which include fiscal incentives and subsidies are:

Government	**Type of incentive**	**Scheme**	**Implementation Year**	**Budget**
Country level				
Canada[109]	Public charger subsidy	Up to 50% project cost reimbursement for Level 2 and fast chargers, to a maximum of CAD 2 million per project	2019 - 2024	CAD 130 million / IDR 1.4 trillion
India	Private charger for public transport	Fund one slow charger per electric bus and one fast charger for every 10 electric buses	2019-2022	INR 10 billion/ IDR 2 trillion
Germany[110]	Private	10-30% subsidy for private charger	2019-2030	EUR 2.5 billion

[109] https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/zero-emission-vehicle-infrastructure-program/21876

[110] https://wallbox.com/en_catalog/ev-incentives-in-germany#NationalPrivateEVChargingIncentives

	charger subsidy	purchase and installation		/ IDR 43 trillion[111] (include budget for EV and battery R&D)
	Public charger subsidy	• Up to €3,000 for purchasing charging stations of up to 22 kW. • Up to €12,000 for purchasing DC chargers up to 100 kW. • Up to €30,000 for purchasing DC chargers above 100 kW. • Up to €5,000 for low voltage and up to €50,000 for medium voltage grid connections		
City level				
California[112]	Charger subsidy	Up to $7,500 per Level 2 charger, up to $80,000 per DC fast charger	Ongoing	USD 71 million[113] / IDR 1 trillion
Delhi	Private charger subsidy	100% grant (up to INR6,000/IDR 1.2 million per charging point) for the first 30,000 shared charging points in housing complexes or multistory apartments	2020 - ongoing	Unknown
	Public charger subsidy	Provision of a capital subsidy for the cost of chargers installation expenses for mandated energy operators		
	Electricity tariff	Preferential tariff for public and captive charging stations for commercial use (i.e. charging facilities used by fleet owners) and private chargers that are BEVC-AC001 compliant and are connected to the Central Management System (CMS)		
Linyi	Private charger subsidy	CNY 3,600/IDR 7.8 million subsidy for home charger installation	2015	Unknown
Shenzhen[114]	Charger subsidy	CNY 400/KW for DC charging facilities, CNY 200/KW for AC chargers over 40 kW and CNY 100/kW (USD 15) for AC chargers under 40 kW	2019	Unknown

111 https://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Topics/Public-Finances/Articles/2020-06-04-fiscal-package.html

112 https://cleanvehiclerebate.org/eng/ev/technology/fueling/electric

113 https://calevip.org/about-calevip

114 IEA (2020)

Moreover, the government can also recommend PLN to offer charging infrastructure purchase and installation cost rebates, since in addition to the equipment costs, there are other costs associated with charger installation such as wiring, grid capacity upgrade, and access to electricity. A similar scheme is currently being done in California[115], where utility companies offer USD 500 - 10,000 rebates for Level 2 and DC fast chargers installation and purchase.

2. Set plugin standards with consideration to operator investments

Related regulator: Ministry of Energy and Mineral Resources

The Minister of Energy and Mineral Resource Regulation No. 13/2020 on Public Charging Infrastructure has laid the groundwork on charging plug socket-outlet standards. However, there are still multiple plugins allowed for us in Indonesia, and it is implied that charging facility operators need to provide all the plugins for their chargers.

A single charging plugin type is recommended to be set. The standardization is a good practice to accelerate charging infrastructure development in general, and also to provide certainty for BEV manufacturers to produce BEVs with a specific interface. In addition, charging interface standardization also eliminates the concerns of bus operators regarding the difficulty of changing buses or of selling the electric buses to other cities in the future.

3. Land access and building regulations

Related regulators: Ministry of Finance, Ministry of Transport, Ministry of Public Works and Housing, local governments

Access to land and parking space to install charging infrastructure, especially public charging infrastructure, can be a significant barrier for charging operators. The scarcity of land and building spaces in city centers, where most of the public charging stations are expected to be located, will drive land acquisition costs sky-high without any intervention from the government.

Policies which could support land access for charging infrastructure are as follows:

1. **Issue mandatory provision of EV charging stations.** Obligation to provide a minimum number of charging stations can be issued for government buildings and government-owned parking facilities. Taking it a step further, building and parking regulation can be revised to include EV chargers as one of the requirements to issue new building and parking business permits. For example, the Government of Jakarta has included electric vehicle charging stations as one of the obligatory facilities in all off-street parking facilities in its draft revision of parking regulation.
2. **Amend building codes.** The International Energy Agency (IEA) published a report stating the need for policies to support updating building codes to promote EV readiness. An "EV-Ready" building is one that has the necessary wiring and electrical

[115] https://cleanvehiclerebate.org/eng/ev/technology/fueling/electric

capacity to sustain the future installation of EV charging stations. Countries and localities are working on implementing these code changes. For example, Iceland plans to update building codes so they require charging outlets for EVs in new and renovated buildings. One of the arguments surrounding "EV-Ready" codes is that in existing buildings, adding wiring to deliver electricity to a parking stall represents over half of the cost of installing an electric vehicle charger. Therefore, installing the necessary infrastructure components at the time of building construction prevents the need for post-hoc trenching and repaving or increasing the electric capacity.

3. **Open access for government land and building assets.** The recently issued Minister of Finance Regulation No. 115/PMK.06/2020 has allowed utilization of government land and building assets by the private sector to reduce idle assets. The policy opens opportunities for public charging infrastructure operators to access the spaces. Nevertheless, to further accelerate the development of charging stations network, several incentives such as by offering concessional rates for the land lease are needed to be offered by the government.

Summary of Recommendations

Indonesia has set its mission to accelerate the adoption of battery electric vehicles (BEV) through the Presidential Regulation No. 55/2019. Nevertheless, through stakeholder consultations, current policy review, and policy benchmarking with leading EV adopter regions, a number of policy gaps still need to be addressed by the national and local governments in Indonesia. The key recommendations developed in this report are as follows.

1. The first and foremost recommendation is to create national and city-level BEV penetration roadmaps and targets which are tied in with GHG reduction objectives. The lack of clarity on BEV regulations has been cited as one of the major challenges in accelerating BEV uptake in Indonesia, therefore a clear national target and roadmap on large-scale BEV uptake are needed to push relevant public institutions as well as the private sector to take action. On the other hand, from the discussions with key national stakeholders, building domestic BEV industries, absorbing excess electricity supply, and reducing reliance on imported fuel were cited as the main backgrounds underlying the national mission of widespread BEV adoption. BEV has yet to be acknowledged as GHG reduction solutions in current policies, as no reference on BEV has been made in Indonesia's First Nationally Determined Contributions (NDC) submitted to UNFCCC nor in Presidential Regulation No. 61/2011 on National Action Plan for GHG Emission Reduction (RAN-GRK). If the detachment between BEV adoption mandates and GHG reduction objectives remains unaddressed, chances are the electricity supply which fuels the BEV will mostly still be generated from carbon-intensive sources such as coal, offsetting the most important benefit of transitioning into e-mobility. The adoption of BEV should be made hand-in-hand with clean electricity generation.
2. National and city-level charging infrastructure roadmaps need to be developed soon, supplemented with policies supporting the provision of the infrastructure. Studies in EV leading cities in the US, Europe, and China have shown that sufficient provision of charging infrastructure especially Level 2 and DC fast charging stations is a major driving force of EV uptake. Incentives for charging infrastructure providers should also consider not only the electricity tariff but also grid connection costs and support for land access, especially for public transport charging facilities. Establishment of a single plug in standard is important not only to reduce the investment costs of charger provision but also to provide certainty for BEV manufacturers to produce BEVs with a specific interface.
3. Establish a national task force and clearly define its responsibilities, followed by city level task forces starting from pilot cities. A derivative regulation on the task forces not only will provide clarity for relevant national government institutions' tasks and responsibilities on the BEV acceleration program, but also to enable local governments to devise their task forces and implementation actions.

4. Demand creation policies are crucial in the early stages of BEV adoption. Based on global best practices, governments need to take active roles to create the early BEV market. Demand creation policies include mandates and programs to procure BEV starting from the public sector, provision of fiscal and non-fiscal incentives by both the national and local governments, BEV and battery secondary market creation, explore and promote various business models and financing options for BEV procurement especially for the public transport sector, and public awareness campaigns as well as capacity building for public transport operators and city officials. Demand creation policies are not only about developing new policies but also need to consider amending existing policies e.g. allowing multi-year contracts between MoT and bus operators, and not only on giving incentives to BEV but also imposing disincentives for polluting vehicles.
5. Subsidies are effective to encourage BEV adoption by reducing the CAPEX difference between BEV and ICE, but should be designed carefully. The subsidy policy design can be a powerful tool to direct the course of BEV adoption to certain vehicles or user segments. It is necessary to ensure that the subsidies are given to effectively benefit the widest user group possible, not to just enable a handful of upper-class society members to purchase luxury BEVs. Therefore, it is recommended to set several subsidy eligibility requirements to promote equitable BEV adoption.
6. To further support BEV adoption by increasing BEV model options and reducing production costs, and also to achieve the national industry objectives, the government needs to promptly formulate policies targeting and supporting the BEV industry players. Production mandates for OEMs to produce and sell EVs, especially passenger car EVs, have been issued in various leading EV markets and can be explored further in Indonesia. Fiscal regulations should be reassessed to ensure that the incentives and requirements for the industries related to BEV are more attractive than those related to ICE vehicle manufacturing and overlapping regulations should be streamlined. Furthermore, strong support by the national government in the R&D sector should be made to create competitive BEV industries in the long run.

References

City of Philadelphia oTIS. (2018). *Electric vehicle policy task force: Policy recommendations*. Retrieved from http://www.phillyotis.com/wp-content/uploads/2018/03/Electric-Vehicle-Policy-Task-Force-Final-Report.pdf

Du, L., & Miller, J. (2017). *Status of policies for clean vehicles and fuels in select G20 countries*. The International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/Status-of-policy-post-TTG_ICCT-Briefing_15082017_vF.pdf

Grab Indonesia (2020, September 2). *Kolaborasi mewujudkan ekosistem kendaraan listrik untuk masa depan* [Webinar]. https://drive.google.com/drive/folders/1npsDEm5GZ0Anm5VRhe7S2ivd4hgIqiMX

Grutter, J. (2020, August 28). *Ebuses transjakarta* [Webinar].

Grutter, J. & Kim, KJ. (2019). *E-mobility options for ADB developing member countries*. Retrieved from https://www.adb.org/publications/e-mobility-adb-developing-member-countries

ICCT (2017). *Emerging best practices for electric vehicles charging infrastructure*. Retrieved from https://theicct.org/sites/default/files/publications/EV-charging-best-practices_ICCT-white-paper_04102017_vF.pdf

ICCT. (2018). *The continued transition to electric vehicles in US cities*. Retrieved from the International Council on Clean Transportation, https://theicct.org/publications/continued-EV-transition-us-cities-2018

ICCT (2019). *Electric vehicle guidebook for Indian states*. Retrieved from https://theicct.org/sites/default/files/publications/India_EV_State_Guidebook_20191007.pdf

ICCT. (2020). *Update on the global transition to electric vehicles through 2019*. Retrieved from https://theicct.org/sites/default/files/publications/update-global-EV-stats-20200713-EN.pdf

IEA (2018). *Global EV outlook 2020*. Retrieved from https://www.iea.org/reports/global-ev-outlook-2018

IEA (2019). *Global EV outlook 2019*. Retrieved from https://www.iea.org/reports/global-ev-outlook-2019

IEA. (2020). *Global EV outlook 2020*. Retrieved from https://www.iea.org/reports/global-ev-outlook-2020

IESR. (2019). *Indonesia Clean Energy Outlook: Tracking Progress and Review of Clean Energy Development in Indonesia* (Rep.). Retrieved from https://iesr.or.id/en/pustaka/iceo2020

IESR (2020). *The role of electric vehicles in decarbonizing Indonesia's road transport sector.* Retrieved from http://iesr.or.id/pustaka/the-role-of-electric-vehicles-in-decarbonizing-indonesias-road-transport-sector

Kim, KJ. (2020, August 26). *Welcoming remarks: ADB's activities on e-transport* [Webinar].

Kim, E., & Heo, E. (2019). Key drivers behind the adoption of electric vehicle in Korea: An analysis of the revealed preferences. *Sustainability*, *11*(23), 6854.

Kodjak & Meszler. (2019). *PROSPECTS FOR FUEL EFFICIENCY, ELECTRIFICATION AND FLEET DECARBONISATION.* Retrieved from https://www.globalfueleconomy.org/media/708302/gfei-working-paper-20.pdf

Li, W., Yang, M., & Sandu, S. (2018). Electric vehicles in China: A review of current policies. *Energy & Environment*, *29*(8), 1512-1524.

Mayor's Electric Vehicle Infrastructure Task Force (2019). *London electric vehicle infrastructure delivery plan.* Retrieved from https://tfl.gov.uk/modes/driving/electric-vehicles-and-rapid-charging#delivery-plan

Meszler, D., German, J., Mock, P., & Bandivadekar, A. (2016). *CO2 reduction technologies for the European car and van fleet, a 2025–2030 assessment.* Retrieved from the International Council on Clean Transportation, http://www.theicct.org/sites/default/

files/publications/EU-Cost-Curves_ICCT_nov2016.pdf

Morrison, G. (2020, August 26). *Introduction to e-mobility: Global trends and considerations for Indonesia* [Webinar].

Palm, J., & Backman, F. (2017). Public procurement of electric vehicles as a way to support a market: examples from Sweden. *International Journal of Electric and Hybrid Vehicles*, *9*(3), 253-268.

Pusat Perancangan Undang-undang Badan Keahlian DPR RI (2020). *Naskah Akademik Rancangan undang-undang tentang perubahan atas undang-undang nomor 22 tahun 2019 tentang lalu lintas dan angkutan jalan.*

Sen, B., Noori, M., & Tatari, O. (2017). Will Corporate Average Fuel Economy (CAFE) Standard help? Modeling CAFE's impact on market share of electric vehicles. *Energy Policy,* 109, 279–287. https://doi.org/10.1016/j.enpol.2017.07.008

Senate of Canada (2017). *Decarbonizing Transportation in Canada.* Retrieved from https://sencanada.ca/content/sen/committee/421/ENEV/reports/TransportationReport_FINAL_e.pdf

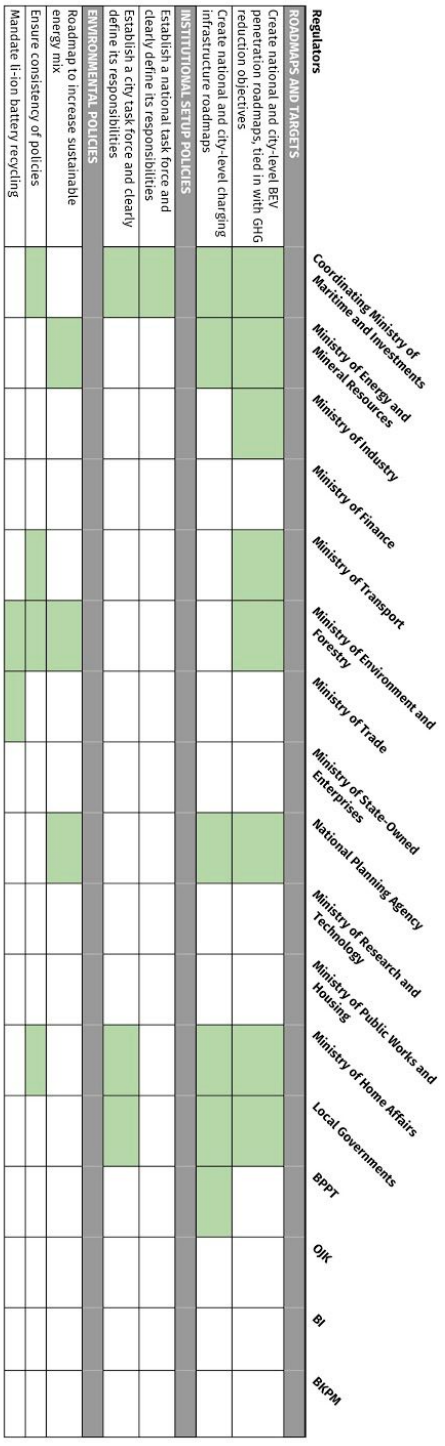
SIAM (2017). *Adopting pure electric vehicles.* Retrieved from http://www.siam.in/uploads/filemanager/114SIAMWhitePaperonElectricVehicles.pdf

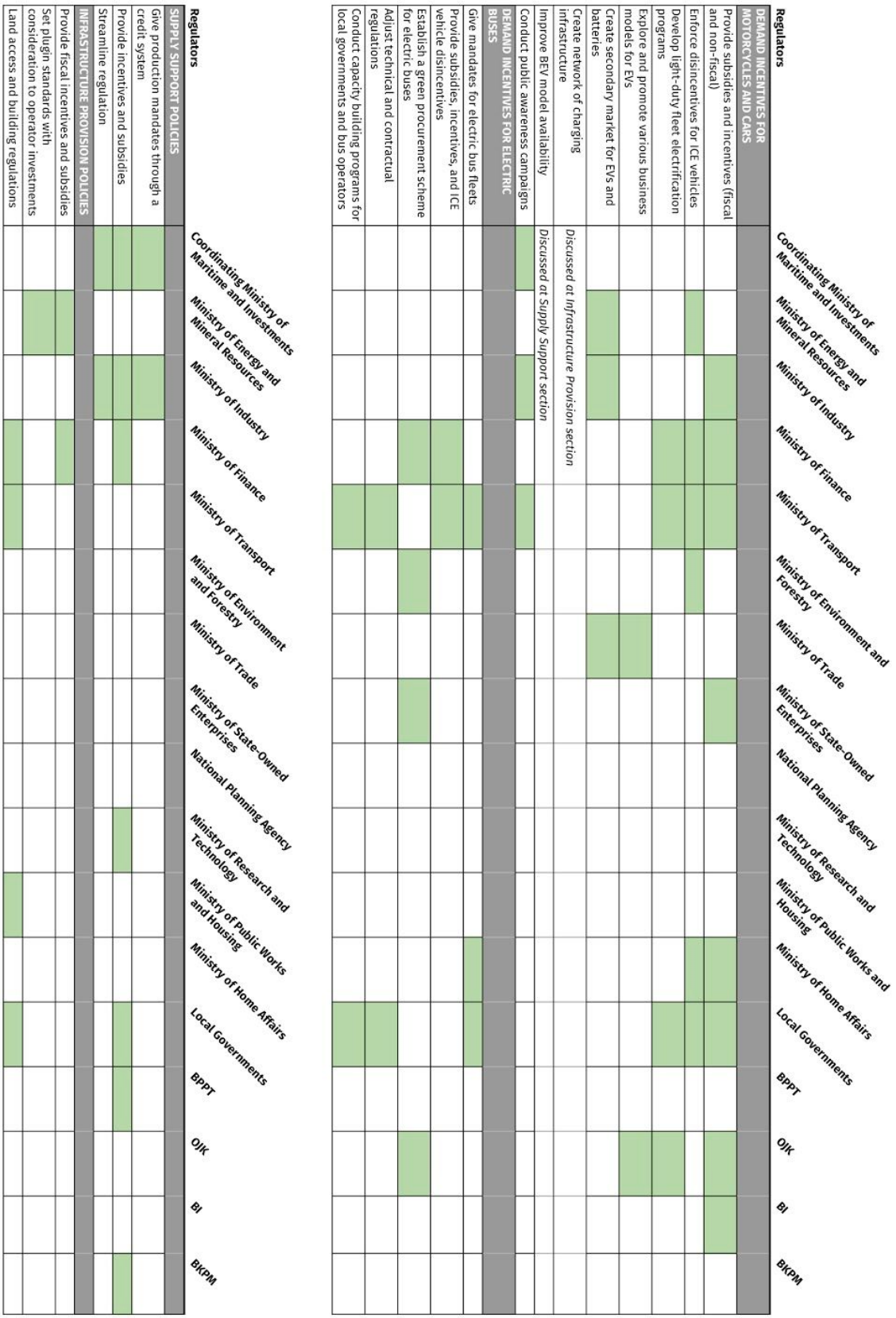
Sierzchula, W., Bakker, S., Maat, K., & Van Wee, B. (2014). The influence of financial incentives and other socio-economic factors on electric vehicle adoption. *Energy Policy*, *68*, 183-194.

SLOCAT. (2020, September 11). E-Mobility Trends and Targets. Retrieved September 30, 2020, from https://slocat.net/our-work/knowledge-and-research/e-mobility/

Solidiance. (2018). *Electric vehicles in Indonesia: The road towards sustainable transportation* (Rep.). Retrieved from https://www.solidiance.com/insights/driving/white-papers/electric-vehicle-in-indonesia-a-market-report-on-e-cars-and-e-motorcycle-in-indonesia

Annexure A. Regulator Matrix




Regulators
DEMAND INCENTIVES FOR MOTORCYCLES AND CARS
Provide subsidies and incentives (fiscal and non-fiscal)
Enforce disincentives for ICE vehicles
Develop light-duty fleet electrification programs
Explore and promote various business models for EVs
Create secondary market for EVs and batteries
Create network of charging infrastructure
Improve BEV model availability
Conduct public awareness campaigns
DEMAND INCENTIVES FOR ELECTRIC BUSES
Give mandates for electric bus fleets
Provide subsidies, incentives, and ICE vehicle disincentives
Establish a green procurement scheme for electric buses
Adjust technical and contractual regulations
Conduct capacity building programs for local governments and bus operators
Discussed at Infrastructure Provision section
Discussed at Supply Support section
Coordinating Ministry of Maritime and Investments
Ministry of Energy and Mineral Resources
Ministry of Industry
Ministry of Finance
Ministry of Transport
Ministry of Environment and Forestry
Ministry of Trade
Ministry of State-Owned Enterprises
National Planning Agency
Ministry of Research and Technology
Ministry of Public Works and Housing
Ministry of Home Affairs
Local Governments
BPPT
OJK
BI
BKPM
Regulators
SUPPLY SUPPORT POLICIES
Give production mandates through a credit system
Provide incentives and subsidies
Streamline regulation
INFRASTRUCTURE PROVISION POLICIES
Provide fiscal incentives and subsidies
Set plugin standards with consideration to operator investments
Land access and building regulations
Coordinating Ministry of Maritime and Investments
Ministry of Energy and Mineral Resources
Ministry of Industry
Ministry of Finance
Ministry of Transport
Ministry of Environment and Forestry
Ministry of Trade
Ministry of State-Owned Enterprises
National Planning Agency
Ministry of Research and Technology
Ministry of Public Works and Housing
Ministry of Home Affairs
Local Governments
BPPT
OJK
BI
BKPM

Annexure B. Stakeholder Consultation Summary

A virtual consultation workshop was conducted from August 26, 2020, to August 28, 2020, to gain inputs from stakeholders on e-mobility development in Indonesia. Both national and local stakeholders play a huge part in developing the e-mobility ecosystem in Indonesia and therefore were included as the workshop's key participants. The details of the workshop, including the methodology, findings, list of participants, and workshop minutes were presented in the "In Search of Better E-mobility Policies in Indonesia" Workshop Report document.

The stakeholder consultation workshop was followed by a series of discussions with key public institutions present in the workshop to get a more thorough understanding of their perspectives and immediate action plans.

Follow up discussion requests were made to the ministries involved in the BEV acceleration program, BPPT, PLN, and two electric bus manufacturers. Unfortunately, not all the ministries responded to the requests. Given the time constraints, in the end in total of eight discussion sessions were held through online platform: twice with the Coordinating Ministry of Maritime and Investments as the coordinator of the national BEV acceleration program, and a single session each with the Ministry of Finance, the Ministry of Home Affairs, BPPT, PLN, and two bus manufacturers (PT Mobil Anak Bangsa/MAB and Bakrie Autoparts). The detailed minutes of meetings and list of participants were submitted as separate documents. The summary of the discussions are as follows:

Discussions with the Coordinating Ministry of Maritime and Investment (CMMAI)

Two discussion sessions were held, the first was with the Infrastructure Support Industry Division on September 29, 2020 and the second was with the Maritime and Transportation Division on October 7, 2020. The key insights from the sessions are:

- The national government is directly focusing on BEV (pure electric vehicles) adoption to reduce fuel imports and to reduce dependence on foreign OEMs. As the coordinator, the CMMAI is responsible to government agencies' focus on BEV instead of also considering HEV or PHEV.
- The CMMAI currently focuses on establishing the domestic BEV industry in the short term, such as by pushing the issuance of localization rate so that there will be technology transfer and labor absorption. GHG reduction is seen as a long term objective which can be regulated or aligned later on.
- The BEV and Charging Infrastructure Roadmap is currently being developed by the relevant ministries (Ministry of Industry and Ministry of Energy and Mineral Resources).
- There will be two kinds of incentives from the Government (although the policies are still under development):

    - Incentives for industry players. The government is aiming to develop domestic BEV industries, including the battery component industry.
    - Subsidies to end-users.
- Main challenges of BEV adoption according to the CMMAI:
    - Non-technical factors, such as divided support within the government and opposition from ICE industry players
    - Over-regulation
    - Many incentive schemes do not offer any value added for BEV industries compared to ICE
- Inputs from the CMMAI:
    - Organizational efficiency should be considered in proposing a Regional Working Group Team. Instead of proposing a dedicated team, it is better to embed the duties to related existing agencies
    - Instead of proposing new regulations, several things can be regulated indirectly through market mechanisms (e.g. production and handling of waste batteries). A study can be carried out comparing case examples between over-regulated and under-regulated countries against the progress of their KBL

Discussion with the Ministry of Finance (MoF)

The discussion was held on October 8, 2020 with the Directorate General Of Budget Financing and Risk Management (DJPPR). The key insights gathered are:

- The MoF is not leading the initiatives to accelerate BEV adoption. The MoF is still waiting for specific assignments from ministries such as the CMMAI, the Ministry of Industry, Ministry of Energy and Mineral Resources, and the Ministry of Transport, to formulate fiscal incentives because the directives given for the MoF in the Presidential Regulation No. 55/2019 are still very general. In deciding the amount of a subsidy, MoF usually has a discussion with other ministries to develop the scheme. The other ministry which is involved in the sector proposes the amount of subsidy and discusses it with the Directorate of Budget.
- Fiscal policies including subsidy, tax and customs can be discussed further with the Fiscal Policy Agency (BKF) and Directorate General of Customs and Excise (DJBC)
- The financing of charging infrastructure can be done through a PPP scheme.
- Currently, local governments and ROEs are prohibited from accessing foreign funding (Article 285 of Law No. 23/2014 on Regional Government). Nevertheless, PT SMI (Sarana Multi Infrastruktur) can act as an intermediary to allocate foreign funds to ROE and local governments. PT PII (Penjaminan Infrastruktur Indonesia/Indonesia Infrastructure Guarantor) can guarantee loans for SOE, ROE, and local government.

Discussion with the Ministry of Home Affairs (MHA)

The discussion was held on October 2, 2020 with the Regional Government Affairs Synchronization Division. The key insights gathered are:

- The MHA supports the BEV acceleration program.
- The MHA will establish the Regional Working Groups when a Central Team has been formed by the CMMAI.
- Updates on the key progress by the MHA:
    - The MHA have announced a circular letter to local governments regarding the acceleration of BEV on August 27, 2020.
    - The MHA have issued MHA Decree No. 8/2020 and No. 57/2020 on Vehicle Tax and Title Transfer Tax, which allows local governments to collect lower taxes from BEV.
    - The MHA has been encouraging BEV adoption in RAD-GRK since 2017
- Main challenges faced by the MHA:
    - There is no clarity yet on the Central Team formed for BEV.
    - RAD-GRK is often not properly implemented on the city or regent level.
    - It is difficult to encourage regions to provide tax incentives, because vehicle taxes are important sources of regional income.
- Inputs from the MHA:
    - BEV adoption needs to be pushed in phases instead of directly targeting all local governments in the country.
    - It is better to prioritize the push to big cities first on the adoption of BEV as their compensation for the air pollution produced in their areas.

Discussion with the PLN

The discussion was held on October 1, 2020 with the Standardization and Technology Development Division. The key insights gathered are:

- PLN supports electric vehicles and the development of the battery industry.
- Electricity supply will not be a problem.
- Infrastructure provision challenges:
    - Difficult to make an infrastructure roadmap because there is no BEV roadmap yet
    - There has been no decision on 1 standard type of charger. Infrastructure developers must provide 3 types of chargers at once, which will increase investment costs.
    - With the current regulation on preferential electricity tariff, fast charging infrastructure projects are not yet viable.
- Inputs from PLN:
    - For private fast chargers, it is better to have an open price instead of setting a ceiling price because it is a luxury facility. However, charging rates for taxis and public transport indeed needs to be regulated to ensure lower price.

Discussion with the BPPT

The discussion was held on October 5, 2020 with the Machinery Centre and Renewable Energy Centre. The key insights gathered are:

- Battery Electric Vehicle (BEV) should be the only focus of the government to develop instead of another type of electric vehicles, such as hybrids.
- Localization rate regulation gives more opportunity to local manufacturers to blossom in the electric vehicle industry and help the localisation of electric vehicle components.
- BPPT has an initial trial of charging infrastructure operated independently to support the use of electric vehicles.
- There are a number of stakeholders that will support the development of electric vehicles, such as universities and state-owned companies.

Discussion with the Bus Manufacturers

The discussion with PT Mobil Anak Bangsa (MAB) was held on October 13, 2020 and the discussion with PT Bakrie Autoparts was conducted on October 16, 2020. The key insights gathered from the bus manufacturer companies are:

- The industry is ready, but there is no demand yet. According to the bus manufacturers, there are many issues which hamper the adoption of electric bus by bus operators, such as:
    - Unclear and overlapping regulations
    - Lack of financing options
    - Unsupportive import duty schemes
    - Instability of power supply
    - High costs of charging infrastructure installation
    - Low tarif per km offered by bus operators
    - Single-year contract limitation from the Ministry of Transportation to bus operators. The contracts are extended per year. The uncertainty of contract extensions makes financial institutions do not feel secure to finance operator investments
- The government needs to initiate actions (e.g. providing credits through SOE or ROE, providing insurance schemes for e-buses). On the other hand, the operators also need to be clear on the e-bus specification they need. Other inputs from the bus manufacturers:
    - Derivative regulations need to be issued soon by the government.
    - The government needs to mandate financing institutions to finance electric buses.
    - The government should allow multi-year contracts.

- The government should incentivize power upgrade and other utility installation costs.
- The government should give higher PSO for electric buses since they give more environmental benefits.
- The government should issue regulation on mandatory battery recycling. The battery component constitutes 40% of an EV's cost. If the battery is produced abroad it will be difficult to meet the localization regulation. Indonesia does not have lithium reserves, so it is necessary to get it from recycled batteries. It is unlikely that other countries with lithium reserves will export lithium as raw material. There needs to be a multilateral partnership scheme but it is still a long shot.
- The bus operators need to give a transparent calculation of tariff/km for bus leasing and should explore the option of passenger fare increase to provide better services.