

Indonesia bets big on electric vehicles but has a long way to go

Indonesia aspires to be a major player in the electric vehicle space, but despite early gains, there is much more work required for the country to achieve its ambitious target of having 2.5 million EV users by 2025



A pair of young people test drive an electric motorcycle at the Indonesia International Hybrid Motor Show

Betting big on EV

Indonesia is preparing its economy to be a major player in the electric vehicle (EV) market. EVs refer to vehicles that are partially (plug-in hybrid EVs) or fully powered by an electric battery (full electric EVs). In Indonesia, any vehicle that is powered by a battery, partially or fully, is considered to be an EV.

The most obvious motivation for this shift to EVs is the domestic availability of raw materials used to produce the most important component of EVs: the battery pack. Indonesia is home to the highest nickel reserves in the world, roughly 22% of the total, while also having access to cobalt (which extends EV battery life) and bauxite (used in aluminium production, which is also important for EV production). Having access to several components for EV battery production ensures a stable source of raw materials which could help lower costs.

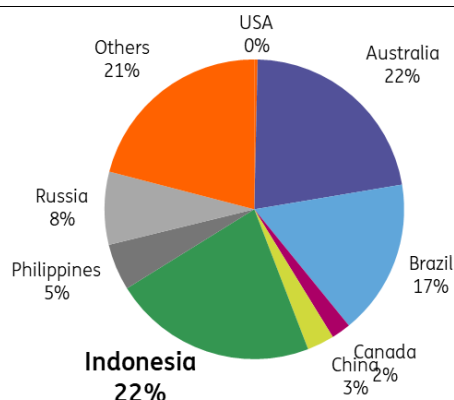
Secondly, preparing Indonesia to be a major regional EV player goes along with President Joko “Jokowi” Widodo’s directive to decrease reliance on raw material exports while shifting to higher

value-added goods exports. Indonesia banned nickel ore exports in January 2020 while developing raw material smelting capacity, EV battery production, and now actual EV production. PT Hyundai Motors Indonesia rolled out its first domestically-produced EV in April 2022.

Developing Indonesia’s EV production capability would help bolster regional exports should neighbouring economies experience increased demand for EVs. Furthermore, Indonesia represents an important sales market for two, three and four-wheeled vehicles (121 million motorcycles and 22 million four-wheeled vehicles registered as of 2021).

Lastly, pushing for dominance in the EV market moves in line with Indonesia’s sustainability goals as the EV strategy also helps Indonesia chase net-zero emissions goals. Indonesia recently brought forward its emission reduction goal, now targeting 32% lower emissions (from 29%) by 2030. Emissions from passenger and commercial vehicles account for 19.2% of the total emissions generated by road vehicles and an aggressive shift to EV acceptance and usage would help Indonesia lower overall emissions, given EVs do not generate emissions like standard internal combustion engine (ICE) powered vehicles.

Global nickel reserves per country



Source: US Geological survey 2022

EV adoption should have a positive impact on the growth outlook

Indonesia is the second-largest vehicle producer in ASEAN behind only Thailand. Year-to-date, Indonesia has produced 920,376 units as of August compared to Thailand’s 1,225,776. Vehicle production in Indonesia slumped during the pandemic but has since recovered and is projected to grow this year by 8.4% year-on-year and 1% next year[1]. Meanwhile, in terms of vehicle sales, Indonesia is the largest market in ASEAN with 658,232 sales for the year followed by Thailand (589,863) and Malaysia (447,209). Sales also dipped due to Covid-19 but have bounced back and are projected to expand 8.7%YoY and 1.8%[2] in 2022 and 2023, respectively. Thus, Indonesia represents a key market for vehicle sales while also being a major player in vehicle production in the ASEAN region.

Increased domestic production of EVs could bolster Indonesia’s GDP growth, contributing to manufacturing activity, exports and domestic vehicle sales. On top of this, increased economic activity for related EV industries (raw material harvesting, refining and EV battery production) and vehicle sales (marketing, vehicle repair) could also boost growth further.

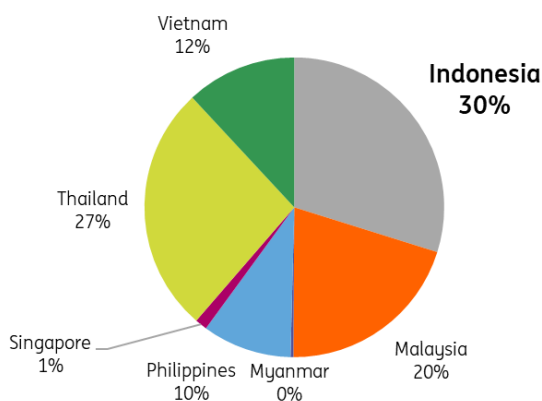
Vehicle production in Indonesia accounts for roughly 8% of total manufacturing and a mere 1.7% of overall GDP, so it is by no means a major driver for economic growth just yet. Similarly, vehicle manufacturing accounts for only a small percentage of total exports (3.8%) given the limited market for Indonesia’s vehicle exports.

One reason for the relatively low percentage of vehicle exports to total exports would be that Indonesia’s vehicle production focuses on so-called multi-purpose vehicles designed specifically for emerging markets such as the Toyota Avanza and Mitsubishi Expander. Such vehicles tend to have safety and emissions standards that are not up to par with developed markets and could be a limiting factor in terms of export potential. The switch to EV production could change this dynamic as increased demand for EVs from developed markets would broaden Indonesia’s potential vehicle export market.

[1] IHS Markit, Autointelligence

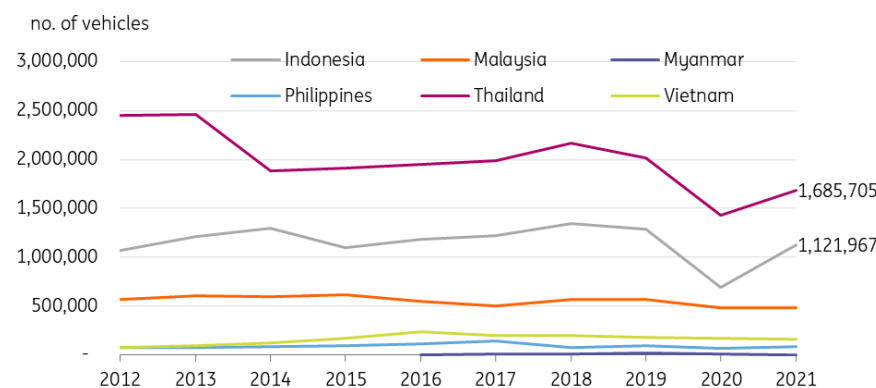
[2] IHS Markit, Autointelligence

Indonesia is the largest market in terms of sales



Source: ASEAN Automotive Federation

ASEAN production is dominated by Indonesia and Thailand



Source: ASEAN Automotive Federation

Creating the EV value chain in Indonesia

The national government has prioritised building the EV value chain while setting ambitious targets for EV production and usage. Indonesia aims to produce 600,000 EVs by 2030 and one million five years after, supported by its domestic supply of nickel, upgraded smelting infrastructure, and locally-produced EV batteries.

President Jokowi passed PR 55 in 2019 to develop Indonesia's EV battery sector, and in 2021 the Indonesia Battery Corporation (IBC) was founded. Although comprised of state-owned enterprises, IBC partnered with foreign investors to develop technology and drive domestic production of EV batteries. Several other regulations were passed that covered tax breaks for EV and EV parts imports (Regulation No. 73/2019) while also setting standards for the EV infrastructure, such as guidelines on charging stations (Regulation 13/2020).

In 2022, Jokowi announced that government agencies and state firms should procure EVs for their fleet (Presidential Instruction No. 7 of 2022) to increase the usage and acceptance of such vehicles. More recently, Jokowi called for subsidies on EV purchases for households on top of existing tax perks and non-tax incentives such as exemption from traffic restrictions. These directives show Indonesia's resolve to push for EV adoption and acceptance although not all directives have translated into actual legislation just yet.

Recent trends: improvement in 2022 but still some way to go

Indonesia's EV vehicle sales improved in 2022, more than doubling 2021 totals by May 2022. In 2022, year-to-date sales hit 1,587 compared to 693 EVs for the same period in 2021. Despite the substantial YoY growth, however, EV sales account for a mere 0.6% of vehicle sales for the same period (267,030). Furthermore, the number of EVs is still minuscule at 4,904 which is a mere 0.2% of total registered vehicles.

Growth to get a boost but the near-term impact could be limited

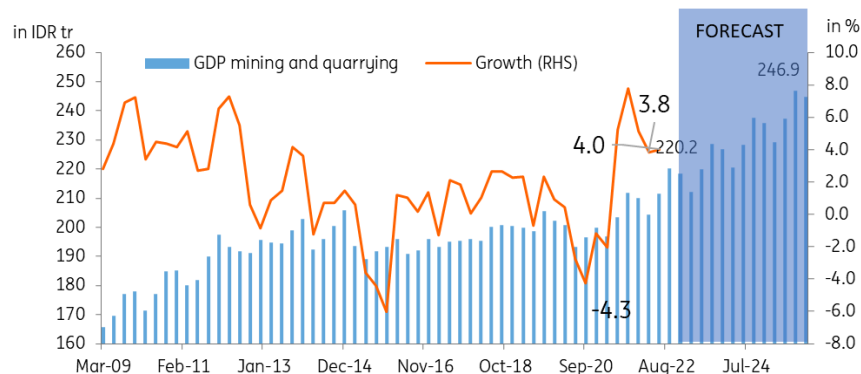
We previously identified sectors that would likely benefit from the continued growth of the EV value chain in Indonesia. The sustained growth of the domestic EV industry could bolster GDP activity in the following sectors: mining and quarrying (nickel mining), manufacturing of transport equipment (EV production), wholesale and retail trade of motor vehicles (EV sales), and the export of road vehicles (EV exports).

In the near term, however, we believe that the initial boost to GDP will be delivered by the increased mining and quarrying activity related to EV development. Given that Indonesia is still transitioning from ICE to EV, we expect that any gains from EV production would be offset by a decrease in current ICE vehicle production. The same situation would apply to motor vehicle sales as households simply shift purchases away from ICE vehicles to EV. Meanwhile, the higher value-added contribution of EVs to GDP may be offset by increased subsidy costs incurred by the government. Lastly, we believe that the projected gains for the export sector will only be realised once Indonesia meets EV sales and production targets, as most if not all locally produced EVs will likely be directed to local consumption.

Based on these assumptions, we can expect the initial impact of the shift to EV to be relatively muted during the period of transition to EV acceptance and usage with benefits delivered mainly

by the increase in mining activity.

Indonesia's mining and quarrying sector to gain from EV shift



Source: CEIC and ING estimates

Steady gain for mining and quarrying sector on increased demand for minerals

Indonesia's mining and quarrying sector posted average growth of 1.6%YoY from 2010 to 2019. In 2020, President Jokowi implemented an export ban on nickel to ensure a stable supply of the mineral for domestic smelting production, leading to a contraction in the mining sector for that year. Base effects and the reopening of the economy post-Covid-related lockdowns may have helped boost 2021 growth. For the first half of 2022, the sector expanded by an average of 3.9% likely driven by the increased demand for EV batteries as Indonesia opened its first EV manufacturing plant.

We can assume a 3.9%YoY growth baseline scenario for the mining sector as demand for raw materials such as nickel, bauxite and cobalt rises due to EV requirements. The mining sector is roughly 7% of total GDP and our base case scenario would deliver at least 0.17 additional percentage points to growth each year through to 2025. As EV usage increases and approaches usage targets, Indonesia may eventually see increased gains from trade as a part of domestic EV production shifts to satisfy the demand for EV exports.

Efficiency key to delivering lower emissions?

We've highlighted the possible benefits of the shift to EV for GDP growth, but we would also like to show how Indonesia's EV adoption could help the country achieve current net zero emissions goals. An EV is estimated to be about three times more efficient in energy utilisation compared to a conventional ICE vehicle. Therefore, in theory, EVs can lower emissions by making more efficient use of the power generated by power plants. Of course, emissions can be lowered further by switching to renewable sources of energy given Indonesia currently sources its power mainly from coal. Indonesia's Ministry of Industry estimates that the country can reduce CO2 emissions by 1.4 MT should it hit production and EV usage targets by 2030.

For this discussion, we focus solely on the efficiency gains by switching to EVs as this would translate to lower energy requirements (for the same number of vehicles) to lower emissions. Furthermore, for this exercise we assume that Indonesia will shift to full battery electric passenger vehicles (BEVs) as these vehicles have zero emissions as opposed to hybrid and ICE

vehicles.

The Hyundai Cikarang vehicle plant produces the Ioniq5, a BEV that does not require fuel and can be assumed to be three times more efficient than a comparable ICE vehicle. The Ioniq5 BEV is currently available for purchase in Indonesia.

Assuming that road vehicle registration maintains its average increase of 8.6% (which should account for new sales and vehicle retirement), we estimate that full-battery EVs need to comprise 50% of the total number of registered vehicles by 2030 to achieve Indonesia's current emissions target from transportation. This exercise shows us that the ambitious usage targets set by Indonesia may be difficult to achieve given the current low base (1,095 units) and the projected target of roughly seven million vehicles in a span of eight years. The challenge to achieve this target is further compounded by the current capacity of EV production which may not be able to produce the required number of EVs per year.

Best case scenario would be ideal but limited production capacity suggests this goal may be out of reach

| | Emissions value | | Target emissions by 2030 | | EV is 3x more efficient (0.33 x no. of EV) | ICE emissions (1 x no. of ICE) | Total emissions (sum of EV and ICE emissions) | EV % to total no. of vehicles | ICE % total no. of vehicles |
|------|----------------------------------|-----------------------------------|--------------------------|--|--|--------------------------------|---|-------------------------------|-----------------------------|
| | No. of registered passenger cars | 1 ICE vehicle = 1 emissions value | 32% lower emissions | | | | | | |
| 2019 | 15,592,419 | 15,592,419 | | | | | | | |
| 2020 | 15,797,746 | 15,797,746 | | | | | | | |
| 2021 | 16,903,094 | 16,903,094 | | | 1,095 | 16,901,999 | 16,903,094 | | |
| 2022 | 18,363,009 | 18,363,009 | 32,486,846 | | 1,211,959 | 16,326,708 | 17,738,667 | 10% | 90% |
| 2023 | 19,949,016 | 19,949,016 | 33,565,311 | | 1,645,794 | 16,956,664 | 18,602,458 | 15% | 85% |
| 2024 | 21,672,007 | 21,672,007 | 34,756,965 | | 2,145,529 | 17,337,605 | 19,483,134 | 20% | 80% |
| 2025 | 23,543,811 | 23,543,811 | 36,009,792 | | 2,719,310 | 17,657,859 | 20,377,169 | 25% | 75% |
| 2026 | 25,577,283 | 25,577,283 | 37,392,553 | | 3,376,201 | 17,904,098 | 21,280,300 | 30% | 70% |
| 2027 | 27,786,385 | 27,786,385 | 38,894,742 | | 4,126,278 | 18,061,150 | 22,187,429 | 35% | 65% |
| 2028 | 30,186,287 | 30,186,287 | 40,526,675 | | 4,980,737 | 18,111,772 | 23,092,509 | 40% | 60% |
| 2029 | 32,793,467 | 32,793,467 | 42,299,558 | | 5,952,014 | 18,036,407 | 23,988,421 | 45% | 55% |
| 2030 | 35,625,829 | 35,625,829 | 44,225,565 | | 7,053,914 | 17,812,914 | 24,866,828 | 50% | 50% |

Source: CEIC and ING estimates

EV adoption can still lower emissions despite capacity constraints

Given the production constraints shown in the previous exercise, we plot out a more plausible path for EV adoption in Indonesia. Assuming that the existing Hyundai Cikarang plant continues to expand EV production towards its announced capacity of 250,000 units per year, we can demonstrate a scenario whereby EVs comprise 3% of total cars in Indonesia (roughly one million registered EVs) by 2030. Based on this trajectory, Indonesia would be able to reduce emissions by 1.9% compared to the base case scenario had only ICE vehicles been sold in the market.

Although the projected improvement in emissions would still be below Indonesia's existing net zero emissions targets, such a scenario (one million EVs by 2030) would yield a positive result by lowering emissions by roughly 1.9%.

Based on existing capacity, Indonesia can still hope to have 1 million EVs by 2030

| | Emissions value | | Target emissions by 2030 | | EV is 3x more efficient (0.33 x no. of EV) | ICE emissions (1 x no. of ICE) | Total emissions (sum of EV and ICE emissions) | EV % to total no. of vehicles | ICE % total no. of vehicles |
|------|----------------------------------|-----------------------------------|--------------------------|---------------|--|--------------------------------|---|-------------------------------|-----------------------------|
| | No. of registered passenger cars | 1 ICE vehicle = 1 emissions value | 32% lower emissions | Number of EVs | | | | | |
| 2019 | 15,592,419 | 15,592,419 | | | | | | | |
| 2020 | 15,797,746 | 15,797,746 | | | | | | | |
| 2021 | 16,903,094 | 16,903,094 | | 1,095 | 1,095 | 16,901,999 | 16,903,094 | | |
| 2022 | 18,356,760 | 18,356,760 | 12,482,597 | 3,095 | 1,021 | 18,353,665 | 18,354,687 | 0% | 100% |
| 2023 | 19,949,016 | 19,949,016 | 13,565,331 | 11,095 | 3,661 | 19,937,922 | 19,941,583 | 0% | 100% |
| 2024 | 21,672,007 | 21,672,007 | 14,736,965 | 27,095 | 8,941 | 21,644,912 | 21,653,853 | 0% | 100% |
| 2025 | 23,543,811 | 23,543,811 | 16,009,792 | 59,095 | 19,501 | 23,484,717 | 23,504,218 | 0% | 100% |
| 2026 | 25,577,283 | 25,577,283 | 17,392,553 | 123,095 | 40,621 | 25,454,189 | 25,494,810 | 0% | 100% |
| 2027 | 27,786,385 | 27,786,385 | 18,894,742 | 251,095 | 82,861 | 27,535,291 | 27,618,152 | 1% | 99% |
| 2028 | 30,186,287 | 30,186,287 | 20,526,675 | 501,095 | 165,361 | 29,685,192 | 29,850,553 | 2% | 98% |
| 2029 | 32,793,467 | 32,793,467 | 22,299,558 | 751,095 | 247,861 | 32,042,372 | 32,290,234 | 2% | 98% |
| 2030 | 35,625,829 | 35,625,829 | 24,225,563 | 1,001,095 | 330,361 | 34,624,734 | 34,955,095 | 3% | 97% |

Source: Shutterstock

Several challenges to EV adoption

Despite the directive to shift to EV, we believe that government targets remain ambitious given challenges to adoption and production capacity. The National Energy Grand Strategy set a target of 2.5 million registered EVs and electric motorbikes by 2025. Indonesia's current EV number is still very low with only 1,095 registered EVs compared to the total, which means EV usage will need to increase significantly over a span of only three years.

Prohibitive costs would be another challenge as EVs remain more expensive than ICE vehicles, even after existing tax breaks, lowering the appeal to switch to EVs. The cost to acquire an EV is said to be roughly four times that of an ICE vehicle even after current incentives. The lack of charging infrastructure could also be a limiting factor for EV adoption, with only 332 charging stations in Indonesia at the moment.

On top of challenges related to cost and lack of infrastructure, EV adoption is also constrained by existing production capacity. The lone EV vehicle plant in the country is the Hyundai Cikarang plant which has a projected 250,000 capacity per year. Even if Hyundai is successful in attaining its planned 250,000 vehicle production capacity per year, this would still fall short of providing enough EVs to achieve the target of 2.5 million EVs by 2025.

Surging global commodity prices have also driven up the cost of computer chips as well as elements like lithium and graphite, all of which are needed for EV production. The rising cost of EV components suggests that EV production costs will rise and in turn keep the price disparity between EVs and ICE wide. Thus, Indonesia may need to increase subsidies even more to boost EV sales.

Fuel subsidy another hurdle to EV adoption

One additional hurdle to EV adoption is Indonesia's subsidised fuel programme. This acts as an additional deterrent to EV adoption as households will see less incentive to switch to EVs even as global crude oil prices remain high.

Indonesia's current EV goals

| Indonesia's EV goals | Target |
|---|--------|
| 2,500,000 EV users | 2025 |
| EV production | |
| 400,000 EV manufactured | 2025 |
| 600,000 EV manufactured | 2030 |
| 1,000,000 EV manufactured | 2035 |
| EV incentives for production | |
| 40% local content for EV manufacturing to qualify for incentive | 2023 |
| 60% local content for EV manufacturing to qualify for incentive | 2029 |
| 80% local content for EV manufacturing to qualify for incentive | 2030 |

Source: Various Indonesian government releases

Conclusion: Great start so far but much ground to cover

Indonesia's decision to prepare itself to be a major player in the EV market can lead to several benefits such as faster economic growth and lower emissions. The push for EV also moves in line with President Jokowi's goal to shift away from low-value-added exports to higher-value-added finished export products. And although we believe that several sectors will benefit from the shift to EVs, we expect the mining sector to benefit most during the initial stages of EV adoption.

Indonesia has had some early success in EV adoption with sales picking up considerably in 2022, overtaking 2021's full-year sales total in the first five months of this year. However, despite these gains, EVs are still dwarfed by ICE vehicles in terms of annual sales and actual usage.

To boost EV sales, Indonesia's national government may consider additional purchase subsidies on top of existing incentives to entice households to shift to EVs. Prohibitive acquisition costs remain one of the main deterrents to EV purchases. Additionally, Indonesia may need to gradually phase out its fuel subsidy programme as it acts as a disincentive to EV adoption.

Switching to EVs may also help Indonesia lower emissions from vehicles, in line with its net-zero objectives. Production capacity, however, may limit the ability to shift dramatically to EVs, although any increase in EV usage would still result in lower emissions compared to the ICE alternative. To lower emissions further, Indonesia may also intensify efforts to shift production to renewable sources given its current dependence on coal as EVs still require energy produced by power plants despite not generating emissions.

Despite the challenges posed by production capacity and reluctance to shift to EVs, the national government appears determined to get the programme off the ground with several presidential decrees and legislation to help boost the local EV industry. A sustained push to ramp up production capacity and lower EV acquisition costs will help Indonesia make headway in its EV usage goals. Until these constraints are addressed, however, we recognise that much more work is needed for Indonesia to successfully make the shift to EV and achieve its ambitious target of 2.5 million EV users by 2025.

