



Decarbonization of Transport:

EV & EV Battery Development Plan in Indonesia

KPMG Indonesia
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Foreword

KPMG Indonesia is excited to present our first publication focusing on the emergence of electric vehicles (EV) and the opportunities that this development presents.

Countries globally have begun addressing climate change through electrification plans as a way to meet their Paris Agreement Goals for 2050. Global governments and automakers are rushing to invest in various parts of the EV supply chain, with particular focus on securing battery production.

Indonesia has aligned itself with global developments in EV adoption, aiming to become a major global player by building an end-to-end domestic supply chain for EV batteries. Indonesia has remarkable advantages and is strongly positioned to succeed: it is equipped with the world's largest nickel reserves and a robust nickel industry, as well as government support through incentives, programs and the involvement of state-owned enterprises (SOEs) in the entire upstream-downstream supply chain. The roadmap for EV battery development (including energy storage systems) until 2026 has also been planned.

Indonesia also has a large and growing domestic market and EV presents a once in a century opportunity for large parts of the EV manufacturing value chain to be based in the country, thereby increasing value added, building energy independence and creating high value jobs for Indonesians. This will require significant policy, market and skill development efforts from the public and private sector.

We hope this report will contribute to the thinking in building a sustainable future in transportation in Indonesia.

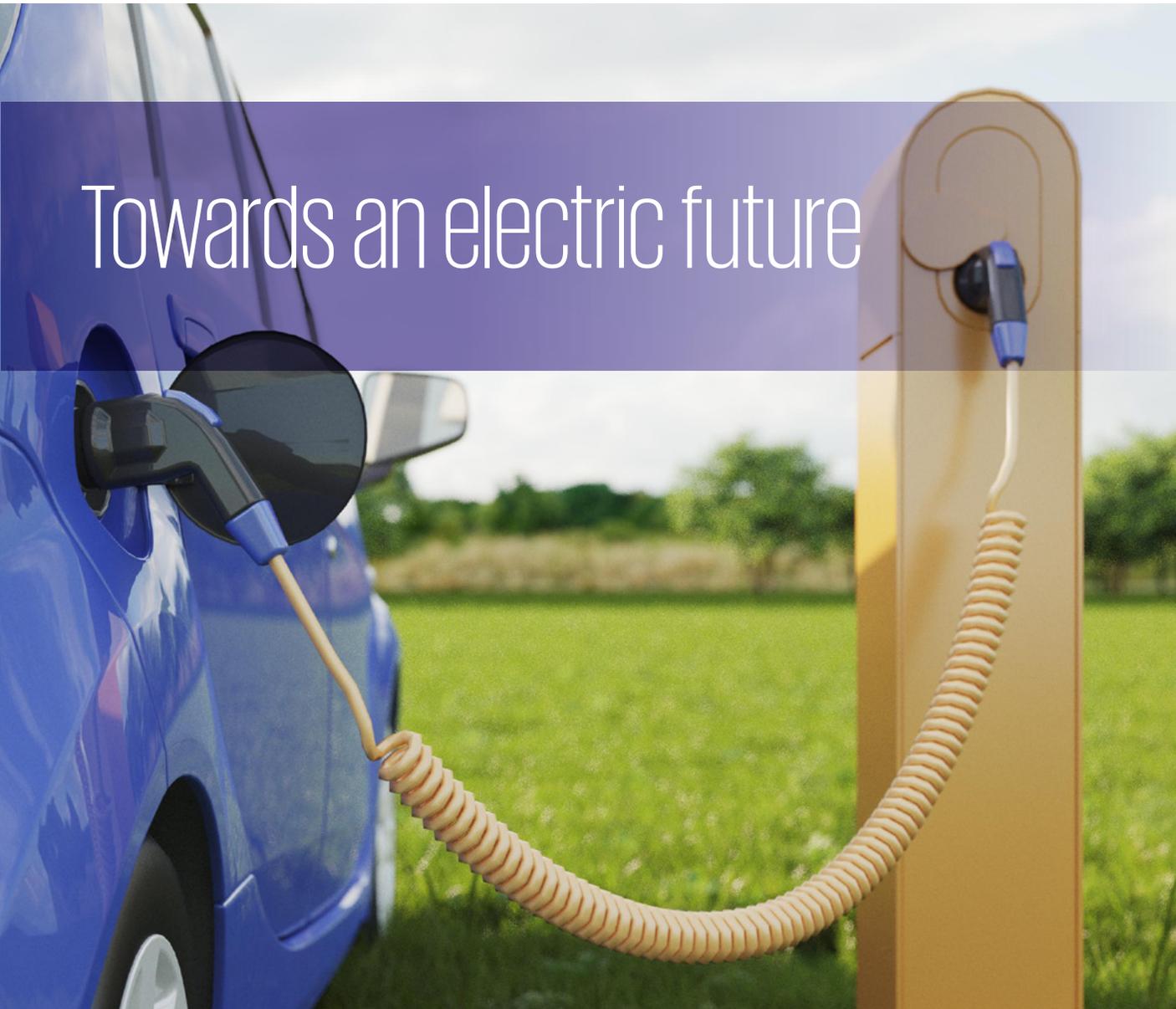


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Towards an electric future



Global trends

Demand for EV have recently seen an uptick in global growth, mainly driven by governments' ambitions to reduce GHG emissions and prevent serious impacts of climate change. Transportation is reported to contribute 14 percent of global GHG emissions,¹ and the urgency to act was further strengthened by the 2015 Paris Agreement in which signatory countries pledged their commitments to mitigate climate change by reducing GHG emissions.

Automotive industry players have begun massively investing in the development and procurement of EVs and EV batteries. In 2019 alone, global automakers spent at least US\$300 billion. The investments are largely driven by German automaker Volkswagen, with China, which has been heavily promoting sales and production of EVs through government programs, receiving more than 45 percent of the sum.²

The era of the internal combustion engine (ICE) is surely ending soon, but the timeline remains uncertain. The automotive industry is projected to be dynamic and produce multiple types of vehicles, not just EVs and battery electric vehicles (BEVs) in the future. The main challenges for this uncertain future are the infrastructure and electrical supply. Approximately 4 billion people live in countries with inadequate EV infrastructure and even in wealthy economies the electric grid is not yet ready for high volume EV usage.

However, forecasts are for nearly 40 million units per year of excess ICE manufacturing capacity globally by 2030, excluding the multiplier effect on other stakeholders within the supply chain. There will be a large structural change with new competitors taking market share, value chains shattered, and supply chains reconfigured, and companies will need to be agile and adaptable to these changes.

¹ FAO, Greenhouse Gas Emissions from Agriculture, Forestry, and Other Land Use, <http://www.fao.org/3/i6340e/i6340e.pdf>

² Reuters, <https://graphics.reuters.com/AUTOS-INVESTMENT-ELECTRIC/010081ZB3HD/index.html>

The industry's current trajectory makes the forecast feasible. In the past three years, the top ten auto makers plus Tesla have invested about US\$200 billion in EVs and have introduced many new models. Furthermore, this US\$200 billion does not include the estimated US\$60 billion that has been invested in startups, small automakers and parts suppliers.

Traditional motor vehicles are a leading source of carbon emissions, and with increasing evidence of climate-change impact and rising political pressure, regulators are encouraging BEV adoption across vehicle fleets or even outright ICE bans. Thus far, seventeen countries have announced mandates to stop sales of ICE vehicles, starting as early as 2026. Other pro-BEV policy measures include industry mandates to automakers to make BEV models available, financial incentives for buyers, subsidized charging infrastructure and campaigns to increase consumer awareness.³

With the automotive industry rapidly adopting EVs, demand for lithium ion batteries has also grown accordingly. By 2035, the global energy storage market is expected to reach US\$546 billion in annual revenue, of which mobility-related energy storage (i.e. rechargeable lithium ion batteries for transportation) is predicted to contribute 74 percent.⁴

With such a clear trajectory towards EV adoption, global players are rushing to take part in the global value chain for EVs and EV batteries. Governments have begun taking concrete action to support local development of some (or even all) of the main sectors of the EV and EV battery supply chain:

- Mining;
- Smelting & refinery;
- Production of battery chemicals;
- Lithium ion battery manufacturing (cell, module, pack); and
- Electric vehicle manufacturing.

Countries such as Indonesia, Thailand and Vietnam are capable of contributing to upstream processes, such as mining, smelting and refinery and production of battery chemicals due to high nickel reserves and countries' goal to be EV giants. With this window of opportunity, these countries are capable of controlling the world's supply chain for providing raw materials or even downstream manufacturing.

The positions of China and ASEAN in the global EV market

China

China accounts for nearly 50 percent of worldwide sales and has the top spot in the EV market. Considering its current position and strong focus on expanding in the EV market, the International Energy Agency (IEA) estimates that by 2030, two out of three vehicles sold in China across all models will be electric. Also, about 60 percent of all bus sales, nearly all two-wheeler sales and more than 10 percent of total truck sales will be electric.

China is moving to extend its EV success into international EV markets and with a supportive policy and production capacity, foreign manufacturers, including BMW and Tesla, have already started setting up manufacturing hubs in China to fulfill international demand. On top of that, some local brands are also expanding to developed countries, which indicates the strong emergence of Chinese brands on the global map.

Since 2014, the Chinese government (both state and local) has offered various incentives to support EV market growth through programs and policies for facility planning, construction and operation, land acquisition, power access and electricity price. For instance, in 2015 the state council released guidance on expediting the construction of EV charging infrastructure which not only laid down set targets but also called for public private partnerships to develop charging infrastructure.⁵

China's position in the global EV market



Source: KPMG Singapore, Decarbonisation of Transport: The Journey of Electric Vehicles in ASEAN, April 2021

³ KPMG Global, Place your billion-dollar bets wisely: Powertrain strategies for post-ICE automotive industry

⁴ Lux Research, Global Energy Storage Market Forecast 2019, <https://www.luxresearchinc.com/hubfs/Lux%20Research%20-%20Global%20Energy%20Storage%20Market%20Forecast%202019%20-%20press.pdf>

⁵ KPMG Singapore, Decarbonisation of Transport: The Journey of Electric Vehicles in ASEAN, April 2021

ASEAN

The region has developed attractive policies towards foreign players to provide a push to the EV market. However, China has an advantage compared to other countries due to the ASEAN-China Free Trade Agreement (FTA).⁶

Country	Status snapshot
Brunei	<ul style="list-style-type: none"> Launched the Brunei Darussalam National Climate Change Policy (BNCCP) recently. The BNCCP focuses on 10 key areas including EVs, with targets to be implemented in the next 15 years. Brunei is reportedly considering growing the share of EVs to 60 percent of total vehicle sales.
Malaysia	<ul style="list-style-type: none"> The National Automotive Policy 2020 does not explicitly call out the incentives and the support the government will provide to EV makers. Original Equipment Manufacturer (OEMs), however, has managed to push the government to reconsider its EV policy.
Singapore	<ul style="list-style-type: none"> Singapore had 1,125 electric cars in early 2020, accounting for only 0.18 percent of total vehicles. The country has announced that it will phase out ICE vehicles by 2040. The government plans to extend more incentives to drive EV adoption in coming years. The country will develop 60,000 charging points by 2030 at public car parks and private premises. The government has announced its decision to stop issuing licenses for diesel-powered cars and taxis in 2025, five years ahead of its initial plan of 2030. In October 2020, Hyundai invested S\$400 million (US\$301 million) in an innovation center in the country to develop new technologies and produce electric cars. The plant is expected to be completed by the end of 2022 and will have an annual production capacity of 30,000 EVs.
Thailand	<ul style="list-style-type: none"> Thailand is one of the leading EV markets in Southeast Asia. As of 2020, the country had about 2,854 EV registration — a surge of 380 percent from 2018. The number of hybrid and plug-in hybrid EVs reached 153,184. In November 2020, Thailand had about 647 charging stations held by 10 service providers. Moving forward, the country is planning to manufacture about 1.2 million EVs and establish 690 charging stations by 2036.
The Philippines	<ul style="list-style-type: none"> The use of EVs is limited in the country but the number of e-motorcycles, e-jeeps and e-utility vehicles have been increasing. The EV market has about 54 manufacturers/importers, 11 parts manufacturers, 18 dealers/traders and nearly 19 charging stations.

Country	Status snapshot
Vietnam	<ul style="list-style-type: none"> Vietnam is a promising e-motorbike market as the country's middle class is increasing and it has 96 million motorbike riders. The country is making strong strides in the EV space: <ul style="list-style-type: none"> VinFast, the first domestic car maker in Vietnam, is expected to kickstart production of its first electric models this year and will target the US and Europe in 2022. The company has agreed to a joint venture with LG Chem of South Korea to manufacture lithium-ion batteries. However, the expansion in EV infrastructure will put additional pressure on the country's already strained grid. As one of the fastest growing economies in Asia, Vietnam is increasingly becoming more dependent on imported energy to support its economic growth.

The growing appetite for EVs in ASEAN and lessons learned from China has encouraged member states to invest in battery manufacturing capabilities. Though many countries in this region are adopting EVs, the prospect of the market depends on developing adequate charging infrastructure, which is currently a challenge in many parts of ASEAN.⁷

Strategies in ASEAN

To leverage this opportunity and combat challenges presented by EVs, some countries have taken measures that can be followed by other countries in the region or elsewhere.

- In Singapore, a joint venture between Singapore Power Group (SP Group) and Hyundai has been formed. This has resulted the JV to produce about 200 vehicles at attractive prices.
- In Thailand, Energy Absolute, an electric services company, established and operates 1,000 EV charging stations.⁸

Indonesia trends

Indonesia aspires to become a hub for EV manufacturing, with an aim to export 200,000 electric cars by 2025 –nearly 20 percent of the one million cars exported by the country each year.

In 2019, nearly 15,500 units of electric two-wheeler motorcycles and about 24 electric passenger vehicles were sold.⁹

⁶ Ibid

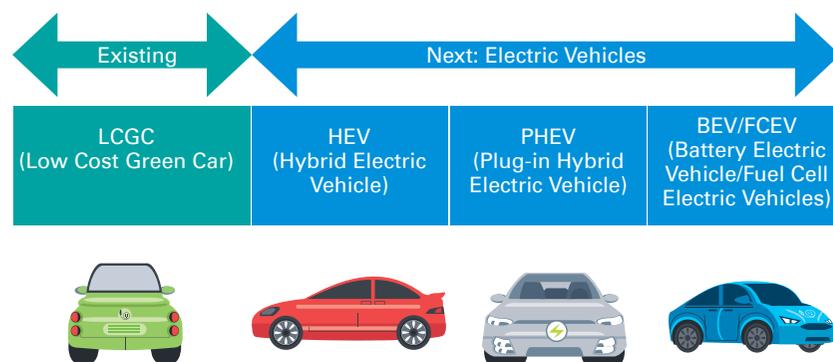
⁷ Ibid

⁸ Ibid

⁹ Ibid

The fight against climate change is a key focus area for Indonesia. In addition to being a Paris Agreement signatory, Indonesia has also ratified its national commitments for reduction of GHG emissions in the Nationally Determined Contributions (NDC), first published in 2016. Under the NDCs, Indonesia aims to reduce GHG emissions by 29 percent against the 2030 business-as-usual scenario or by 41 percent, if international assistance is available.

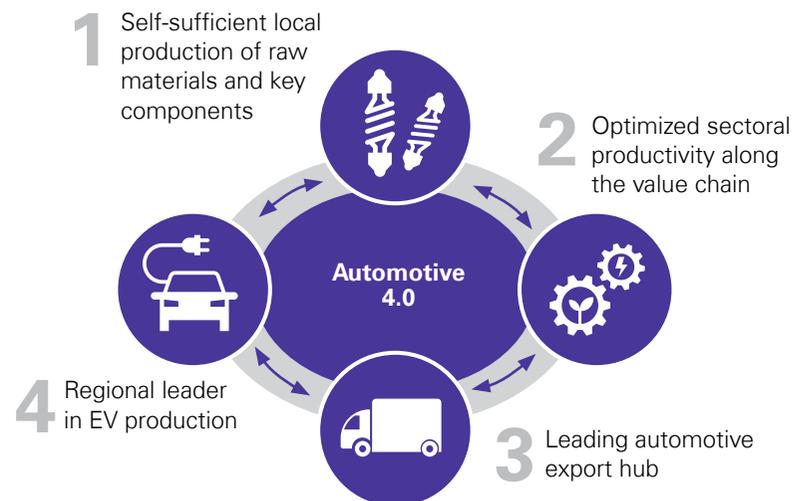
Indonesia has aligned with global efforts to adopt EVs as a means to tackle GHG emissions. The government plans to introduce EVs to the public under the Low Carbon Emission Vehicles (LCEV) scheme:¹⁰



Overview	Low carbon emission vehicle	Mostly fuel-powered, but uses small battery packs to improve fuel efficiency	Optimize battery powered, but uses a fuel-powered generator (range extender)	Full-electric vehicles that are completely battery/ fuel cell powered
Energy Source	Gasoline/diesel	Gasoline/diesel	o Gasoline/diesel o Electricity	Electricity/ hydrogen
Infrastructure Requirements	Pump station (available)	Pump station (available)	Pump station + charging station (alternative)	Charging station/ hydrogen station (required)

Source: Ministry of Industry, *Memacu Investasi Energi Bersih Dalam Mendukung Transformasi Menuju Sistem Energi Rendah Karbon di Indonesia*

By 2030, the government aims to meet the following key goals:



Source: Ministry of Industry, *Memacu Investasi Energi Bersih Dalam Mendukung Transformasi Menuju Sistem Energi Rendah Karbon di Indonesia*



¹⁰ Ministry of Industry, *Memacu Investasi Energi Bersih Dalam Mendukung Transformasi Menuju Sistem Energi Rendah Karbon di Indonesia*, <http://iesr.or.id/wp-content/uploads/2019/11/Presentasi-Dirjen.-ILMATE-IESR-171219.pdf>



Policy landscape for EV adoption

EV policy initiatives in Indonesia

The Indonesian government has solidified its support for the development of the domestic EV industry through several policies and regulations. The most notable regulation is Presidential Decree No. 55/2019, which firmly cements the development of the domestic EV industry as a national priority, stemming from government efforts to increase national energy efficiency and achieve clean, renewable energy in accordance with commitments to reduce GHG emissions.

To accelerate development, the decree outlines fiscal and non-fiscal incentives to EV industry players:

Fiscal incentives	Non-fiscal incentives
<ul style="list-style-type: none">• Import duty incentives for Completely Knock Down (CKD) and Incompletely Knock Down (IKD) EVs• Tax incentives based on emissions and engine capacity of the EVs• Tax incentives and tax holidays for imports of materials and machinery for EVs• Incentives for research & development• Incentives for certification of human resources within the EV battery industry• Incentives for certification of EVs, EV batteries and EV-related products	<ul style="list-style-type: none">• Exceptions for limitations on road usage• Rights for production of EV-related technology and products whose license/ patents are held by the central/regional government

Parliament is currently discussing a renewable energy bill which aims to expand the use of renewable energy and reduce dependence on fossil fuels. It will also promote R&D in technology and offer incentives for more sustainable energy sources, which will be used for EVs.¹¹

¹¹ Eurasia Group newsletter, Greater policy support for integrated electric vehicle supply chain will have its drawbacks

In addition, the Indonesian government has announced rules to remove loan down payment requirements for the purchase of green vehicles while also easing rules on lending, risk calculation and credit assessments to increase the accessibility of loans for purchasers of electric cars. These measures are intended to boost demand for EVs now and in the coming years. Moreover, the country has also stopped the export of unprocessed nickel ore to maintain an adequate supply of the metal for use in upcoming domestic battery chemical plants.

Currently, Indonesia is strategizing to create an integrated EV supply chain by attracting OEMs, setting up a state-owned battery maker and boosting lithium ion battery manufacturing. By focusing locally, Indonesia will retrofit current motorcycles with electric engines so that the job losses created by the displacement of ICEs are absorbed in local manufacturing.¹²



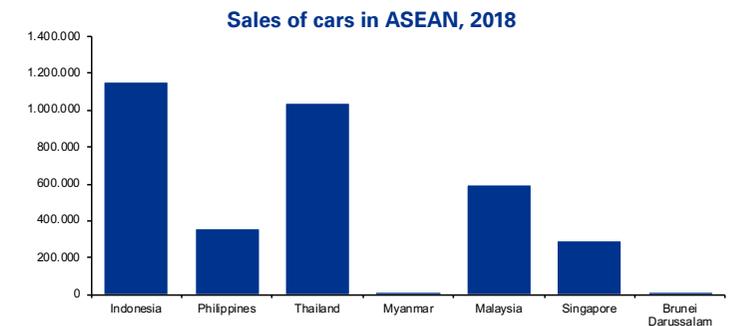
¹² KPMG Singapore, Decarbonisation of Transport: The Journey of Electric Vehicles in ASEAN, April 2021

Building an ecosystem to supercharge EV growth

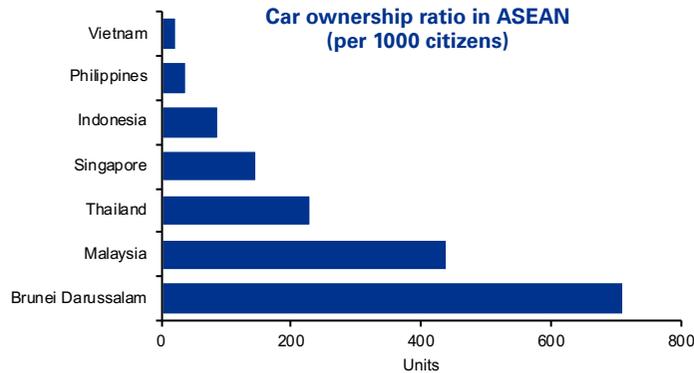
Automotive market in Indonesia

Indonesia is the largest auto market in the ASEAN region, with 32 percent of the regional market. However, as of 2018, the car ownership ratio in Indonesia is significantly lower than the rest of the region, at 87 cars per 1000 citizens. Therefore, there is a large potential for growth within the domestic automotive industry.

Sales of cars in ASEAN, 2018	
Indonesia	1,151,284
Philippines	357,410
Thailand	1,041,739
Myanmar	17,524
Malaysia	598,714
Singapore	288,683
Brunei Darussalam	11,226



Car ownership ratio in ASEAN (per 1000 citizens)	
Brunei Darussalam	711
Malaysia	439
Thailand	228
Singapore	147
Indonesia	87
Philippines	38
Vietnam	23



Indonesia is also a major auto exporter to more than 80 countries globally. The automotive and automotive spare part industries ranked as third and fourth biggest contributors, respectively, among the country's exports during 2016 to Q3 of 2019. This illustrates how Indonesia has a robust foundation to take part in the global value chain for EVs.

Top 5 Export contributors for Indonesia, 2016-Q3 2019		
Rank	Industry	Export proceeds
1	Base metals for iron and steel	IDR18.84 billion
2	Base metals and precious metals for other non-iron products	IDR17.03 billion
3	Four wheel/more vehicles	IDR13.37 billion
4	Spare parts and accessories for four wheel/more vehicles	IDR9.31 billion
5	Machinery for general use	IDR7.59 billion

Source: Ministry of Industry, *Memacu Investasi Energi Bersih Dalam Mendukung Transformasi Menuju Sistem Energi Rendah Karbon di Indonesia*

Automotive manufacturer plans in Indonesia

In accordance with global developments and government initiatives, car manufacturers have begun publicizing their plans for EV manufacturing and sales in Indonesia.

Toyota

Toyota Astra Motor has confirmed that it plans to begin domestic production of EVs by 2022 with Toyota Manufacturing Indonesia.¹³ Toyota's current EV lineup includes HEVs, PHEVs and BEVs. However, HEVs will be prioritized for production based on the company's demand forecasts.

Hyundai

Hyundai has begun construction of an EV manufacturing plant in Delta Mas, Cikarang.¹⁴ The company expects to begin EV production in 2022 for domestic sales.

Mitsubishi

Mitsubishi will develop two vehicle models, namely the Xpander hybrid and plug in hybrid sport utility vehicle (SUV).¹⁵ According to the Ministry of Industry, Mitsubishi has pledged to invest an additional US\$778 million by the end of 2025.

Honda

Similarly, Honda is also planning to increase its investment by US\$361 billion through 2021, move production to Indonesia, build a new EV model which will be exclusively manufactured in Indonesia and add 31 export destination countries.

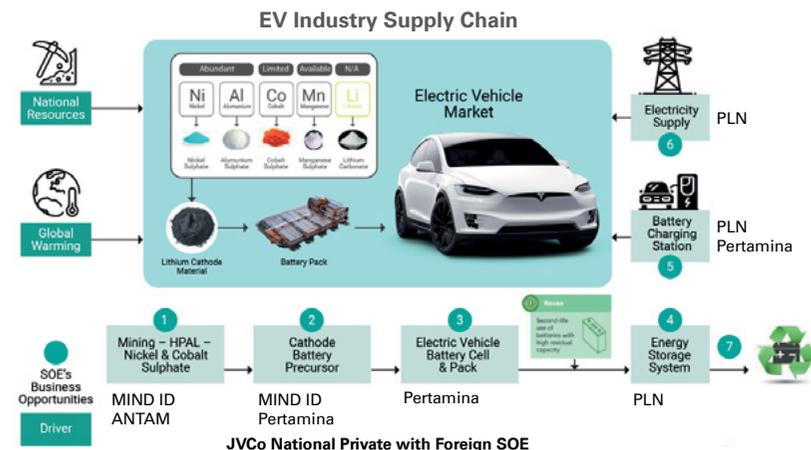
Suzuki

Suzuki has also expressed plans to increase investment in Indonesia by US\$83.36 million to develop mild hybrid vehicles.¹⁶

Government plans to support EV battery manufacturing

In supporting domestic EV development, the government plans to create a domestic end-to-end EV battery supply chain, given that the country has a large reserve of nickel, which is a key raw material for the production of lithium ion batteries.

The projected supply chain involves several state-owned enterprises (SOEs) (see the section on Indonesia Battery Corporation, page 10):



Source: Ministry of Energy and Mineral Resources, *Peluang Investasi Nikel di Indonesia*

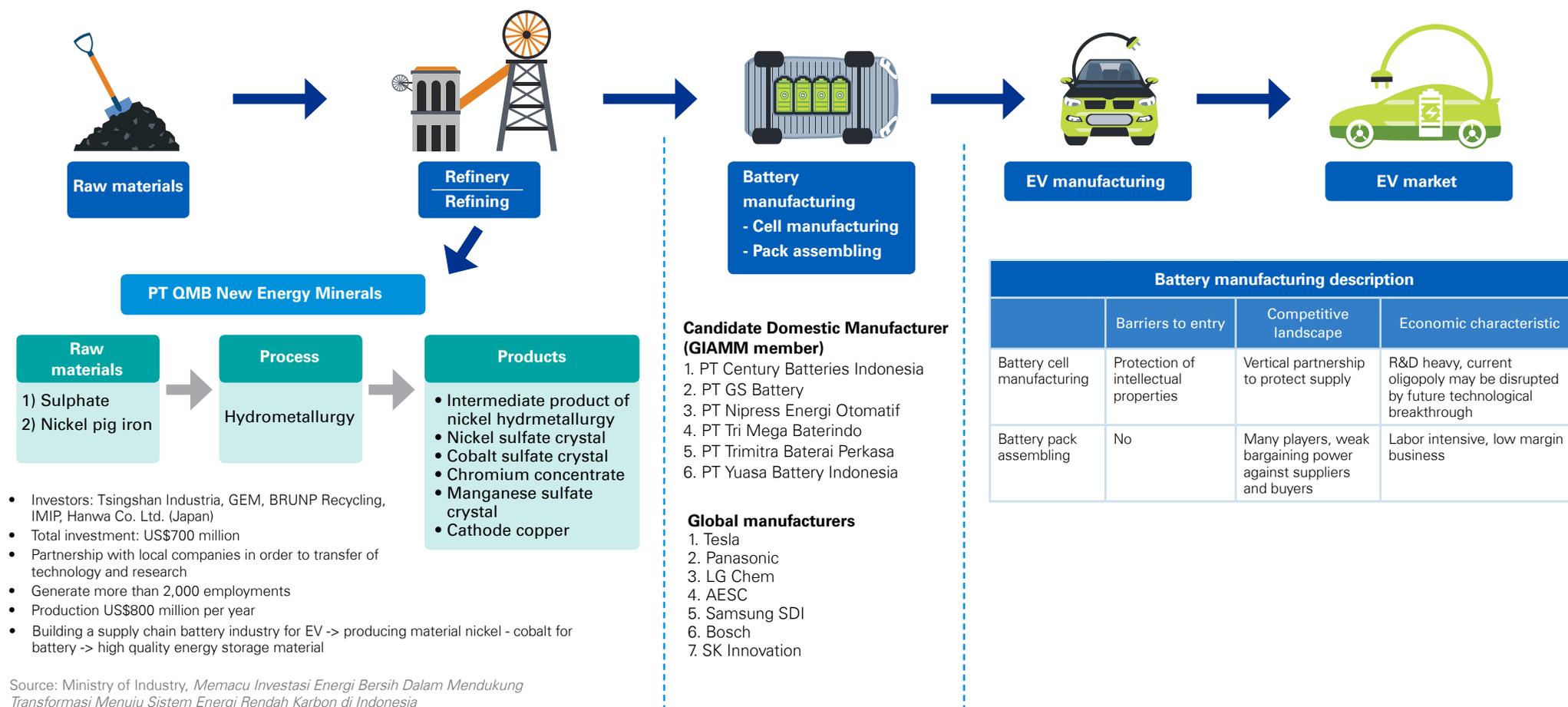
¹³ Kontan, *Toyota targetkan produksi mobil listrik di Indonesia mulai tahun 2022*, published 9 December 2020, <https://industri.kontan.co.id/news/toyota-targetkan-produksi-mobil-listrik-di-indonesia-mulai-tahun-2022>

¹⁴ CNBC, *Hyundai: Pabrik Mobil Listrik di Bekasi Mulai Produksi 2022*, published 16 November 2020, <https://www.cnbcindonesia.com/tech/20201116144534-37-202153/hyundai-pabrik-mobil-listrik-di-bekasi-mulai-produksi-2022>

¹⁵ Liputan 6, *Kembangkan Mobil Listrik, Mitsubishi Siap Investasi Rp 11,2 Triliun di Indonesia*, published 10 March 2021, <https://www.liputan6.com/bisnis/read/4503377/kembangkan-mobil-listrik-mitsubishi-siap-investasi-rp-11-2-triliun-di-indonesia>

¹⁶ Eurasia Group newsletter, Greater policy support for integrated electric vehicle supply chain will have its drawbacks

Indonesia already has a robust nickel industry, complete with operational smelters and processing infrastructure, as well as international partnerships with major players, such as Tsingshan Industrial from China. Below is an illustration of how Indonesia's existing nickel industry will support the planned EV battery manufacturing plants:¹⁷



QMB New Energy Minerals is a joint venture between Indonesia, China and Japan (comprising GEM Co. Ltd., Brun Recycling Technology Co. Ltd, Tsingshan Industrial, PT IMIP and Hanwa). The company is based in Morowali Industrial Park, Central Sulawesi and focuses on processing nickel laterite to supply raw materials for production of lithium ion batteries for EVs. The partnership between Indonesia and the other countries is also expected to enable the transfer of technology and expertise to the local industry.

¹⁷ Ministry of Industry, *Memacu Investasi Energi Bersih Dalam Mendukung Transformasi Menuju Sistem Energi Rendah Karbon di Indonesia*, <http://iesr.or.id/wp-content/uploads/2019/11/Presentasi-Dirjen.-ILMATE-IESR-171219.pdf>

Indonesian nickel industry

Indonesia is positioned to become a major player within the EV battery supply chain due to its local reserves of nickel, which is a key raw material in the production of lithium ion batteries used for EVs.

Indonesia has the largest nickel reserves in the world, comprising 52 percent of global nickel reserves at 72 million tons. This is followed by Australia (15 percent), Brazil (8 percent), Russia (5 percent) and others (20 percent). In 2019, Indonesia was ranked as the biggest producer of nickel ore globally, contributing 30 percent (800,000 tons) of global nickel ore production (2,668,000 tons).¹⁸

As of 2020, Indonesia has 292 IUP (Izin Usaha Pertambangan/mining permits) with 12 active operating smelters and 4 KK (Kontrak Karya/contract of work). Most of the concessions are located in Sulawesi, as the island hosts most of the national nickel reserves.

Operational IUPs and KKs in Indonesia		
No	IUP	Location
1	PT Antam Tbk	South Konawe, Southeast Sulawesi
2	PT Aneka Tambang Halmim	East Halmahera, North Maluku
3	PT Fajar Bhakti Lintas Nusantara	Central Halmahera, North Maluku
4	Bintang Delapan Mineral	Morowali, Central Sulawesi
5	Bintang Delapan Energi	Morowali, Central Sulawesi
6	PT. Gebe Sentra Nike	South Konawe, Southeast Sulawesi
7	PT. Trimegah Bangun Persada	Central Halmahera, North Maluku
8	PT. Gane Permai Sentosa	South Halmahera, North Maluku
9	PT. Mulia Pacific Resources	North Morowali, Central Sulawesi
10	PT. Itamatra Nusantara	Morowali, Central Sulawesi
11	PT. Waniatira Persada	South Halmahera, North Maluku
12	PT. Vale Indonesia	Morowali, North Luwu, Kolaka, North Kolaka

Source: Ministry of Energy and Mineral Resources, *Peluang Investasi Nikel Indonesia*

¹⁸ Ministry of Energy and Mineral Resources, *Peluang Investasi Nikel di Indonesia*, <https://www.esdm.go.id/assets/booklet/tambang-2020/Booklet-Nikel-FA.pdf>

¹⁹ Wood Mackenzie, Indonesian nickel ore ban: who will fill the supply gap?, www.woodmac.com/news/opinion/indonesian-nickel-ore-ban-who-will-fill-the-supply-gap/

Nickel ore export ban

Indonesia introduced its nickel ore export ban on 30 August 2019 with effect from 1 January 2020. The ban was introduced with the following goals in mind:¹⁹

- To preserve Indonesia's nickel ore reserves for the rapidly growing domestic nickel pig iron (NPI) and smelting industries
- To boost domestic lower grade ore processing, which can support domestic EV battery development and other nickel value-added product industries to build a full nickel supply chain.

The announcement of the export ban caused sharp increases in nickel ore prices, with the three-month nickel contract on the London Metal Exchange reaching its highest price/ton in nearly five years.²⁰

The nickel ore export ban was predicted to impact Chinese NPI industry players the most, as nickel ore is a key raw material for NPI and Indonesia accounted for 40 percent of China's total ore imports. Consequently, the ban was predicted to lower Chinese NPI production by 6.2 percent compound annual growth rate (CAGR) through 2025, even with alternative nickel ore supply from the Philippines.²¹

Indonesia implemented a nickel ore export ban previously in 2014, which resulted in Tsingshan, a major Chinese stainless-steel manufacturer, to invest in Indonesia's downstream sector through the Morowali Industrial Park for nickel processing and NPI production. Thus, the new nickel ore export ban can also be expected to result in additional foreign investment to strengthen domestic value-added products, decreasing Indonesia's economic reliance on raw materials.

In April 2020, the Indonesian nickel miners' association (APNI) proposed to the government a relaxation of the nickel ore export ban to cushion the impact of COVID-19 on the global nickel industry. However, this was rejected. The government relaxed exports of other minerals through the revision of the mining law in June 2020, but kept the nickel ore export ban in place.²²

The nickel ore export ban was met with criticism from the European Union (EU), claiming that the ban violates free trade and restricts EU steel producers' access to raw materials needed for stainless steel production. This creates an unfair advantage for Indonesian producers, and greatly harms the EU's efforts.

²⁰ Nasdaq, Indonesia announces nickel ore export ban starting in January 2020, published 2 Sep 2019, <https://www.nasdaq.com/articles/indonesia-announces-nickel-ore-export-ban-starting-in-january-2020-2019-09-02>

²¹ DBS, Nickel and battery: a paradigm shift, published 17 Sep 2020, https://www.dbs.com/in/sme/aics/templatedata/article/generic/data/en/GR/102020/201021_insights_nickel_battery.xml

²² Reuters, Indonesia nickel ore export ban to remain -mining ministry director, published 4 June 2020, <https://www.reuters.com/article/indonesia-mining-idUSL4N2DH17Q>

As of January 2021, the EU has filed WTO panel request against the export ban, which the EU deems as illegal. The EU initially filed its complaint in Nov 2019 followed by a period of consultations from 30 January 2020, but the discussions ultimately failed to resolve the issue. Indonesia has stated that it is ready to maintain its position despite opposition, claiming that the ban was largely introduced for preservation of reserves and to boost Indonesian participation in global value chains.²³

Government plans for the upstream nickel industry

The government plans to strengthen the national upstream nickel industry through:²⁴

- Adding 19 new operational nickel smelters by 2023
- Constructing battery manufacturing plants for nickel cobalt mangan (NCM) and nickel cobalt aluminium (NCA) type batteries for national EV development
- Supplying NPI, which is a low-grade ferronickel alternative that is cheaper than pure nickel, to the stainless-steel industry.



Opportunity for nickel investment

Even though Indonesia already has a number of operational smelters and industrial complexes for nickel, the country still has a considerable amount of nickel greenfield, which poses an opportunity for further foreign investment.

Indicators	Sulawesi	Maluku	Papua
Green field	77%	43%	98%
Nickel reserves	2.6 billion tons	1.4 billion tons	0.06 billion tons
Industrial complexes	Morowali, Konawe, and Bantaeng	Weda	None

Source: Ministry of Energy and Mineral Resources, *Peluang Investasi Nikel di Indonesia*

Potential for nickel industry growth

The government's plans to create an integrated EV battery ecosystem encompassing the upstream-downstream value chain means that Indonesia shows great potential to become a global nickel hub. Nineteen new nickel smelters are expected to begin operations by 2023, which will increase Indonesia's NPI production capacity by 12 percent CAGR during the period 2019-2025. Consequently, Indonesia's share of global NPI production is expected to double from 36.5 percent in 2019 to 67.3 percent in 2025.²⁵

Production of stainless steel, of which nickel is a key raw material, is also expected to grow. Tsingshan, a major Chinese stainless-steel producer, will be injecting capital into its stainless-steel plants in Indonesia. It is also investing in the construction of a carbon steel factory in Central Sulawesi with a capacity of 4-5m tons annually.²⁶

The supply of nickel sulphate is also expected to grow, backed by supportive government policies on investment and expansion, which are expected to result in additional growth in the supply of nickel sulphate.²⁷

²³ Indonesia Window, Indonesia to settle nickel export ban dispute with EU, published 16 January 2021, <https://indonesiawindow.com/en/indonesia-to-settle-nickel-export-ban-dispute-with-eu/>

²⁴ Ministry of Energy and Mineral Resources, *Peluang Investasi Nikel di Indonesia*, <https://www.esdm.go.id/assets/booklet/tambang-2020/Booklet-Nikel-FA.pdf>

²⁵ DBS, Nickel and battery: a paradigm shift, published 17 Sep 2020, https://www.dbs.com/in/sme/aics/templatedata/article/generic/data/en/GR/102020/201021_insights_nickel_battery.xml

²⁶ Ibid

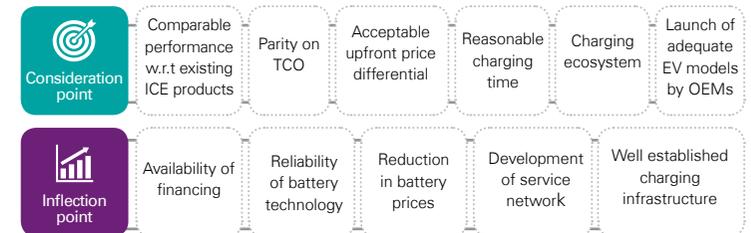
²⁷ Ibid

Tracing the EV growth story

Key considerations for enabling EV adoption

“Consideration point” and “inflection point” are two important factors that will drive the adoption of EVs. The consideration point occurs when customers start to consider choosing an EV when making a vehicle purchase decision. Actual market penetration might be low in the initial years, but with increased product launches, comparable performance and parity in total cost of ownership (TCO), consideration percent increases. In contrast, inflection point occurs when various aspects related to EV performance, battery technology and an enabling ecosystem are broadly established, and the market has gained traction.²⁸

Parameters for consideration



Parameters for inflection

In case of any of these enablers are not in place, growth is expected to be slower and inflection point likely to be delayed

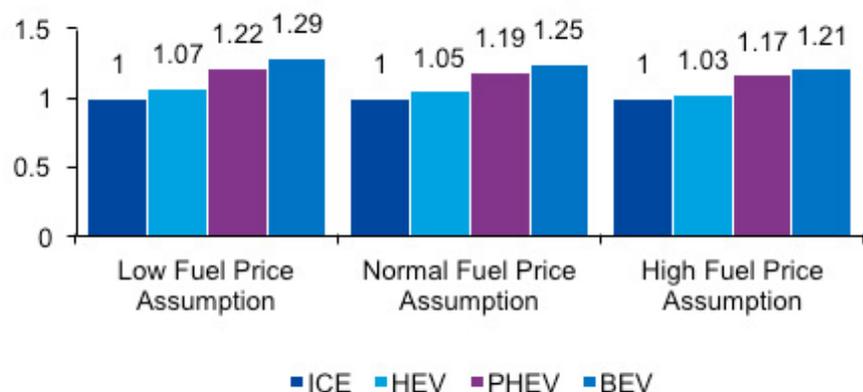
Source: KPMG India publication, Shifting gears: the evolving electric vehicle landscape in India.

TCO Analysis

Research by Society & Economy Research Association of University of Indonesia (LPEM FEB UI) suggests that EVs and ICEs are a mutually substituted product and it is important to compare price and TCO of EV and ICE in Indonesia to understand the future of the market. In general BEVs have the most TCO. However, if the fuel price is high, the electromotive vehicles (x-EVs) TCO tends to become lower, making it more appealing to customers.

²⁸ KPMG India publication, Shifting gears: the evolving electric vehicle landscape in India

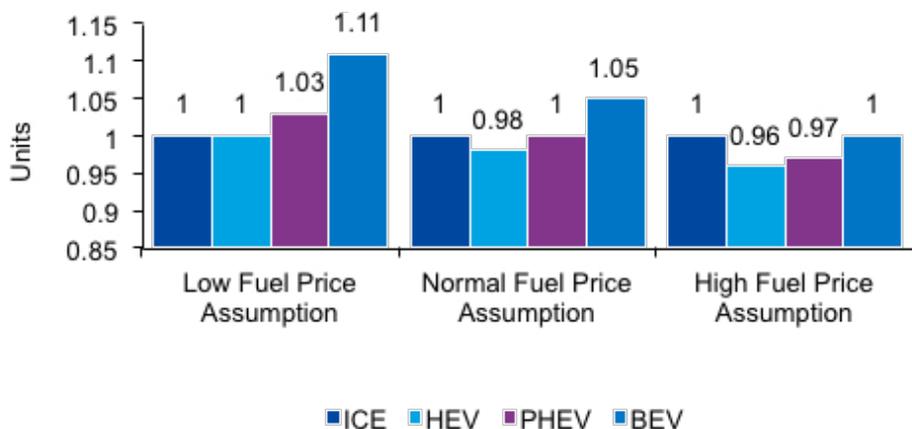
TCO Ratio for 5 years of ownership and AKT 10K



Source: Dr. Ir. Riyanto, M.Si, LPEM FEB UI, *Kajian Dampak Percepatan Penggunaan Mobil Listrik di Indonesia*.

The study also discusses a tax exemption scenario, where high fuel price and annual kilometers travelled (AKT) of 18.000 , x-EV could have a lower TCO than ICEs.

TCO Ratio for 5 years of ownership and AKT 18K, with tax exemption



Source: Dr. Ir. Riyanto, M.Si, LPEM FEB UI, *Kajian Dampak Percepatan Penggunaan Mobil Listrik di Indonesia*.



EV battery development plan in Indonesia



Indonesia Battery Corporation

On 16 March 2021, four SOEs in the mining and energy sector (Mining Industry Indonesia (MIND ID), PT Aneka Tambang Tbk (Antam), PT Pertamina (Persero) (Pertamina) and PT PLN (Persero) (PLN)) signed an agreement to form Indonesia Battery Corporation (IBC). IBC will function as a holding company to manage the battery industry ecosystem, especially for electric vehicle.²⁹

The SOEs have been assigned the following key roles within the EV battery supply chain:³⁰

SOEs	Sector	Activities
Inalum & Antam	Upstream	Mining and refining nickel for production of batteries
Pertamina	Intermediate	<ul style="list-style-type: none">• Construction and operation of precursor plants, cathode plants, battery cells and battery packs• Battery recycling (with PLN)
PLN	Downstream	<ul style="list-style-type: none">• Distributor for batteries• Battery recycling (with Pertamina)

Indonesia has a big ambition that its battery holding can become a global player, since Indonesia already possesses the raw materials for making EV batteries.³¹ IBC is expected to collaborate with potential partners from countries such as China, South Korea, the United States (US) and European countries.³²

²⁹ Kontan, *Erick Thohir bentuk Indonesia Battery Corporation (IBC), produksi 140 GWh di 2030*, published 26 March 2021, <https://industri.kontan.co.id/news/erick-thohir-bentuk-indonesia-battery-corporation-ibc-produksi-140-gwh-di-2030>

³⁰ CNBC, *Holding Indonesia Battery, Ini Jobdesk MIND ID-Pertamina-PLN*, published 14 October 2020, <https://www.cnbcindonesia.com/market/20201014185551-17-194430/holding-indonesia-battery-ini-jobdesk-mind-id-pertamina-pln>

³¹ Pertamina, *From EV Battery to Energy Storage, Pertamina is Ready to Develop the Battery Industry Ecosystem in Indonesia*, published 13 February 2021, <https://www.pertamina.com/en/news-room/news-release/from-ev-battery-to-energy-storage-pertamina-is-ready-to-develop-the-battery-industry-ecosystem-in-indonesia>

³² CNBC, *Resmi Dibentuk! Cek 8 Fakta Indonesia Battery Corporation*, published 26 March 2021, <https://www.cnbcindonesia.com/market/20210326164501-20-233179/resmi-dibentuk-cek-8-fakta-indonesia-battery-corporation>

Roadmap

According to a meeting held by Commission VII of the House of Representatives (DPR), the roadmap for EV battery development (which will also include development of energy storage systems or ESS) until 2026 is as follows:³³

Year	Targets
2021	<ul style="list-style-type: none">Construction of charging stations (<i>Stasiun Pengisian Kendaraan Listrik Umum</i> or SPKLU) and battery trade-in stations (<i>Stasiun Penukaran Baterai Kendaraan Listrik Umum</i> or SPBKLU) across IndonesiaAs of February 2021, PLN has already completed 32 SPLKU and 22 pilot projects for SPBKLU in 33 cities across Indonesia
2022	EV manufacturing companies to begin production in Indonesia
2024	<ul style="list-style-type: none">EV battery companies to begin production in IndonesiaAntam's nickel refining/ high pressure acid leach (HPAL) plant is planned to begin operations in 2024, as well as Pertamina and Inalum's cathode and precursor manufacturing plant
2025	Pertamina and PLN's cell to pack manufacturing plant is targeted to begin operations in 2025
2026	The new capital city is planned for a 100 percent EV adoption rate

Production of EV batteries will focus on NCM and NCA batteries, supported by the domestic nickel industry. A report by Mordor Intelligence predicts that the Indonesian battery market will grow at a CAGR of more than 5.6 percent during 2020-2025 due to the availability of raw materials, planned EV development, commitments to GHG emission reductions, as well as increased consumption for other electronics, such as mobile phones and laptops.³⁴ The government is optimistic that domestic battery manufacturing plants can reach production capacity of 140 GWh and become a key supplier for EV producers in Europe, the US and the Asia Pacific.³⁵

Challenges

Indonesia's EV battery ambitions might face several challenges, such as:

Limited domestic EV demand. This is partly due to high price points for EV vehicles and limited charging and supporting infrastructure.³⁶ Indonesia can learn from China, where the local government in Shenzhen provides subsidies of up to US\$3,000 to buyers for vehicle insurance and charging equipment installation. Similarly, the city of Beijing in 2017 mandated that all parking areas in new residential buildings should leave space for EV chargers and new government/SOE buildings were directed to install chargers at 25 percent of parking spots.³⁷

Regional competition. Regional competition to promote the EV industry in Asia is getting tougher, as India is planning a production-linked incentive scheme for auto and auto component manufacturers. The scheme also includes plans to establish advanced battery manufacturing plants. Thailand also announced plans to establish itself as an EV production hub for the ASEAN region by 2025.

Strategic competition. Essential minerals, such as Nickel and lithium, are a primary national security concern and are becoming a focus, of geopolitical competition. Governments in key markets (including the US and the EU) are intensifying efforts to shore up the supply chain security of these minerals in the aftermath of the pandemic and amid a broader decoupling of global economies.³⁸

³³ Kompas, *Peta Jalan Pengembangan Baterai EV di Indonesia*, published 2 February 2021, <https://otomotif.kompas.com/read/2021/02/02/163100615/peta-jalan-pengembangan-baterai-ev-di-indonesia-sampai-2027>

³⁴ Mordor Intelligence, *Indonesia Battery Market – Growth, Trends, COVID-19 Impact, and forecasts (2021-2026)*, <https://www.mordorintelligence.com/industry-reports/indonesia-battery-market>

³⁵ Kontan, *Pertamina bangun pabrik baterai untuk pasok produsen kendaraan listrik dunia*, published 2 February 2021, <https://industri.kontan.co.id/news/pertamina-bangun-pabrik-baterai-untuk-pasok-produsen-kendaraan-listrik-dunia>

³⁶ Ibid

³⁷ KPMG Singapore, *Decarbonisation of Transport: The Journey of Electric Vehicles in ASEAN*, April 2021

³⁸ Eurasia Group newsletter, *Greater policy support for integrated electric vehicle supply chain will have its drawbacks*



Navigating Through Challenges

Clear cut goals. Setting clear national goals will give thorough direction to different stakeholders, such as policymakers, businesses and consumers, to take action on climate change and other environmental issues.

Extensive urban planning and land transport. Big cities in ASEAN countries need to start thinking about urban and transport planning together to reduce the average distance travelled. The lack of public transport infrastructure makes private transportation in Indonesia the preferred mode of travel. To nudge more users towards public transport, a two-pronged approach will have to be adopted: increase ubiquity and convenience of public transportation and encourage electrification of private vehicles.

Attract investment for EV value chain. Significant investments are expected to happen within Indonesia due to the land and mineral reserves that can substantially support the growth of EVs. Hence, it is essential for government to attract investment for the EV value chain.

Expand charging infrastructure. Setting up charging infrastructure is key. This is by far the toughest challenge faced by many ASEAN countries. The government should act immediately in concert with energy production, transmission and distribution companies to ensure that charging does not become a barrier to widespread EV adoption.

Create an innovation ecosystem for the future. Indonesia will be presented with several opportunities as new value chains are built in the future, creating jobs and business opportunities. One of them is joint ventures. By working together with other companies, this will accelerate innovation in the market and thus create a truly innovation-driven ecosystem in the region. Furthermore, Indonesia has also created a holding company (IBC) to have more presence on each supply chain.

Technology development and advancement. Continued technology advances are needed to develop EVs that have longer battery life and longer travel distance. These two factors in particular cause anxiety for buyers who are considering switching to an EV. Moving forward, there is scope to develop new alternatives (aluminum-graphite, graphene-polymer, micro-capacitors, miniaturized solid oxide fuel cells and sodium-based batteries) to expensive lithium-ion batteries that are currently used to power EVs.

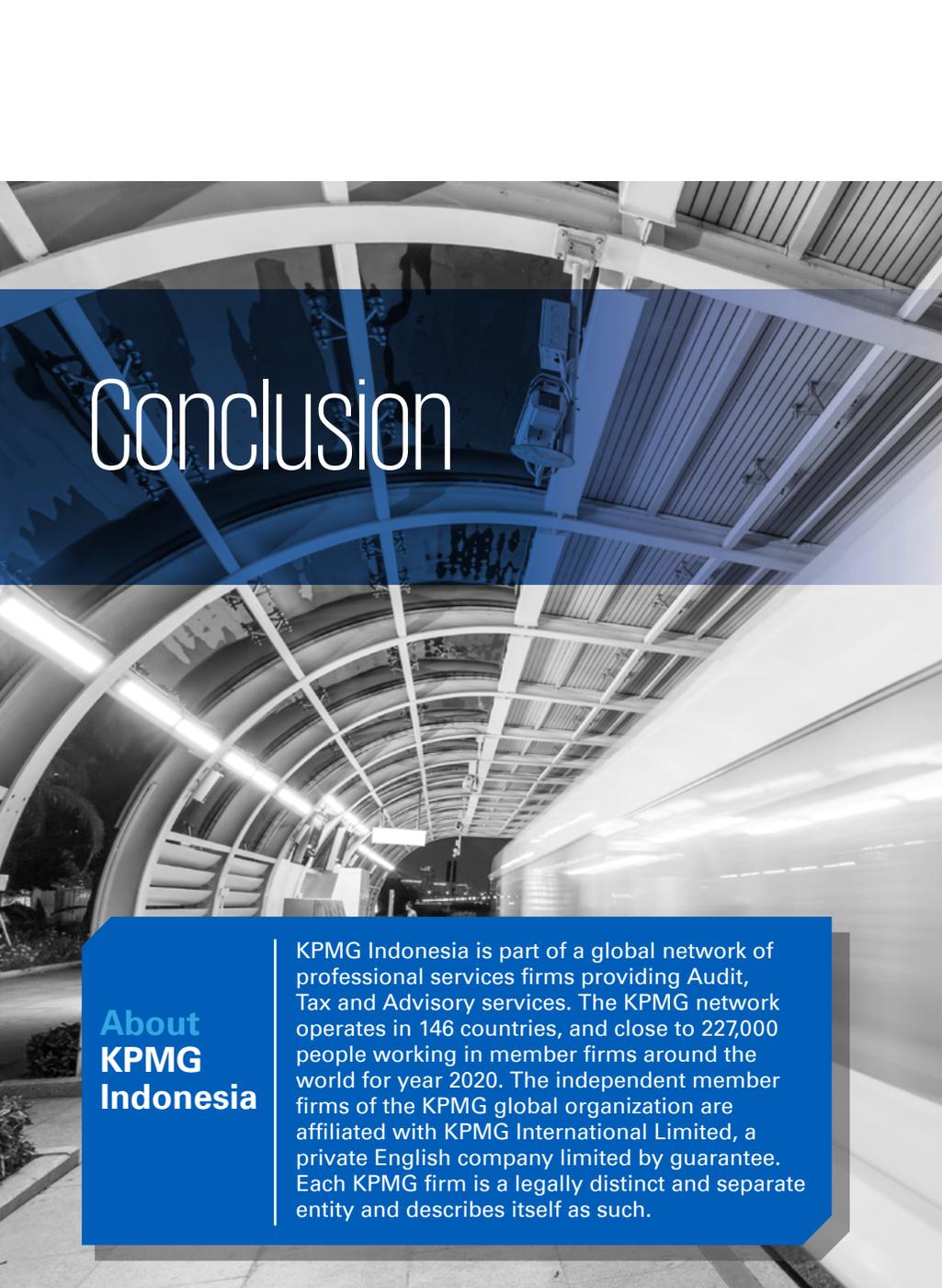
Human resources development While employment intensity of the EV value chain is lower than in the ICE automotive sector, this presents critical policy challenges for the government. Careful planning while bringing workforce, governments, educational institutions and employers together, can create new employment opportunities for a reskilled and upskilled workforce, thereby offsetting the job losses.

Designate a single nodal government agency. The convergence of the energy, utility and transport sectors needs to be recognized and the government should create a nodal agency to take responsibility for the EV ecosystem, working closely with other parts of the government machinery.

Government support. Support from the government will play a significant role in lifting the market for EVs. Therefore, the government should focus on introducing tailored, strong and rewarding policy interventions for the various stakeholders involved. To raise consumer interest in EVs, the government should support policy interventions to increase incentives and create more awareness on the benefits of EVs. The government can impose stringent environmental protection laws against the use of ICE vehicles and provide subsidies and focus on development of storage space.³⁹



³⁹ KPMG Singapore, Decarbonisation of Transport: The Journey of Electric Vehicles in ASEAN, April 2021.



Conclusion

About KPMG Indonesia

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Global growth in demand for EVs has recently increased, mainly driven by governments' ambitions to reduce GHG emissions and prevent serious impacts of climate change. Automotive industry players have begun massively investing in the development and production of EVs and EV batteries. Indonesia is aligned with global efforts to adopt EVs and tackle GHG emissions.

By being agile and acting quickly, Indonesia can utilize the advantages of being an early adopter to attract global capital. New avenues of financing will create a truly innovation-driven ecosystem in the country while opening a new job market for young Indonesians.

The most notable regulation from the Indonesian government is Presidential Decree No. 55/2019, which firmly mandates the development of a domestic EV industry as a national priority. This regulation is one of many government efforts to increase national energy efficiency and achieve clean, renewable energy in accordance with commitments to reduce GHG emissions.

Similarly, car manufacturers, such as Toyota, Hyundai, Mitsubishi, Honda and Suzuki, have announced plans for EV manufacturing and sales in Indonesia.

To support domestic EV development, the government plans to create a holistic domestic EV battery supply chain to capitalize on Indonesia's extensive nickel reserves. Even though Indonesia already has several smelters and industrial complexes for processing nickel, there is still opportunity for further foreign investment in the sector.

On 16 March 2021, the shareholder agreement for the formation of IBC was signed by MIND ID, Antam, Pertamina and PLN. IBC will engage as a holding company to manage the battery industry ecosystem, especially for EVs.

The government has produced a roadmap for EV battery development and storage systems through 2026 and EV manufacturing companies are targeted to begin production in Indonesia as early as 2022. Later, the new capital city of Indonesia is projected to have a 100 percent EV adoption rate by 2026.

However, Indonesia's battery ambitions might face a number of industry and geopolitical challenges, such as limited domestic EV demand, regional competition and strategic competition.

Factors considered important in navigating through challenges in EV and decarbonization planning include clear cut goals, extensive urban planning and land transport, attracting investment, expanding charging infrastructure, creating an innovation ecosystem, technology and human resources development, designating a single nodal government agency and support from the government.

To prepare for several different scenarios, stakeholders are expected to be agile and adept in adapting to changes by creating their own vision of the future, based on data-driven analysis of both the automotive market and of the value of the assets and capabilities that their organizations bring to the new automotive industry.

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