

The consumer cost of ownership of electric passenger cars in Indonesia

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Executive Summary

The electric vehicle (EV) market in Indonesia is still at an early stage in its development, in part because the high cost of EVs deters potential buyers. While purchase price is often cited as a key obstacle to EV adoption, it is only one of many cost items that consumers consider in a vehicle purchase. Understanding the broad cost structure of EV ownership, known as the consumer cost of ownership (CCO), can help to identify solutions for overcoming cost hurdles to EV adoption.

This study analyzes a broad set of ownership costs of two comparable passenger vehicles: the most popular EV model by sales, the Hyundai Kona EV, and a similar ICE model, the Honda HR-V; both are classified as SUV-Bs. We calculated the vehicle price, including various taxes and fuel and electricity costs, for 6 years of ownership. For the EV calculation, we applied 3 different scenarios, (i) EV with luxury tax and transfer tax, (ii) EV without luxury tax, and (iii) EV without luxury tax and transfer tax. The main findings are as follows:

- » Cost parity between the Honda HR-V and the Hyundai Kona EV cannot be achieved within 6 years of ownership, even under current tax incentives, and even if the luxury tax and transfer tax are 0%, implying that other changes to the tax system are needed if EVs are to be promoted.
- » The saving in fuel costs from the Hyundai Kona EV does not provide a significant reduction in terms of the consumer cost of ownership.
- » The base price difference between the two vehicles is larger than the total tax applied to the Hyundai Kona EV, which highlights the need for more incentives for EVs.
- » Differences between showroom and base prices plus taxes reflect the different profit and commercial pricing decisions by manufacturers, which we are not evaluating in this paper.

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Regarding policy, we recommend that the government:

- » Introduce a feebate program and structure it based on fuel consumption or CO₂ emission levels. A strong tax must be levied for vehicles whose fuel consumption is above the average; fiscal rebates can be given to the most efficient models, with the highest incentive given only for zero-emission vehicles.
- » Introduce electricity fare reduction and time of day (TOD) pricing schemes. This can be implemented for both public charging and home charging. TOD can reduce the energy cost if the EVs are charged during off-peak hours when electricity prices are low.
- » Adopt a VAT exemption for EVs, especially in the early phase. The VAT exemption can be phased out as the EV market matures.
- » Provide scrapping incentives to reduce the high upfront cost of EVs. Indonesia has not yet adopted an official scrapping incentive policy. The scrapping incentive implemented in other countries has proven to be effective in spurring the penetration of EVs.
- » Require carbon taxes on fuel, especially since the Indonesian government began to impose carbon taxes in April 2022 on coal-fired power plants. A carbon tax linked to fuel price may discourage ICE use and promote the use of cleaner vehicles, including EVs.
- » Give an EV parking benefit to EV users. This can be offered by municipal or city governments. This can be in the form of free municipal paid parking zones. Jakarta, the capital of Indonesia, has integrated a vehicle registration database with the municipal parking system; thus implementation of such a policy could be done relatively soon.
- » Reduce toll fares or provide preferential access to road infrastructure to lower the consumer cost of ownership, especially for commuters who commute via toll roads daily.

Introduction

Background

Presidential Regulation (PR) No. 55/2019 was adopted in August 2019 with the aim of accelerating the uptake of battery electric vehicles (EVs) in Indonesia. As of mid-2022, there were ongoing efforts to further accelerate the uptake of EVs by the Indonesian government, via Government Regulations, Ministerial Regulations, and Governor Regulations that includes both fiscal and non-fiscal measures.¹ Indonesia's EV market is still in its infancy, with only 687 BEVs rolled out from showrooms throughout 2021. This represents 0.1% of total passenger vehicle sales.² The ICCT has previously published several documents that outline the existing policies at national and sub-national levels to analyze further challenges and new opportunities to accelerate EV uptake.

High EV upfront cost is identified by many stakeholders to be a major barrier to early EV uptake, which is why PR No. 55/2019 suggested providing fiscal incentives in several schemes. These incentives have been reflected in recent policies e.g., luxury tax reform (0% luxury tax for BEV), 0% import duty for incomplete knock down (IKD) EVs, and tax deductions or exemptions (applies to locally regulated taxes such as the transfer tax and circulation tax). The new luxury taxation set by the government of Indonesia (GOI) in 2019 was revised in mid-2022 to add more incentives including

1 Aditya Mahalana, Zifei Yang, Francisco Posada, *Indonesia transport electrification strategy*, (ICCT: Washington, DC, 2021) <https://theicct.org/publications/indonesia-electrification-strategy-oct21>.

2 Reza Pahlevi, Berapa Penjualan Mobil Listrik di Indonesia (how much is the sale of electric car in Indonesia), Databoks, 2022, Katadata, <https://databoks.katadata.co.id/datapublish/2022/04/21/berapa-penjualan-mobil-listrik-di-indonesia>.

exemption from luxury taxes for battery electric vehicles (BEV) and fuel-cell electric vehicles (FCEV).³ Despite the fiscal incentives for EVs, consumers still consider the price of EVs to be high, so the passenger vehicle segment is still dominated by internal combustion engine (ICE) vehicles.

Besides national-level policies, local governments have started to develop their own unique policies, both fiscal and non-fiscal, to increase the share of electric vehicles. An example of fiscal policies is exemption from transfer taxes (Jakarta), and discounted transfer taxes (West Java Province). Non-fiscal incentives offered by local governments include exclusion from vehicle restrictions and differentiated parking in Jakarta. An example of non-fiscal intervention is inclusion of EVs in the procurement catalogs of the government and several State-owned Enterprises (SOEs), with an aim of promoting the technology and becoming an early adopter. Other incentives related to EVs include a special bank interest rate for EV purchases using a credit scheme (Bank Rakyat Indonesia or BRI), a discount on electricity upgrades for home charging, and an option to divide the billing of electricity costs between household consumption and EV charging (State-owned electric company – PLN). The latest policy for electrification is the Presidential Instruction No. 7/2022 on the use of battery electric vehicles for government operations.⁴ Through this instruction government institutions, both central and local, must use battery electric vehicles for their operational fleets. This could be interpreted as a form of mandate for electrification.

In the latest update, in December 2022, the central government announced that it will provide subsidies for BEVs of up to IDR 80 million (~ 5,130 USD). The industry minister said that the incentives are given to encourage purchases of electric and hybrid vehicles that cover cars and motorcycles.⁵ According to the statement, the subsidy is given in an effort to reduce CO₂ emissions and simultaneously to reduce fuel subsidies and incentivize EV makers to expand their investments in the country. However, as of late 2022, the government was still holding a series of meetings with the parliament to pass the regulation.

Objective and scope

This paper focuses on taxation policy for passenger vehicles in Indonesia with these objectives: (i) to compare consumer ownership costs of comparable EV and ICE models in the same passenger vehicle (PV) segment and evaluate how the recent policies (since 2019, the year when the PR 55/2019 was issued) at the national and sub-national level for EVs will influence the cost competitiveness of EVs, and (ii) to evaluate if existing policies reduce EV cost sufficiently and recommend additional policies needed to make EVs more cost competitive. We include taxation policies at the national and local levels and incentives in terms of luxury tax and transfer tax exemptions for EVs. Non-fiscal incentives, e.g., exclusion from “odd-even” restrictions and the differentiated parking fee in Jakarta, as well as the special interest rate and discount on electricity upgrades, are not included in the consumer ownership cost calculation.

In this working paper, analysis is performed on a consumer ownership cost calculation, where two similar PV models—an ICE vehicle (Honda HRV gasoline) and an EV (Hyundai Kona EV)—are compared using various taxation scenarios. The calculation is a useful tool

3 Indonesia adopted luxury taxes for motor vehicle starting in the 1980s, with a goal of protecting low-income households, controlling luxury goods consumption, protecting small businesses and increasing government revenue. Luxury tax incentives, such as discounts, have been used to promote energy efficient cars (the low cost green car) since 2013. In 2019 the regulation was again revised to accommodate incentives for EV and CO₂ emissions then included as a criterion.

4 Instruksi Presiden (Inpres) No. 7/2022 tentang Penggunaan Kendaraan Bermotor Listrik Berbasis Baterai Sebagai Kendaraan Dinas Operasional dan/atau Kendaraan Perorangan Dinas Instansi Pemerintah Pusat dan Pemerintah Daerah [Presidential Instruction No 7/2022 on the use of battery electric vehicle for government operational vehicle], 2022, <https://peraturan.bpk.go.id/Home/Details/225262/inpres-no-7-tahun-2022>

5 Stefano Sulaiman, “Indonesia to offer \$5,000 subsidy on electric car sales,” *Reuters*, 2022, <https://www.reuters.com/business/autos-transportation/indonesia-offer-5000-subsidy-electric-car-sales-2022-12-14/>.

to break down the cost elements of vehicles and assess the impacts of various taxation policies and alternative scenarios. The consumer cost of ownership calculation is also our main tool in developing the key financial incentives needed for EVs to become more cost competitive with their ICE counterparts. The calculation visualizes vehicle taxation as well as incentives such as a discounted luxury tax and a 0% transfer tax for the Capital Jakarta region. In an overview of passenger vehicle taxation in Asian countries and the potential to drive low-emission vehicle purchases published earlier by the ICCT, several Asian countries including Indonesia were examined in terms of the taxation mechanism for passenger vehicles and regarding how taxation policies can help lower transport emissions.⁶ The approach in this working paper follows the aforementioned study, with a more in-depth review and a different selection of vehicles.

Summary of taxes for passenger vehicles in Indonesia

This working paper categorizes vehicle taxation based on the time of payment: (i) a one-time tax at vehicle acquisition and (ii) a recurring tax during the use phase. In Indonesia, the one-time tax includes the luxury tax, VAT, and transfer tax. Use-phase tax refers to the recurring annual circulation tax and mandatory road accident fund.

Luxury tax. Passenger vehicles are subject to a luxury tax in Indonesia. Started in 2013, the GOI has been providing incentives in terms of the luxury tax cut for vehicles with small engine sizes (below 1500 cc) of both diesel and gasoline-powered vehicles. In 2019 GOI enacted Government Regulation (GR) No. 73/2019 and revised it through GR No. 74/2021 in October 2021. Under the new luxury taxation scheme, in addition to the incentives for vehicles with small engines, the luxury tax is eliminated for battery electric vehicles and fuel-cell electric vehicles that meet certain local content requirements. PR 55/2019 mandated that the minimum local content (TKDN) provision be a requirement to qualify for luxury tax incentives and noted that it should increase from 40% in 2019 to a minimum of 80% in 2030. The new luxury tax also incorporates CO₂ emissions as a criterion for setting the value tax rate.

Value added tax. The legal basis for value-added tax (VAT), sometimes referred to as the goods and services tax (GST), is Act No. 8/1983; however, the act was updated in 1994 (Act No. 11/1994) and in 2000 (Act No. 18/2000); the latest revision is found in Act No. 42/2009. According to the regulation in Indonesia, both ICE vehicles and EVs are subject to the same VAT rate (10%).

Transfer and circulation tax. While the luxury tax and VAT are regulated by the central government through the Ministry of Finance, the transfer tax and annual circulation tax are regulated by provincial governments. Both taxes are regulated under Act No. 1/2022, which gives the provincial government the authority to set transfer and circulation taxes. The transfer tax is charged only once, upon transferring the ownership of the vehicle from the manufacturer to the user. The transfer tax is also charged for used vehicles or when ownership is changed to a different owner but at a much lower rate compared to new vehicles. This is a mandatory tax, and the value of the transfer tax is mentioned in every vehicle's license paper (*Surat Tanda Nomor Kendaraan Bermotor* or STNK in Bahasa Indonesia). The circulation tax is paid annually and is set at a maximum 1.2% of the vehicle's value.⁷ New vehicles can get their license plate only if the transfer tax and circulation tax are paid. The car dealer or showroom usually offers to include these costs

6 Zhinan Chen, Zifei Yang, and Sandra Wappelhorst, *Overview of Asian and Asia-Pacific Passenger Vehicle Taxation Policies and their Potential to Drive Low-Emission Vehicle Purchases*, (ICCT; Washington, 2022), <https://theicct.org/publication/asia-vehicle-taxation-jan22/>.

7 The provincial governments are responsible for setting the tax rate and for maintaining the database of vehicle value by model year. This table is updated annually, and we used this information to calculate the consumer cost of ownership. An example of this database can be found at Jakarta's one-door administration system (SAMSAT) https://samsat-pkb.jakarta.go.id/INFO_NJKB.

in their advertised showroom price. BEV and FCEV are exempted from the transfer and circulation taxes.

Road accident fund. The balance in the road accident fund is regulated based on the Ministry of Finance Regulation No. 16/PMK.010/2017; however, the legal standing of this fund is regulated by Act No. 34/1964 on Mandatory Passenger Accident Fund. The fund is divided into two parts: one consists of receipts from passengers of public transport (air, water, road, and railway transport), and the other consists of revenues collected from motor vehicle owners for new or renewed registrations. Revenues flowing to this fund come from both ICE vehicles and EVs.

Table 1 provides a detailed explanation of taxes and charges related to vehicle purchases.

Table 1. Regulations governing vehicle registration, and selected provisions

Tax scheme	National/ local	One time/ recurring	Tax rate for ICE	Tax rate for EVs
Luxury tax (PPNBM) Government Regulation No. 74/2021 on Luxury Tax for Motor Vehicle	National	One time	Passenger vehicle below 10 seats and with engine displacement below 3000 cc • CO ₂ g/km <150 (15%) • CO ₂ g/km 150 - 200 (20%) • CO ₂ g/km 200 - 250 (25%) • CO ₂ g/km > 250 (40%)	0%
Value added tax (VAT) Act No. 43/2009, which is the third update of the original Act No.8/1983 on Value Added Tax	National	One time	10%	10%
Transfer tax and Circulation Tax Act No. 1/2022 on Finance Relationship between Central and Local Governments	Local*	Transfer tax: one time Circulation tax: recurring	Transfer Tax: 12% Circulation tax: 2%	Transfer Tax: 0% Circulation tax: 0%
Road accident fund Act No. 33/1964 on Mandatory Transportation Accident Fund. Using insurance scheme run by PT. Jasa Raharja (State-owned insurance company), payable upon claim for fatal accident with casualties.	National	Recurring	IDR 143.000 (US\$ 10)	IDR 143.000 (US\$ 10)

*The rates for transfer taxes and circulation taxes are determined by provincial governments and can vary across provinces. The maximum rates are 12% for the transfer tax and 2% for the circulation tax.

Passenger EV sales compared to ICE in Indonesia

Although central and local governments have tried to accelerate the uptake of EVs since 2019, widespread introduction of EVs within the passenger vehicle market in Indonesia was started only in 2020. Hyundai was the first manufacturer to roll out a BEV lineup (Hyundai Ioniq and Kona EV), followed by Nissan (Leaf 40 kW). In mid-2022, Hyundai launched the IONIQ-5 and discontinued the Ioniq, and Wuling also introduced Wuling Air, a compact EV. There are other luxury brands such as Tesla and Lexus, but in this study, we do not look specifically at these niche brands. The Association of Indonesia Automotive Industries (GAIKINDO) reported total passenger vehicle sales of 659,806 in 2021⁸ but sales of BEVs reached only 687 that year.⁹ Grab Indonesia, one of the largest ride-hailing providers in Indonesia, also incorporated several Hyundai Ioniqs into their EV fleets. Furthermore, the company also did the total cost of ownership (TCO) calculation

8 Gbungan Industri, Kendaraan Bermotor Indonesia "Indonesian Automobile Industry Data," <https://www.gaikindo.or.id/indonesian-automobile-industry-data/>.

9 Reza Pahlevi, "Berapa Penjualan Mobil Listrik di Indonesia?," Katadata 2022, <https://databoks.katadata.co.id/datapublish/2022/04/21/berapa-penjualan-mobil-listrik-di-indonesia>.

by comparing Hyundai Ioniq EVs with an ICE vehicle.¹⁰ Note that the TCO conducted by Grab may use different assumptions and may include other costs incurred that are specific to ride-hailing operations. In Grab's TCO, the cost parity is achieved in year 9, assuming annual kilometer traveled of 70,000 km or 200 km per day. However, Grab's TCO analysis does not specify the make and model of ICE vehicles that was compared to the Hyundai Ioniq EV.

Several segments of passenger vehicles are produced and distributed for the Indonesian market, including sport utility vehicles (SUVs), hatchbacks, sedans, off-road vehicles, and multi-purpose vehicles (MPV). According to GAIKINDO's annual wholesale data, the MPV segment, particularly the 7-seater (3 rows), has the largest share in the PV fleet due to its multipurpose function, availability of parts, and, most important, its affordable price. However, there is no EV model introduced for the MPV segment. Several EV manufacturers now produce and sell their products in Indonesia, Hyundai takes the lead in Indonesia's EV market as their market share reached more than 80% as of mid-2022.¹¹ Other EV manufacturers that sell their products in Indonesia include Nissan, Wuling, and Lexus. Several others have announced their entry into the Indonesian EV market, including Mercedes-Benz and DFSK.

Approaches to calculating the consumer cost of ownership

In this working paper, we define the consumer cost of ownership as the combination of vehicle base price, VAT, one-time tax, recurring tax (annual circulation and registration tax), fuel cost (gasoline RON 92 and electricity rate for household), levies for the mandatory road accident fund and several different kinds of EV incentives. Incentive scenarios analyzed are as follows:

- » EV without luxury tax discount (not meeting minimum local content)
- » EV with luxury tax discount (meeting minimum local content)
- » EV with luxury tax discount and 0% transfer tax (only for Jakarta).

The main information used to calculate the consumer cost of ownership was compiled from primary sources. Table 2 lists the source of information for the consumer cost of ownership.

¹⁰ Uun Ainurrofiq, *Kolaborasi mewujudkan ekosistem kendaraan listrik untuk masa depan*, Grab Indonesia, September 2020, https://gatrik.esdm.go.id/assets/uploads/download_index/files/a70c2-webinar-ev-ecosystem-esdm.pptx.pdf.

¹¹ Akhmad Hanan and Budi Prayogo Sunariyanto, "Hyundai takes the driver's seat in Indonesia's EV market," the Lowy Institute 2022, <https://www.loyyinstitute.org/the-interpretor/hyundai-takes-driver-s-seat-indonesia-ev-market>.

Table 2. Information source for the consumer cost of ownership

Item	Source of information and assumptions
Vehicle model selection and price	Information from dealers, showroom, and other online sources
Vehicle specifications	Manufacturers and their dealers
Fuel price	Fuel cost at pump of RON 92 gasoline, compiled from various news articles. We assumed all gasoline vehicles are using minimum RON 92 as recommended by manufacturers.
Electricity price	Minister of Energy and Mineral Resources Circular No. T-162/TL.04/MEM.L/2022 ^a . There is no assumption made for charging prices in public charging stations.
Ownership	6 years ^b
Discount rate	5%. The assumption is registration costs and other payments are paid upfront and discount rate refers to the official statistics of the Indonesian Central Bank ^c .
Annual kilometers traveled	Assumed to be 10,000 kilometers per year ^d
Exchange rate	Exchange rate Indonesian Rupiah (IDR) to US Dollar (US\$). Using 2021 average exchange rate 1 US\$ equals to 14,100 IDR - 14.600 ^e

Notes:

^a State-owned electric company (PLN), <https://web.pln.co.id/statics/uploads/2022/06/TA-Juli-s.d-Sept-2022-3.jpg>.

^b 6 years of ownership is consistent with assumptions in the ICCT paper (Chen et al, 2022)

^c Central Bank of Indonesia, Press release 22 December 2022, https://www.bi.go.id/id/publikasi/ruang-media/news-release/Pages/sp_2435022.aspx

^d Annual miles traveled differs by country, but again, is consistent with ICCT's paper (Chen et al, 2022) where 10,000 km is used as the annual distance traveled for analyzing TCO in 18 countries.

^e Data compiled from the Central Bank of Indonesia, <https://www.bi.go.id/id/statistik/informasi-kurs/transaksi-bi/Default.aspx>

Vehicle model selection and price

For this comparative analysis, two vehicle models were selected: the Honda HRV gasoline-powered vehicle and the Hyundai Kona EV. As described earlier, although the top-selling passenger vehicle segment is MPVs, we selected the SUV-B segment for analysis because no EV is offered in the MPV segment. We selected Hyundai Kona because it is the highest-selling BEV passenger vehicle in 2021. Originally, for a better comparative analysis, we intended to compare Hyundai Kona EV with its gasoline version. However, due to poor sales, Hyundai ended distribution of the Kona gasoline version after selling only 205 units between April 2019 and May 2021.¹² Therefore, for the calculation, we used a similar vehicle from SUV segment B, the Honda HRV.

Prior to the second half of 2021, only a limited number of the EV passenger vehicles typically used for daily purposes by general users were on Indonesia's roads. Premium brands such as Tesla and BMW are also present. For the PV segment, Hyundai was the first to introduce its EV line (the Hyundai Ioniq and Hyundai Kona EV). Nissan released Leaf EV 40 kW to the Indonesian market in the second half of 2021. The Nissan Leaf EV, the Hyundai Ioniq EV, and the Kona EV shared similarities in various parameters, for example regarding price, battery capacity, and range per single charge. They are also targeting the same market segment.

Honda HRV. The Honda HRV was introduced in the Indonesian market in 2014. Honda added the HRV to compete for market share in the SUV segment B. The vehicle is assembled locally in Indonesia, and it comes with two engine displacement options, 1.5 L and 1.8 L, and the 1.5 L version comes with continuously variable transmission (CVT).

12 [Cintamobil.com](https://cintamobil.com), "Pantas Setop, Ternyata Segini Penjualan Hundai Kona Bensin" (Why it is stopped, here is how much Hyundai Kona gasoline sales), 2021, <https://cintamobil.com/pasar-mobil/pantas-setop-ternyata-hanya-segini-penjualan-hyundai-kona-bensin-aid17194>

This configuration makes the HRV a powerful compact SUV in Indonesia. According to Honda Prospect Motor Indonesia, total sales of first generation Honda HRVs is 208,749 units.¹³ As of March 2022, Honda launched the second generation HRV, which we use in this study.

Hyundai Kona EV. Hyundai Motors Indonesia officially launched its BEV models, the Ioniq electric and Kona electric, in the 4th quarter 2020. These two models became Hyundai's first BEVs for the Indonesian market. The model used in this study is imported (CBU), however, Hyundai announced that it has invested US\$ 1.55 billion to develop its manufacturing facility in the ASEAN Region and is expected to start commercial production by the second semester of 2021 with a maximum production capacity of 250,000 units per year. The manufacturing facility in Indonesia is expected to be able to supply the main markets in the ASEAN Region.¹⁴ Kona EV is classified as SUV segment B with a usable battery capacity of 39.2 kWh and is claimed to have a range of 250 km.¹⁵

Table 3. Vehicle purchase price and specification

Vehicle	Price (USD)	Price (IDR)	Rated power (kW)	Displacement	Battery capacity (kWh)	CO ₂ emissions (g/km) WLTP
Honda HRV	26,420	382,900,000	89	1498 cc		148
Hyundai Kona EV	51,198	667,200,000	100	Electricity consumption: 143 Wh/km	42 (usable 39.2)	

Information on vehicle price and specification were taken from the manufacturer's website; however several values such as rated power and CO₂ emissions were converted to the aforementioned metrics.

Fuel Price

Gasoline-powered passenger vehicles make up the majority of Indonesia's vehicle fleets. Three types of gasoline are distributed in Indonesia by the State-Owned Oil Company PERTAMINA: RON 90, RON 92, and RON 98. PERTAMINA dominates the fuel market in Indonesia; nevertheless, several smaller fuel retailers also sell RON 92, 95, and 98. Most ICE vehicle manufacturers recommend using a minimum RON 92, especially for newer vehicles. However, due to the price gap between the subsidized RON 90 and non-subsidized RON 92/RON 98, many vehicle owners prefer to use RON 90. The fuel price shown here is taken from January to October 2022 for Pertamina RON 92 distributed to Jakarta.¹⁶

13 Dwi Wahyu, Grid Oto, "Sejarah Honda HR-V di Indonesia, SUV yang Laris Manis Sejak Lahir," 2022, <https://www.gridoto.com/read/223201981/sejarah-honda-hr-v-di-indonesia-suv-yang-laris-manis-sejak-lahir?page=4>.

14 "Hyundai Indonesia," <https://www.hyundai.com/id/id/hyundai-story/hyundai-indonesia>.

15 Electric vehicle database, Hyundai Kona Electric, 39 kWh; <https://ev-database.org/car/1422/Hyundai-Kona-Electric-39-kWh>.

16 PERTAMINA is the largest fuel distributor in Indonesia and the fuel price is different across regions due to logistics costs. Other fuel retailers in Indonesia include Shell, BP, and Vivo.

Table 4. Average Pertamina RON 92 price, January to October 2022, Jakarta

Month	Price per liter (USD)	Price per liter (IDR)
January	0.62	9,000
April	0.86	12,500
May	0.86	12,500
June	0.86	12,500
July	0.86	12,500
August	0.86	12,500
September	1	14,500
October	0.95	13,900
Average (January - October)	0.81	11,790

Electricity price

The electricity price per kilowatt hour in Indonesia is set by the central government. There are several classifications for home/domestic use, ranging from 900 volt-ampere (VA) to 6,600 to 200,000 VA. However, all these groups, except the 900 VA, have a basic electricity price of IDR 1,444.7 (0.1 USD per kWh). We assume that EVs are charged at home. Currently, there are some incentives to reduce charging costs, such as discounts on electricity upgrades and the option to separate charging and household electricity consumption. In March 2022, PLN provided a 30% discount on electricity for home charging in the hours between 10 p.m. and 5 a.m., which can reduce the cost of charging from IDR 1,444.7 (0.1 USD) to IDR 1.100 (0.07 USD) per kWh.

Calculation results

Consumer cost of ownership calculations

The consumer cost of ownership calculation was made using the parameters mentioned earlier and by following the methodology laid out in section 3. The calculations are meant to provide a better understanding of the various cost elements of a car purchase and operational costs such as fuel and annual taxes that are summed to reflect the total cost for six years of ownership. Figure 1 below shows the three vehicle models selected under different tax and incentive schemes.

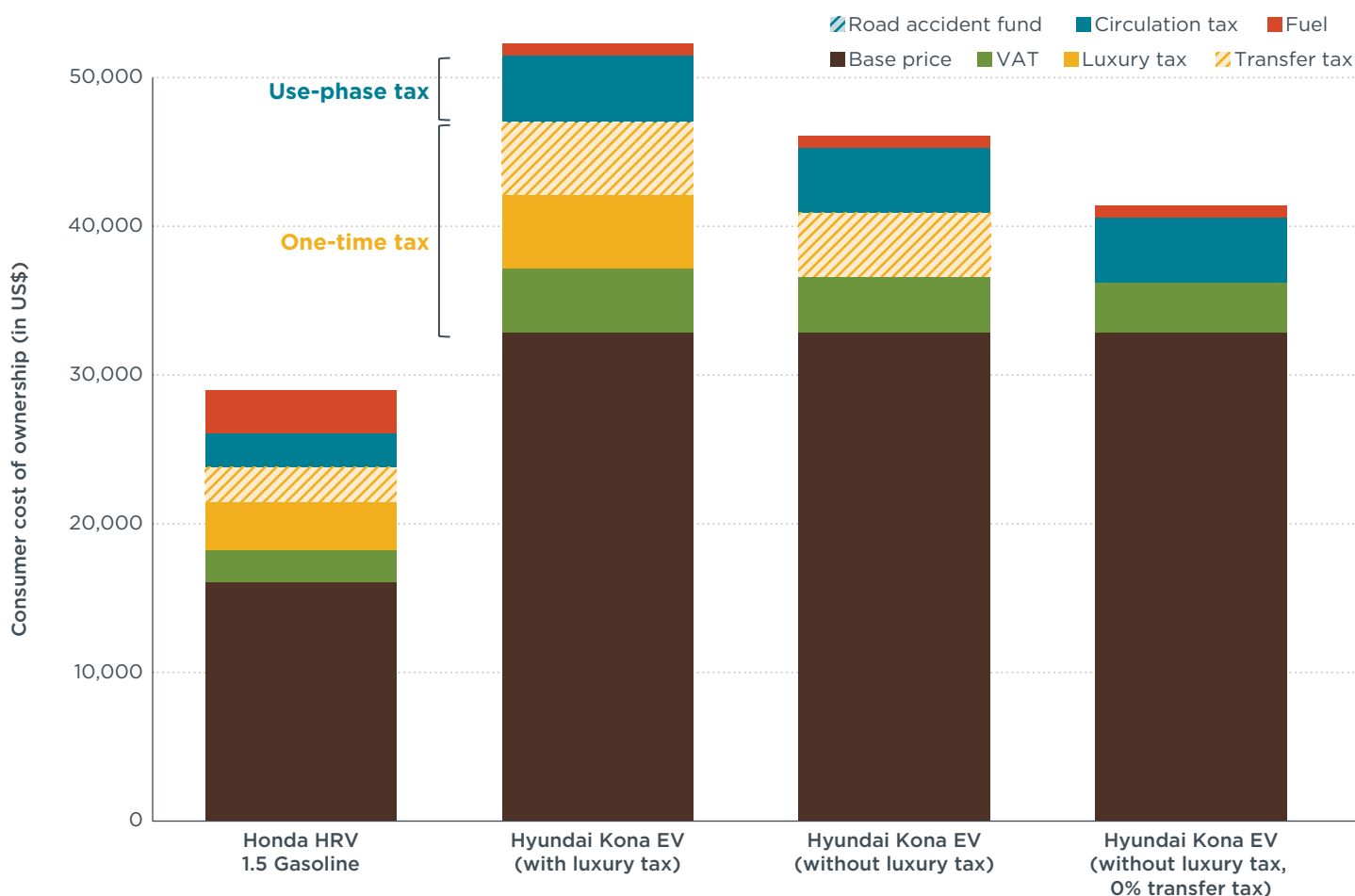


Figure 1. Consumer cost of ownership calculations for three vehicle models under different EV tax and incentive schemes

The base prices for all three models used in the consumer cost of ownership calculation were taken from the Ministry of Interior Regulation No. 40/2021. By using the base prices provided by the regulation, we calculated in sequence the luxury tax, VAT, road accident fund, transfer tax and circulation tax. We also compiled information from the dealers, although detailed information such as vehicle base price could not be obtained, and all promotional materials showed only the showroom price and financing options.

Table 5. Comparison of base price and fuel cost

Cost component	Honda HR-V	Hyundai Kona
Base price	USD 16,000 IDR 232,000,000	USD 32,828 IDR 476,000,000
Fuel cost	USD 2,925 IDR 42,126,088	USD 903 IDR 13,094,077

Figure 1 shows the comparison of the two vehicle models with different tax and incentive schemes. The Honda HR-V consumer cost of ownership includes all taxation elements and for Hyundai Kona EV, three different tax and incentives scenarios are applied: (i) with luxury tax, (ii) without luxury tax, and (iii) without luxury tax and 0% transfer tax—this is when the vehicle is registered in Jakarta. By using this comparison, the following conclusions were drawn:

- » Cost parity between the Honda HR-V and Hyundai Kona EV cannot be achieved within 6 years of ownership, even under current tax incentives, and even if the luxury tax and transfer tax are 0%.

- » Even with lower fuel costs compared to the gasoline-fueled Honda HR-V, the consumer cost of Hyundai Kona EV is higher.
- » The base price difference between the two vehicles is larger than the total tax applied to the Hyundai Kona EV, which highlights the need for more incentives for EVs.
- » Differences between showroom and base prices plus taxes reflect the different profit and commercial pricing decisions of the manufacturers, which we are not evaluating in this paper.

Under the luxury tax scenario, the total one-tax burden for these two vehicles ranges from 30% - 43%. The luxury tax is still the highest tax component, accounting for up to 20% of the consumer cost of ownership. In this calculation, the Honda HR-V is subject to a 20% luxury tax, while the EV is subject to 15%. The second-highest tax component is the transfer tax, which contributes to approximately 13% of the vehicle price when newly purchased. The removal of the transfer tax for EVs, which is already being implemented in Jakarta, is helpful to reduce further the consumer cost of ownership. The VAT is set to be 10% for all vehicles.

The base price of the Honda HR-V is less than half the price of the Hyundai Kona EV. Although we have noted that there are additional margins taken by the manufacturer within the calculation, in this study we do not investigate further pricing policies set by manufacturers such as margin or profits and other associated costs.

Based on the calculation, even without the taxes, the Hyundai Kona EV would not reach cost parity with the Honda HR-V over six years of ownership. Savings from fuel usage over the first 6 years of vehicle ownership also would not give significant benefit in terms of the total cost of ownership.

The core obstacle to broad EV penetration of the Indonesian market is the high base price. Therefore, we have listed several feasible fiscal incentives to bring down the consumer cost of ownership of the Hyundai Kona EV (as well as other EVs that are distributed in Indonesia) in the near term. In the long term, it is assumed that the EV cost will decrease as the technology matures and production scales up.

Policy recommendations

This working paper provides an overview of the vehicle taxation structure in Indonesia and visualizes the portion of each tax using different schemes across the two vehicle models. It is clear from the consumer cost of analysis calculation for private passenger vehicle owners that the taxation system has more impact on the six-year total cost than fuel costs have.

Feebate program—taxing gas guzzlers and rewarding efficient vehicles. Indonesia levies the luxury tax on both ICE vehicles and EVs. For ICE vehicles, depending on the gram CO₂ emissions per kilometer and engine displacement, the luxury tax rate could be as high as 95%. The GR 74/2021 offers a 0% luxury tax for EVs (BEV and FCEV). Beginning in 2022, the central government also offered a 0% import duty incentive for incomplete knockdown EVs.

Feebate systems impose a fee on vehicles with high CO₂ emissions or high levels of fuel consumption and simultaneously provide a rebate to vehicles with low CO₂ emissions and fuel consumption. EVs with no emissions would be eligible to benefit from these systems. Furthermore, feebate systems can be designed to be revenue-neutral and they are an especially good option for developing or transitional countries that import vehicles, or that have not yet adopted standards. This would make the feebate systems appropriate for Indonesia, where almost all passenger car EVs in the market are imported. Furthermore, only vehicles produced domestically qualify for EV direct subsidies under the government plan.

The feebate should ideally be structured based on fuel consumption or CO₂ emission levels, data for which are not available in the country. Lessons from global best practices suggest that a strong tax must be levied for vehicles consuming fuel or emitting CO₂ at levels well above the average.¹⁷ However, for a country where fuel consumption or CO₂ emission standards are not in place, it is better to set a “cutoff” level that is aligned with policy ambition. Fiscal rebates (e.g., incentives) can be given to the most efficient models, with the highest incentive for zero-emission battery electric vehicles. The program can be designed in a way that is self-sufficient, i.e., the revenue collected from the pool of fuel-inefficient vehicles would fund the rebates for the most-efficient and zero-emission vehicles.

VAT exemption. Leading countries for EV adoption include VAT exemptions in their subsidy scheme. In Norway, one of the leading countries has implemented VAT exemption and it has proven effective in accelerating the EV transition. However, when the Norwegian government announced that they would remove EV subsidies, the first to fall was the VAT exemption on EVs costing more than 500,000 kroner (equivalent to US\$ 47,500) as of 1 January 2023.¹⁸ Traditionally, tax exemptions are applied to basic human needs and thus the tax authority considers any tax exemption to cause VAT inefficiency, which subsequently distorts the economy. However, in order to achieve a specific target, for example the transition to electric vehicles, this kind of policy is needed.

Incentives for vehicle scrapping. A scrappage incentive policy could potentially be adopted to reduce the consumer cost of ownership of EVs. An example of this policy is the car scrappage scheme in the UK, where vehicle owners could be given £1,000 to £5,000 to trade in their old cars for less polluting, newer models, including electric cars.¹⁹ However, the amount of compensation varies depending on emission rating, type of vehicle, and vehicle age. The French government temporarily increased its scrappage incentive as part of the COVID-19 stimulus package with up to 6,000 euros offered for purchase of a new EV.²⁰ Furthermore, the scrappage incentive would benefit commercial fleets such as taxis, ride-hailing vehicles, buses, and trucks as the cost burden for fleet renewal increases each year while the price per kilometer of service is regulated by the government and does not keep pace with the increasing price of new vehicles. Lastly, as more polluting vehicles can be replaced with EVs through scrapping schemes, this measure will also subsequently contribute to cleaner air quality and help city governments to expand low-emission zones or even introduce zero-emission zones.

Carbon taxes for fuel. Since mid-2021, there have been ongoing efforts to introduce a carbon tax in Indonesia. The GOI will begin to impose a carbon tax starting in April 2022 for coal-fired power stations using a tax mechanism based on emission limits, or cap and tax. The implementation of this policy is expected to reach all sectors in the economy to reduce national GHG emissions.²¹ While the introduction of a carbon tax in Indonesia’s tax code was the first milestone, as a next step, the GOI plans to finalize a presidential decree on the economic value of carbon and develop a carbon tax and carbon exchange technical mechanism. A carbon tax linked to the price of fuel may raise fuel prices and thus discourage vehicle travel and encourage the use of cleaner vehicles including EVs. However, it also risks being rejected by citizens.

17 The VAT rate in Indonesia is relatively low compared to India (28%), Hungary (27%), and Croatia (25%). Even if EVs are given full exemption from VAT in the near term, their relative advantage is only 10%; thus to further increase EV’s advantages, the per gram fee under the feebate mechanism needs to be steep.

18 [Electrive.com](https://www.electrive.com/2022/05/13/norway-to-remove-vat-exemption-for-pricey-electric-cars/), “Norway to remove VAT exemption for pricey electric cars”, <https://www.electrive.com/2022/05/13/norway-to-remove-vat-exemption-for-pricey-electric-cars/>.

19 [Autotrader.co.uk](https://www.autotrader.co.uk/content/news/car-scrappage-scheme-uk?refresh=true), “Car scrappage scheme UK 2022 – 2023,” <https://www.autotrader.co.uk/content/news/car-scrappage-scheme-uk?refresh=true>.

20 Peter Sigal, “France extends EV incentives until July 2022,” *Automotive News Europe*, 2021, <https://europe.autonews.com/automakers/france-extends-ev-incentives-until-july-2022>.

21 “Indonesia to Impose Carbon Tax in April 2022, Starting with Coal Power Plants, October 2021,” *The Jakarta Globe*, <https://jakartaglobe.id/business/indonesia-to-impose-carbon-tax-in-april-2022-starting-with-coal-power-plants>.

EV parking benefit. Countries in Europe such as Germany, through the Electromobility Act, allow cities and municipalities to create preferential benefits for EVs in terms of free parking and vehicle access. In Poland, BEVs are exempt from parking fees in municipal paid parking zones.²² In Indonesia, Jakarta has integrated the vehicle registration database with the municipal parking system, allowing parking benefits for EVs to be implemented. Furthermore, in 2021 the Government of Jakarta mandated that motor vehicles that do not pass vehicle emission tests are subject to paying the highest parking rate.

Reduced fares on toll roads. Several countries have implemented free or preferential use of road infrastructure, including toll roads.²³ Indonesia has invested heavily in road infrastructure in the last 5 years to connect more cities on the island of Java and Sumatra, with an aim to promote economic growth and improve the flow of goods and traffic. Many commuters also have relied on toll roads, especially those that connect metropolitan cities and their surrounding suburbs. Therefore, waivers on toll roads would help to overcome cost barriers to EV adoption and will subsequently spur demand for EVs.

Electricity fare reduction and time of day (TOD) pricing. The GOI could consider reducing electricity tariffs for EV charging and developing “time of day” charging pricing schemes. This could potentially be applied to public charging or home charging. Since 2020, PLN has offered EV users the option to separate electricity bills for charging and for household use. There is even an option to install a dedicated meter for home charging. The pricing policy for EV charging will also contribute to a lower consumer cost of ownership for EVs. The calculation showed that electricity costs over the six-year period are relatively low for private EV users; this electricity cost will be significantly different when applied to ride-hailing since typical ride-hailing vehicles travel 7 times more than an average vehicle. Ride-hailing is also having high reliance on public charging during daytime hours; depending on public charging costs, it can cost 3-5 times more than home charging. Furthermore, ride-hailing drivers also pay an opportunity cost while waiting for charging.

Time of day tariffs reduce the energy costs of EV users, as long as they are charged during off-peak hours where electricity prices are low. TOD tariffs are not available yet to EV consumers in Indonesia, because the country currently lacks advanced metering infrastructure (AMI) and the necessary regulatory framework. TOD tariffs are adopted in other regions (e.g., Shenzhen, China) where electricity tariffs are divided into peak, normal, and valley prices. Electricity during valley hours (11 p.m. to 7 a.m.) costs less than half as much as during peak hours.²⁴ This would require additional technical coordination with PLN to develop and implement the AMI expansion across cities.

Table 6 provides the suggested tax structures and incentives that could be adopted by national and local authorities to close the TCO gap between ICE and EVs.

22 Sandra Wappelhorst, Kyle Morrison, Agora Verkerswende, 2022, “Charge, Set, Go!, Electrifying Urban Transport in Germany and Poland,” https://theicct.org/wp-content/uploads/2022/03/Agora-Verkehrswende_Charge_Set_Go.pdf.

23 Sandra Wappelhorst, Dale Hall, Mike Nicholas, Nic Lutsey, *Analyzing Policies to Grow the Electric Vehicle Market in European Cities*, (ICCT: Washington, 2020).

24 World Bank, “Electrification of Public Transport: A Case Study of the Shenzhen Bus Group,” working paper (Washington, DC: World Bank, June 30, 2021), <https://openknowledge.worldbank.org/handle/10986/35935>.

Table 6. Suggested policy intervention to accelerate EV cost parity with other ICE passenger vehicles in Indonesia (order based on priority)

Recommended policy intervention	Priority	Term	National level	Local level
Fee-bate scheme (combination of tax exemption and subsidy)	High	Long	x	
VAT exemption	High	Short	x	
Compensation for vehicle scrapping	High	Long	x	x
Carbon tax for fuel	Medium	Long	x	
Electricity fare reduction, and time of day (TOD) tariff	High	Long	x	
EV parking benefit	Medium	Short		x
Reduced toll road fare	Medium	Short	x	

Closing and summary

This study reviews capital, fiscal, and operational cost elements that are key to understanding and comparing the consumer cost of ownership of ICE vehicles and EVs in Indonesia. Our findings demonstrate that existing policies in Indonesia are not strong enough to make EVs competitive with conventional vehicles and to increase their market share. To illustrate the impact of various tax schemes, we selected the Honda HR-V and the Hyundai Kona EV and quantified the taxes levied on those models. The following conclusions were drawn based on the calculation of the consumer cost of ownership:

- » **One-time taxes on new vehicles consisting of the luxury tax, VAT, and transfer tax have the biggest potential for creating tax reduction benefits for EVs.** Elimination of these tax elements could also be regarded as a short-term measure, as the GOI could gradually re-introduce these taxes once EVs have penetrated the market. Also, a full tax exemption may not be sufficient to achieve cost parity, and therefore a feebate system could be paired with the exemption to greater effect.
- » **Current local content requirements are not being met by all EVs.** Most passenger EVs are imported and only a handful of local manufacturers benefit from the domestic-oriented fiscal incentives. The local content restrictions are not seen to protect EV manufacturers, but instead have put the price of EVs out of reach of most Indonesians. This would eventually add to the high base price of EVs in Indonesia. Lowering the import duty could be a short-term relief measure, and emphasis should be made to simultaneously introduce ZEV mandates or sales quotas on manufacturers of EVs. Such regulations could have the effect of stimulating market competition and lowering consumer prices.
- » **There is no mandatory vehicle scrapping scheme in Indonesia.** An introduction of a vehicle scrapping compensation policy aimed at favoring low-emission vehicles exclusively, particularly EVs, could further reduce the high upfront cost and attract the interest of both individual and commercial buyers.
- » **Purchase incentives are needed, especially at the early stage of EV transition.** Our calculation shows that several benefits to owners could potentially be reduced, including the annual circulation tax exemption, free municipal parking, and reduced toll road fare. Best practices from other countries suggest that these owner incentives can effectively close the cost gap between EV and ICE, but they should be regarded as short-term measures.
- » **Electricity fare reductions are needed.** The government should also consider introducing a time-of-day tariff program for electric vehicle users to ensure that EVs get the most affordable rate for their charging. This would require investment to provide advanced metering infrastructure for consumers.
- » **Consumers should be informed directly about the tax benefit of EV purchases to increase the impact of the taxation system.** A complicated and non-transparent taxation system is difficult for consumers to understand and could influence their

decision when purchasing a new vehicle. A comprehensive communication strategy that directly informs consumers about existing tax benefits and planned additional policies that reduce taxation at the purchase and ownership phases for EVs will maximize the impact of the taxation system as financial information is one of the key elements that drive consumers' decision-making. Information concerning incentives and other benefits could be displayed on the vehicle at the showroom, in advertisements on the manufacturer's website, and/or on a consumer platform.

- » **Zero-Emission Vehicle (ZEV) mandate should be strengthened.** If all recommended actions mentioned above are implemented, the expectation is that in the long term the consumer cost of ownership will decrease as EV sales and local production align with demand. Subsequently, the mandate for EV purchases as laid out in Presidential Instruction (PI) No 7/2022 on the use of battery electric vehicles for government operations should be strengthened. We believe this mandate could be extended to cover most of public transport (taxis, ride hailing, and urban buses).

Only limited studies looking at taxation and fiscal policies for EVs are available in Indonesia. The consumer cost of ownership in this study could be regarded as an exercise to highlight the numerous opportunities to use fiscal policies as an effective instrument to lower the cost of EVs. All the recommendations and suggestions are aimed at initiating changes to the existing taxation scheme in Indonesia to favor the transition to electric mobility and a low-emission vehicle fleet. This study is also the first developed by ICCT that looks specifically at the challenges for EV penetration in Indonesia.

Although we have suggested several recommendations to boost EV penetration of the vehicle market in Indonesia, a proper taxation system that could provide continuous fiscal incentives while maintaining stable government revenue flows would need further comprehensive studies. The ICCT will complement this first part of its study of the consumer cost of ownership with a separate calculation for ride hailing fleets, as we know that vehicles used as ride hailing fleets run 7-10 times more than the average vehicle, thus making the cost at the operational phase significantly different from the operational cost for individual users. Lastly, the ICCT will further investigate the valuation of non-fiscal incentives such as exclusion from vehicle restrictions, and how this would impact the consumer cost of ownership.