ELECTRIFYING INDONESIA'S TWO-WHEELER INDUSTRY

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BCG × AEML

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AEML is a forum for EV pioneers to catalyze the development of a world-class electric mobility ecosystem in Indonesia. We are the industry body, thought leader and public policy advocate for the EV ecosystem.

AEML engages, sustains and grows the EV ecosystem through engagement with vehicle brand owners, component suppliers, battery providers, and infrastructure players. Through these partnerships, we are building a robust domestic value-chain, and collaboration among all stakeholders, creating economic and social value for Indonesia.

Our mission to electrify mobility in Indonesia is based on a calling to protect the environment by reducing pollution in the communities where people live, work, study and play. By contributing to the Indonesia's climate initiatives, we also directly support the nation's energy independence. In doing so, we will achieve our vision to support the adoption of EV and foster the creation of a globally competitive EV ecosystem.

Executive summary

The development of the electric vehicle (EV) industry is an important national agenda for Indonesia, covered by a presidential decree and national plans. In line with the national agenda, the country also aspires to be the leading market and manufacturing powerhouse in the region, with an ambition to reach 25% annual sales penetration for electric 2-wheelers (e2W) and 2.5 m annual production capacity by 2030.

Developing the e2W industry to achieve the 2030 ambition is also expected to bring numerous socio-economic and environmental benefits, including annual economic value creation of IDR 171 tr by 2030. This translates to IDR 746 tr in cumulative economic value creation by 2030—15-times the size of the gap between potential cumulative incentive spending contribution for e2W and cumulative fuel subsidy spending for internal combustion engine (ICE) 2W.

As Indonesia's e2W industry is still in nascent stages, there is significant potential for growth. Despite several existing policy measures, the country still faces various demand and supply side challenges inhibiting the growth of the industry. Demand-side bottlenecks include higher costs of EV, insufficient vehicle specs, and charging constraints. Supply-side challenges include low demand and high CAPEX requirements for vehicle manufacturing and infrastructure rollout.

Globally, markets have used a wide range of policy measures across demand, supply, and infrastructure and enablers dimensions to drive EV development. Financial and tax incentives (demand and supply side) and charging network support are key policy themes observed across most markets. In particular, end-user financial incentives were universally observed to jump-start adoption in early stages of industry development.

Given the ambitions of Indonesia, and existing bottlenecks, further policy support could be considered beyond contemporary foundations. Immediate priority considerations include end-user financial support, manufacturer financial support for localization such as grants and loans, and both CAPEX and OPEX support for infrastructure. In the longer term, local content requirements may need to be ramped up to spur local supply chain development, and minimum EV quotas may need to be introduced to reinforce EV production and sales.

Note: Facts and data used in this report are from research and analysis conducted in September 2022.

Contents of this report

A. Rationale for promoting EVs and vision for Indonesia

INDONESIA IS POISED TO ENERGIZE AN ELECTRIC VEHICLE (EV) revolution, combining ambitious national strategies and significant market potential with an established industrial base to unlock substantial growth in coming years.

EVs represent an important element of Indonesia's future transport ecosystem, and a key pillar of the nation's evolving industrial agenda. The National Masterplan for Industry (RIPIN) 2015-35 names EVs as a top industrial priority, and a strategic direction for the industry built on innovation, research and development (R&D), and infrastructure is laid out clearly in the National Medium-Term Plan (RPJMN) 2020-2024. These industrial efforts are further supported by a Presidential Decree in 2019, which sets out the future trajectory for EV growth and adoption.

Through these policies, Indonesia aspires to be a leading market and a manufacturing powerhouse in the region for both electric 2-wheelers (e2Ws) and electric 4-wheelers (e4W) by 2030, with targeted annual production capacity of 2.5 m e2W units and 600,000 e4W units. This frames an ambition which aims to establish e2Ws with a 25% annual share of total two-wheel (2W) sales, and e4W with a total 20% annual four-wheeler (4W) share, putting Indonesia at the forefront of regional EV development.

Indonesia offers an attractive ecosystem for EV acceleration, particularly in the e2W segment. It is the largest automotive market in Southeast Asia, accounting for up to half of 2W sales, but with significant room for growth due to low vehicle penetration. Indonesia is also home to substantial, mature vehicle manufacturing capabilities, with major multinationals working alongside local ecosystem partners. Local capabilities and supply chains for automotive parts are also well established.

With the world's largest nickel reserves—a key ingredient of lithium-ion batteries for EVs—Indonesia also has a natural resource advantage to assist in development of battery electric vehicles (BEVs). Global players are already planning investments to leverage this key material for the battery value chain, from raw material processing to battery manufacturing. With around 40% of the cost for electric vehicles entirely separate from that of internal combustion engine (ICE) vehicles, this provides an opportunity to reset the industry, and spur Indonesia's domestic players to overtake competitors in the high-growth EV segment.

Focusing on e2W growth is the natural next step for Indonesia's own strategic journey. It provides a far greater penetration opportunity in the domestic market, with approximately 70% of households with ICE vehicles owning 2W versions, and just 30% owning 4Ws. 2Ws have approximately 2.3X the penetration of 4W alternatives in Indonesia today, with an existing stock of 115 m two-wheel vehicles compared to just 16 m for 4Ws.

Indonesian income levels also more naturally lend themselves to an e2W approach, with a popular e2W model costing roughly half the annual income of IDR 62 m, compared to a popular e4W model (~IDR 750 m) which costs more than 10-times the average annual income. Targeting e2Ws thus enables greater household adoption through improved affordability.

Domestic electricity infrastructure also dictates a more targeted e2W approach in Indonesia. Average domestic wattage of 1,300 W is sufficient for slow-charging of e2Ws which require around 300 W, but not suited to slow-charging of more demanding e4W vehicles which need wattages of around 1,760 W.

Focusing on Indonesia's domestic e2W industry not only supports a more suitable low-carbon transport solution, but also offers up the chance to unlock valuable socio-economic opportunities. A new e2W industry could generate USD 11.4 b (~IDR 171 tr) in annual economic value by 2030 while adding ~215,000 jobs in parts, components, and vehicle manufacturing by 2030. It could significantly improve the national trade balance, adding ~IDR 45 tr annually by 2030, while at the same time reducing CO_2 emissions by 6.1 m tons annually by the same year.

Exhibit 1. Benefits of developing e2W industry

Source: BCG analysis

By remaining focused on ICE technologies and neglecting any environmental or industrial benefits of EV adoption, Indonesia faces the risk of competitor markets charging ahead to widen the gap in EV development. The focus of this study is on the opportunity that a pivot towards e2W manufacturing could unlock, developing the value chain and building out firm foundations for wider EV industry development.

With annual production of 2.5 m vehicles, an average price of USD 1,900 per vehicle, and 80% of the content locally made, an expected multiplier effect of 2X to 2.5X would deliver between USD 7.5 b and USD 9.5 b to the Indonesian economy directly, with an additional USD 1 b to USD 1.9 b of potential value added via exports, creating up to USD 11.4 b total value.

Supercharging this e2W opportunity will necessitate IDR 19.2 tr in new investment to achieve 2.5 m e2Ws manufactured annually by 2030. That includes IDR 6.7 tr investment in 7.4 gigawatt hour (GWh) cell manufacturing capabilities, IDR 1.2 tr in 7.4 GWh pack assembly, and IDR 11.2 tr in e2W assembly. Greater penetration of electric vehicles will also reduce the need for oil imports for ICE fuel, offering a potential IDR 45 tr boost to Indonesia's trade balance annually by 2030.

Industry development offers a pathway to unlock up to 215,000 jobs by 2030. That incorporates approximately 183,00 jobs in tier 1, 2, and 3 suppliers for parts and components of 2.5 m projected e2Ws, and an additional 32,000 jobs in e2W manufacturing and assembly. The wider benefits of this job creation could positively impact up to 860,000 citizens in Indonesia according to BCG analysis.

A transition towards EVs will also deliver significant environmental benefits, with an annual CO2 emissions reduction of 0.48 tons per vehicle per year. That emissions benefit is only likely to increase as Indonesia's energy mix transitions towards greener, low-carbon power solutions. Replacing 12.5 m ICE vehicles with e2Ws by 2030 could save 6.1 m tons of CO2 emissions—equivalent to 4% of Indonesia's total transport emissions—while also conferring IDR 4.5 tr total social cost savings via reduction in negative climate impact in areas such as agriculture, health, and other aspects of the economy.

B. Current situation diagnostics

Current state of e2W industry

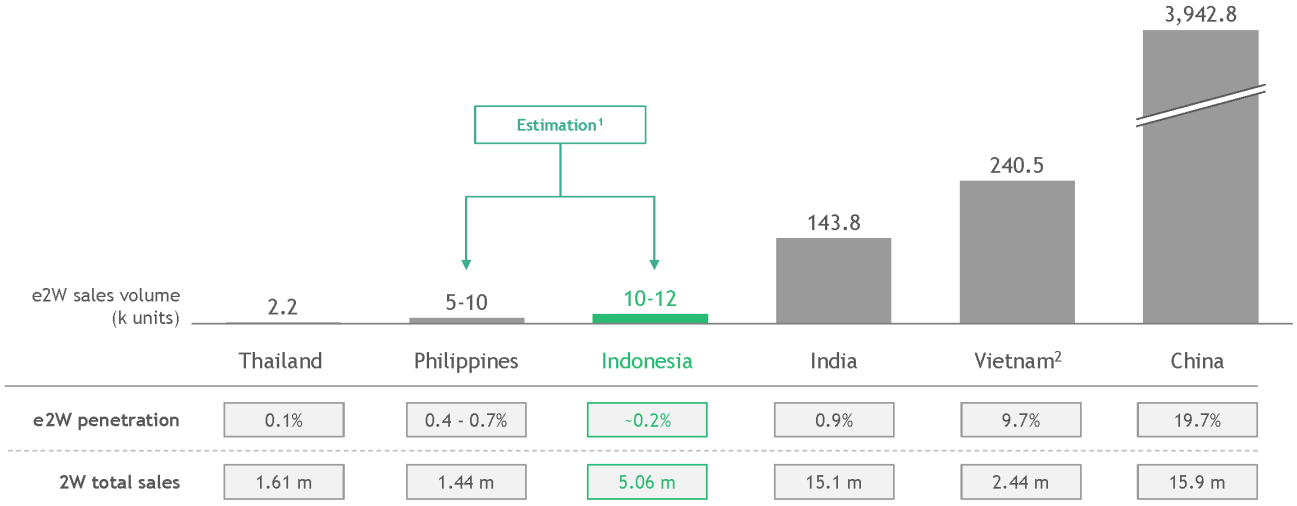
Indonesia's EV industry is in a relatively nascent stage, with significant growth potential. Indonesia's 5.06 m e2Ws represent just 0.2% of total 2W vehicle sales as of 2021, trailing that of Philippines (0.4-0.7%), India (0.9%), Vietnam (9.7%), and global leader China (19.7%), although slightly ahead of regional neighbor Thailand (0.1%).

Holistic development strategies are required to transform this potential into accelerated industry development.

Local players are already gaining a head-start in Indonesia's domestic e2W market, dominating early manufacturing with a variety of models, with prices typically ranging from ~IDR 13 m to ~IDR 35 m. A number of foreign manufacturers are also operating within the market, with rival models announced costing between ~IDR 11 m up to high-end models at ~IDR 84 m—although some of these models are yet to become available for public purchase.

Charging infrastructure remains relatively limited, with just 86 public vehicle battery swapping station (BSS) locations and 155 public electric vehicle charging stations at the time of writing. The majority of charging infrastructure today is heavily focused on Java, which is home to 75% of total charging stations, with half of all Indonesian charging stations located in Jakarta as of 2021.

Exhibit 2. Sales volume and penetration of e2W industry



1. Indonesia: e2W vehicle parc as of 2021 is estimated to be 12 k, with 2020 vehicle parc estimated at 1.9 k, Philippines: e2W sales were 5 k in 2019 and 3 k in 2020

2. 2020 figure

Source: Statista; ICCT; AISI; Frost & Sullivan; Press search

Existing policy measures

Indonesia has adopted a number of supportive policies to drive EV development, stimulating demand and supply across multiple clusters to boost end-user adoption and industry investment. These efforts are driven by agencies such as the Ministry of Finance, Ministry of Investment, Ministry of Energy and Mineral Resources, PLN, as well as presidential decree.

On the demand side, the range of measures include tax incentives and preferential access to vehicles. On the supply side, existing measures include tax incentives for manufacturers, efforts to reduce the regulatory burden, and capability-building initiatives.

Infrastructure and enabler related measures are also being adopted to stimulate across both supply and demand, including support for charging networks, and industry standardization efforts.

Exhibit 3. Existing policy measures in Indonesia

Policy clusters		Policy (4W + 2W / 4W only)	Ministries in charge
Demand	End-user financial incentives	• Lower risk weight of 75% for loans for EV purchasing (compared to 100% for other industries)	Financial Services Authority
	End-user tax incentives	• Luxury goods tax reduction for EVs - 0% for BEV/ FCEV if local content requirement met	Presidential decree; Ministry of Finance
	Preferential access	• Exemption from road restrictions • Parking fee discount	Presidential decree
Supply	Manufacturer financial incentives	• Lower risk weight of 75% for loans for EV value chain activities (compared to standard 100%) and exemption from maximum credit limit if guaranteed by BUMN	Financial Services Authority
	Manufacturer tax incentives	• CIT holiday (up to 20 years) for investment in EV industry • Import duty exemption on SKD kits for EV	Presidential decree; Ministry of Finance
	Regulatory hurdle reduction	• Government grants free access to government owned BEV-related technology to EV players	Presidential decree
	Capabilities building	• Tax deduction of up to 300% of costs incurred in R&D, technological innovation activities and industrial vocation • Professional certification for battery industry	Presidential decree
Infra. & enablers	Sales & emission regulations		
	Charging network support	• Discounted rate for home power capacity upgrade & special electric price rates up to 30% for home charging • 35% - 50% discount on electricity rates given to SPKLU business • Ease of SPKLU licensing (simplified process steps)	Minst. of Energy & Mineral Resources; PLN State Electric Company
	Industry standardization	• Setting up product certification & technical standards for EV industry (standards for EV charging infra. in place)	Minst. of Energy & Mineral Resources; Ministry of Investment; Presidential decree

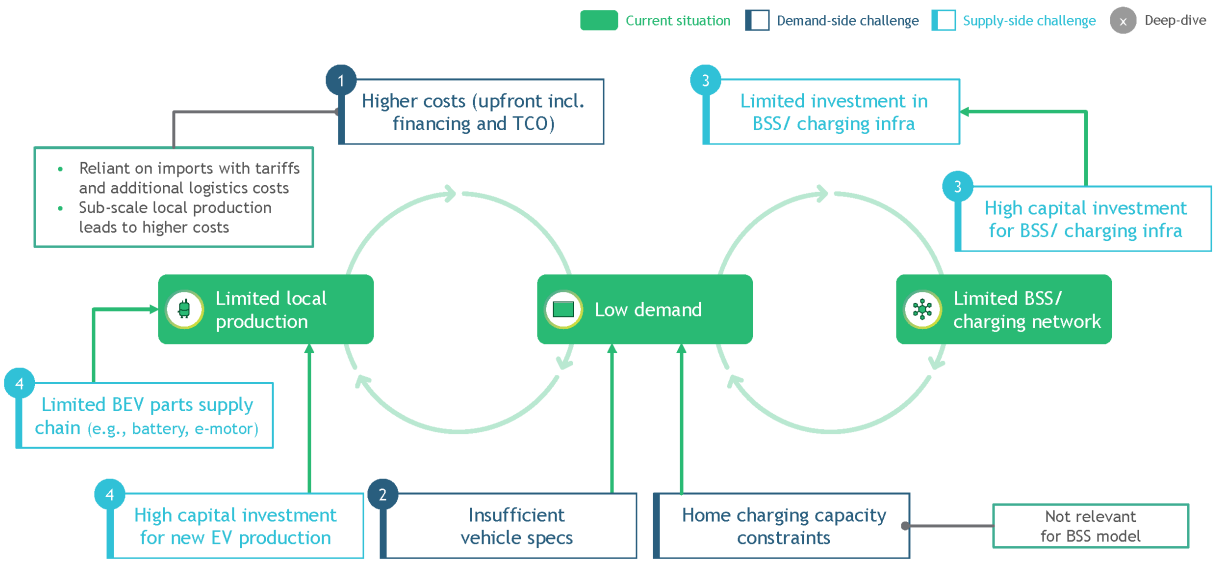
Source: Presidential decree; Ministry of Finance; Ministry of Energy & Mineral Resources; Ministry of Investment; PLN; OJK

Challenges and obstacles

Indonesia's nascent EV industry is faced with a number of critical demand and supply challenges which must be overcome to progress to the next level. That includes demand side challenges which incorporate home charging capacity limitations, insufficient vehicle specifications, and higher costs for upfront purchase including financing and total cost of ownership (TCO).

On the supply side, limited investment in capital-intensive charging infrastructure, high capital investment needs for new EV production, and limited BEV parts supply are stifling growth.

Exhibit 4. Existing challenges in Indonesia



Source: Stakeholder interviews; BCG analysis

Higher costs. Upfront cost remains a key buying factor for the retail mass market, with purchasing costs and down payment requirements for e2Ws still above that of traditional ICE models. "End-user subsidies to bring down sticker price will be key for adoption," said one manufacturer.

Consumers looking to purchase new e2Ws are facing a pricing difference of around IDR 5 m to IDR 11 m against comparable ICE models. "I'm willing to pay a maximum of 25% more for e2W than ICE if the specs are the same," said one Indonesian consumer. "I'm willing to pay additional USD 100-150 compared to a previous ICE. However, I need to compromise some specs," said another Indonesian consumer.

Financing costs for the purchase of an e2W are also currently higher than ICE vehicles, with one popular e2W model requiring a down payment equivalent to 16% of the total cost, compared to 14% for a comparable ICE model. "There are higher down payment and monthly installments required for e2Ws, mainly due to risks with battery residual value," said one manufacturer.

TCO is a particularly important point for heavy commercial users, with e2W TCO higher than that of entry-level ICE vehicles. "The current monthly BSS subscription fee is IDR 250-300,000 higher compared to my fuel cost, while I can only save around IDR 30-50,000 in maintenance per month," said one user. "The current TCO of e2Ws is high due to limited local production scale and reliance on imports," said one manufacturer.

Analysis indicates that the six-year TCO for an e2W with a maximum speed of 70 km/h and 50 km travel distance per charge is approximately IDR 66.6 m, compared to IDR 61.6 m for a mid-end ICE two-wheeler with a fuel range of ~200 km and top speed of 110 km/h, or IDR 47.1 m for an entry level ICE two-wheeler with a range of 160-180 km and top speed of 94 km/h.

Insufficient vehicle specifications. Limited maximum speeds and modest battery power ranges remain major hurdles for adoption of e2Ws, with maximum speeds typically no greater than 70 km/h, and maximum ranges typically no further than 60 km per charge per battery. "A major roadblock for Indonesian consumers is the lack of range and power of e2W batteries," said one manufacturer.

However, the dynamics of an e2W motor do offer some unique opportunities for users according to one Indonesian consumer who noted "we enjoy the comfort of not having vibrations from the engines and exhaust."

Limited investment in BSS infrastructure. Investment in BSS also remains relatively limited, with high capital expenditure requirements for operators, resulting in challenging affordability for end-users. "Convenience and efficiency is key for heavy users. We cannot spend an hour to charge batteries," said one Indonesian user. The need for widespread infrastructure development is echoed by manufacturers, with one noting "there are currently not enough swapping stations, ideally there should be one every two kilometers, simar to petrol stations."

It costs approximately IDR 7.5 m to IDR 9 m per battery at a BSS location, with no electricity subsidies for operators currently in place. This leads to high subscription fees for users to cover a four-year payback period, with an average monthly cost of IDR 614,000 for e2W compared to between IDR 325,000 and IDR 600,000 for ICE. "BSS operators need support on electricity cost to be operationally viable," said one manufacturer.

Limited local production. The local EV production base in Indonesia remains underdeveloped due to high upfront capital expenditure (CAPEX) requirements and low domestic demand. An estimated USD 120-150 m investment is required to build an e2W production facility capable of 400-500,000 annual production capacity.

An underdeveloped local supply chain for key components is also a notable hurdle. "Sourcing BEV specific parts [battery, e-motor, etc.] locally is a key obstacle," said one manufacturer. Local suppliers of BEV parts are extremely limited, while imported parts impose higher logistics costs and a greater tariff burden. "The cost of batteries alone can be up to 40% of the overall bike components. We need support on battery costs to ensure competitiveness with ICE," said one manufacturer when discussing costs.

Sourcing non-BEV parts can also be challenging, as manufacturers must compete with ICE demand. Local suppliers do exist, but primarily serve the ICE segment, with exclusive and established partnerships. Parts suppliers are also reluctant to commit capacity to supplying customized parts for low-volume e2W manufacturers. "An annual production scale of at least 100,000 units is required to be commercially viable," said one Indonesian automobile manufacturer.

GOJEK PILOT CASE STUDY

Indonesian on-demand digital, delivery, and transport platform GoJek undertook a pilot study to assess the potential commercial viability of e2W vehicles across its ecosystem, looking to explore user behavior, battery range, supply, and BSS network availability. The study incorporated ~300 GoJek 2W riders, trialing e2Ws for everyday operations.

The study revealed average distances travelled of 100-150 km per day for heavy users, with an average battery swapping range of 77 km after a swap, indicating battery capacity of at least 80-100 km is necessary for e2Ws to limit the need for BSS visits to just one per day. It revealed that two or three batteries were swapped per day for riders (up to two batteries could be swapped at a time). It also demonstrated clear 'range anxiety' for riders, with the average battery range before a swap at 31 km, showcasing the need for higher network density of BSS to alleviate fears.

The GoJek pilot case study identified that BSS network availability, vehicle power, and budget were the top three e2W purchasing criteria, with targeted government policy support required to enable these three areas and meet end-user needs:

- **Charging and swapping.** Swapping preferred over charging, but BSS network remains limited. Significant investment in BSS is required to drive e2W adoption. "There is very limited BSS. I would buy [e2W] if BSSs were reliable and entire ecosystem for EV was there."

- **Power and comfort.** Less powerful vehicles in both speed and acceleration compared to ICE alternatives, although drivers enjoyed the comfort advantage of e2Ws. Enhanced components and R&D are required to improve specifications. "I prefer e2Ws due to less noise and better comfort, with no vibrations."

- **Budget.** Heavy users with experience are willing to pay USD 100-150 more for e2W, but inexperienced retail users reluctant to pay more. Investment in local production and finance scheme required to stimulate adoption. "I'm willing to pay additional USD 100-150 compared to previous ICE. However, I need to compromise some specs."

C. Key learnings for future policy development

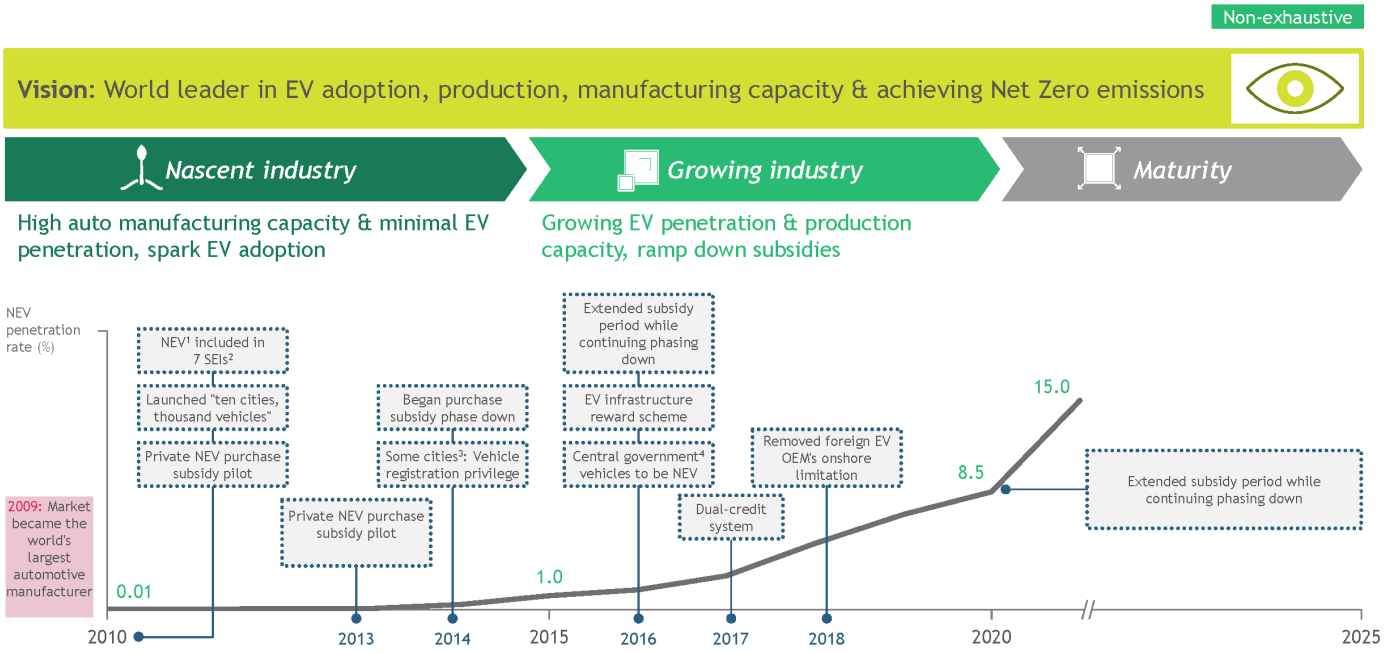
Learning from global benchmarks

In order to inform a successful path forward for e2W growth, we have assessed Indonesia's market potential against benchmark markets from around the world.

Each market had their own success story for EV development. For example, mainland China is a world-leader in EV adoption, production, manufacturing capacity, and net-zero transport emission targets, with EV penetration growing to over 15% of the total vehicle annual sales. In the nascent stage of its EV industry, mainland China already had substantial auto manufacturing capacity but minimal EV penetration.

It introduced subsidies for both consumers and manufacturers in around 2010 to spark industry growth, backed by tax exemptions, EV privileges, and EV adoption targets for public and government agencies. Five years later, in 2015, with the industry enjoying notable growth, these subsidies were adapted and ramped down, with production quotas and tighter emissions limits introduced to maintain industry momentum.

Exhibit 5. EV evolution in mainland China's market



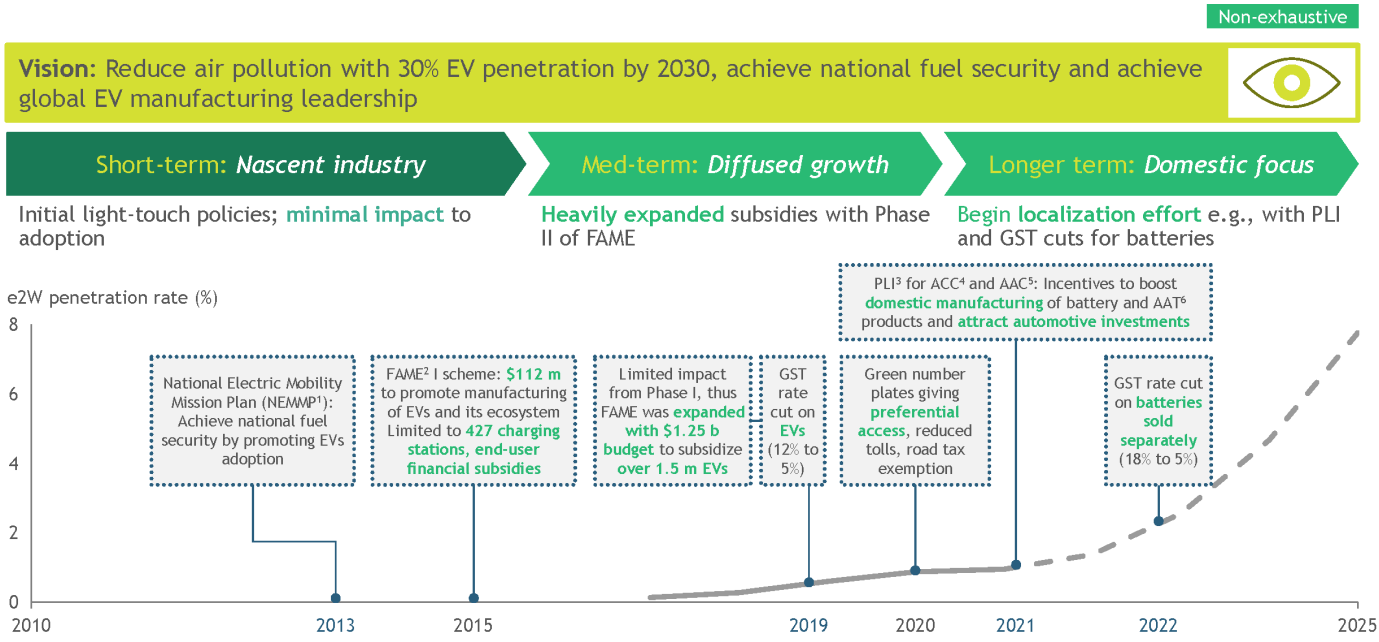
1. NEV = New energy vehicle 2. SEI = Strategic emerging industries 3. Beijing, Shanghai, Guangzhou, Tianjin, Hangzhou, Shenzhen 4. Required half of new vehicles purchased by China's central government be NEV within 5 years

Source: IEA; ICCT; BCG analysis

India offers another relevant example that could echo Indonesia's own future journey, with targets to reduce air pollution through 30% EV penetration by 2030, as part of efforts to achieve national fuel security and global EV manufacturing leadership. It began its EV journey with subsidy and tax exemption incentives, although the light-touch nature of these interventions generated very little initial momentum.

Significant expansions to subsidies in 2019 catalyzed industry growth through Phase II of its Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme, complemented by preferential access to green vehicles, reduced tolls, and road tax exemptions. In later years, India has turned to a domestic focus with tax cuts for EV batteries and production-linked incentives (PLIs) leading to e2W penetration growing at an accelerated pace.

Exhibit 6. India's EV evolution



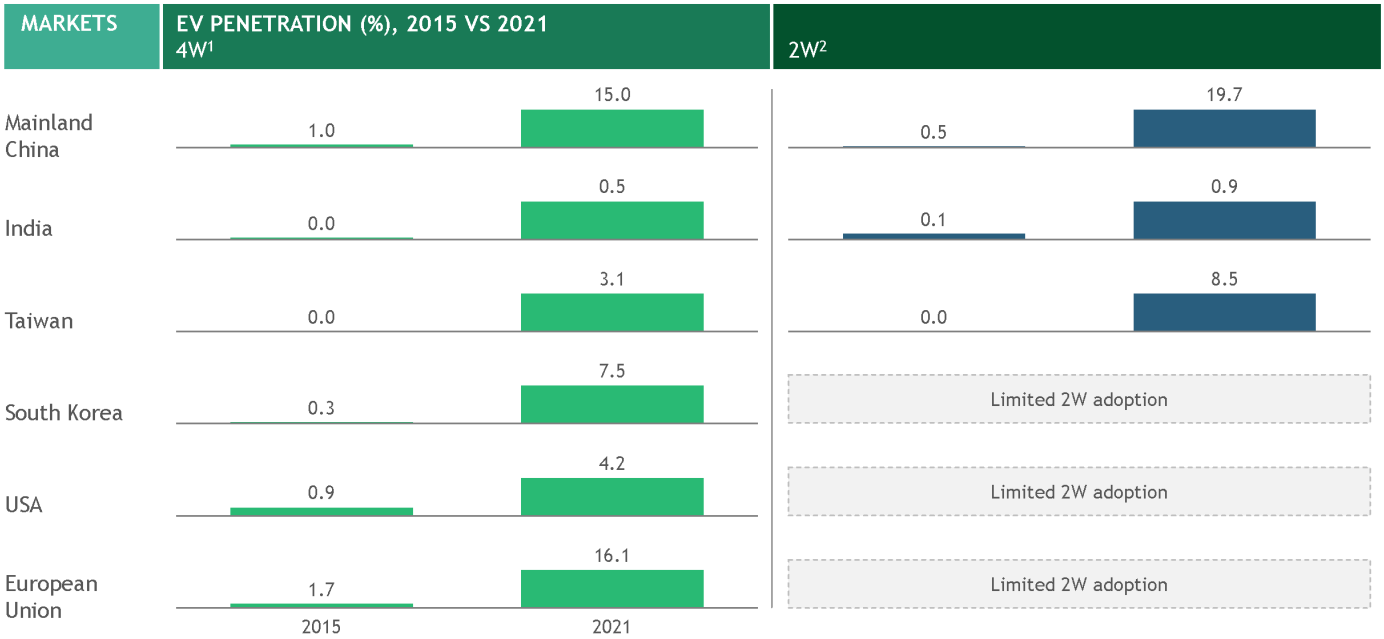
1. National roadmap for EV manufacturing and adoption 2. Faster Adoption and Manufacturing EV in India. Part of NEMMP 3. Production Linked Incentive 4. Advanced Chemistry Cell 5. Automobile and Auto Component 6. Advance Automotive Technology

Data prior to 2017 is unavailable

Source: UBS; IEA; Press releases; BCG analysis

Markets across the world are introducing a range of policies to spur EV adoption across demand, supply, and infrastructure and enabling initiatives. Mainland China's combination of subsidies, incentives, and infrastructure development and support saw e2W penetration grow from 0.5% in 2015 to 19.7% in 2021, demonstrating how end-to-end ecosystem support can energize EV growth. India's accelerating efforts across subsidies, reduced tax, permit exemptions, grants, emissions limits and more has also spurred e2W adoption growth, from 0.1% in 2015 to 0.9% in 2021. Taiwan has leveraged subsidies and tax exemptions across demand, supply, and infrastructure dimensions to spur its e2W industry, reaching 8.5% penetration in 2021. Across South Korea, the USA, and EU, efforts to support e4W penetration also tell a compelling story of how holistic support accelerates EV adoption.

Exhibit 7. Overview of benchmarked markets



1. BEV + PHEV sales of total passenger car vehicle sales 2. Excluding bicycles

Source: IEA; Statista; ICCT

The most common interventions to accelerate EV industry development are in the form of financial and tax incentives, alongside charging network support. End-user financial incentives, end-user tax incentives, and preferential access are used in markets across the world to stimulate demand. On the supply side, manufacturer financial incentives and manufacturer tax incentives, as well as capability building, are widely leveraged, with India, mainland China, and the EU also implementing efforts to reduce the regulatory burden.

Among measures to support infrastructure and enablers, charging network support and industry standardization are also widely used, although these efforts are focused on e4W vehicles in the majority of markets.

Exhibit 8. Overview of policies used by benchmarked markets

e2W e4W

POLICY CLUSTER		Mainland China	India	Taiwan	S. Korea	US	EU
DEMAND	1A End-user financial incentives	✓	✓	✓	✓[2]	✓[2]	✓[2]
	1B End-user tax incentives	✓	✓	✓	*Phased out*	✓[2]	✓
	1C Preferential access	✓[4]	✓	✓	✓	✓[2]	✓
SUPPLY	2A Manufacturer financial incentives[1,2]	✓	✓	✓	✓	✓	✓
	2B Manufacturer tax incentives[1,2]	✓	✓	✓	✓	✓	✓
	2C Regulatory hurdle reduction	✓	✓	○	○	○	✓
	2D Capabilities building	✓	✓	✓	✓	✓[2]	✓[2]
INFRA. & ENABLERS	3A Sales & emission regulations	✓	○	○	○	✓[2,3]	✓[2]
	3B Charging network support	✓	✓	✓	✓	✓	✓
	3C Industry standardization	✓	✓	✓	✓	✓[2]	✓[2]

✓ Currently in place

1. Possible for bilateral negotiations on case-by-case basis; inclusive of broad legislation/policies that include & support EVs 2. Applies to both e2W & e4W

3. Only in California 4. Applies to e4W only

Source: Desk research; Press releases; BCG analysis

DEMAND STIMULATION

End-user financial incentives

End-user financial incentives are core to demand stimulation and often tailored with specific eligibility criteria based on intended outcomes, including reducing emissions, creating more accessible EV adoption, pushing specific EV types, reducing stock of ICE vehicles, and fostering innovation. Incentives come in two broad types—delayed rebate and subsides at the point of sale (POS)—with average e2W price reductions ranging from 14% (US, California) to 40% (mainland China). Germany, France, mainland China and Taiwan leverage delayed rebate, whereby a user pays full price and government approval provides a delayed rebate through transfer to the purchaser—delaying the cash outlay for government by increasing the administrative burden. South Korea, India, France all use POS subsidies whereby lower sticker prices for consumers stimulate adoption, but results in upfront cash outlay for government.

Key considerations for Indonesia: Encourage adoption of zero-emission vehicles (ZEVs) can deliver the maximum impact on EV development. Prioritize low- and mid-price segment for the benefit of the masses. Encourage ICE trade-in to accelerate shift from ICE to EV.

End-user tax incentives

End-user tax incentives are also tailored to varied criteria based on target outcomes, and can be one-off or recurring incentives. Targeted outcomes include lower upfront consumer cost burden, lower recurring costs, lower emissions, accessible and wider EV adoption, channeling sales of specific EV types, and stimulating domestic industry. Mainland China for example exempts e2W purchases from purchase tax which would add 10% to the price of each unit.

Key considerations for Indonesia: Higher tax incentives for ZEVs, and tiered local content criteria, help to encourage local value-add via more localized components. Structure incentives across one-time and yearly reductions to balance decline in government earnings.

Preferential access

Preferential access is conferred through a variety of mechanisms to improve the access and convenience of owning and operating EVs. This preferential access can come in the form of free parking or discounts, reduced road restrictions, toll road discounts, permit exemptions, and dedicated parking spots. As with other demand incentives, these are targeted at outcomes including lower emissions, improved road accessibility, lower operating costs, simplified administration, and improved user convenience, with a variety of these measures adopted in markets around the world.

Key considerations for Indonesia: Alleviating road restrictions is likely to have the greatest impact domestically. Other measures may stimulate small, incremental uplifts in local demand.

SUPPLY STIMULATION

Manuacturer financial incentives

Manufacturer financial incentives are critical to stimulating investments along the EV value chain, and can come in the form of grants or loans. Various eligibility criteria can be used to achieve targeted outcomes, including encouraging localization/local content, supporting specific steps in value chain, targeting specific activities (e.g., limited to local sales) and targeting small or large businesses. India, for example, focuses on grants for both battery and vehicle manufacturing, while France leverages both grants and loans with a focus on vehicle manufacturing.

Key considerations for Indonesia: Localization can be encouraged through on-shore manufacturing requirements. Target battery manufacturing to leverage Indonesia's strategic strengths and natural advantages. Target e2W assembly to reduce production costs and pass savings on to consumers. Offer loans instead of grants to ensure recipients have incentives to perform.

Manufacturer tax incentives

Manufacturer tax incentives can be offered as exemptions or adjustments to encourage local production, with reduced duties on specific categories such as components or raw materials with the goal of spurring local production. Defined periods of relief across timeframes and application areas can encourage business investment while mitigating any reduction to government revenue. Thailand introduced up to 90% reduction through tax exemptions for raw materials required for local battery manufacturing and introduced corporate income tax exemption for up to eight years for qualifying applications in e2W and components production.

Key considerations for Indonesia: Indonesia already has several tax incentives, including corporate income tax holidays for EV manufacturing activities, tax deductions for EV-related investments, and import duty exemptions on semi-knocked down (SKD) automobile kits. Further targeted duty exemptions on selected EV components in the short term could be considered to spur local vehicle manufacturing.

Regulatory hurdle reduction

Initiatives to reduce regulatory hurdles are applied scarcely around the world, but do offer a path to reduce barriers for market entry and encourage manufacturers and operators to enter the market. In mainland China, relaxation of foreign ownership restrictions on automakers was implemented through phasing out regulation over a five-year transition period. In India, government allowed state-owned entities to offer land to private agencies setting up public charging stations.

Key considerations for Indonesia: Potential for relaxation of regulatory restrictions to remove early barriers to entry for prospective market participants along the value chain, helping facilitate supply-side development in the EV industry.

Capability building

Capability building measures can be applied through training and certifications, as well as R&D interventions along the EV value chain. Training provides a path to ensure consistent, measurable, and industry-recognized skilled labor. In the US, for example, The Electric Vehicle Infrastructure Training Program (EVITP) provides training on EV charging equipment/infrastructure. R&D interventions can help ensure developments and improvements to existing products and processes in key industry focus areas, such as the EU's initiative to improve techniques and technologies for raw material extraction, refining, purification, and battery recycling in the battery segment.

Key considerations for Indonesia: Developing national training and certification programs prioritizing battery manufacturing and EV infrastructure could empower industry growth. R&D funding across the EV value chain prioritizing battery technology as a critical component of EV could also spur forward momentum.

INFRASTRUCTURE AND ENABLERS

Sales and emission regulations

Sales and emission regulations typically involve quotas, limits, and penalties which seek to encourage the gradual replacement of ICE vehicles with EVs. These may shift to long-term blanket bans on ICE vehicles, with zero-carbon emission targets and 100% EV penetration. For example, mainland China has set emissions limits of 93 CO2g/km by 2030, down from 117 CO2g/km in 2020, with a production quota rising from 12% to 27% by 2030. Its ultimate aim is to ban the sale of ICE vehicles by 2035.

Key considerations for Indonesia: Encourage EV production and sales through quotas, which relate to the total share of EV against ICE sales volumes. This can be backed with incentives to encourage incumbent ICE manufacturers to pivot to EV production. A blanket ban on ICE vehicle sales can provide a long-term pathway to 100% EV penetration.

Charging network support

Charging network support can be applied to both CAPEX and OPEX to enhance the financial viability of investments. CAPEX support can facilitate direct investments in charging stations by alleviating upfront costs through methods such as direct funding and grants, and tax returns or credits. EU market Austria implemented a USD 30,000 funding per company for DC charging stations, while Italy provided USD 3,000 tax return. OPEX incentives can help facilitate lower ongoing running costs of charging stations, with examples including India reducing goods and service tax (GST) for electricity from 18% to 5%.

Key considerations for Indonesia: CAPEX incentives for charging network investors can foster and encourage roll-out of essential charging infrastructure. Alleviating electricity costs for operators with mandated cost reductions to customers as part of a sustainable commercial model also offers a path to accelerate adoption.

DEEP DIVE: CHARGING SOLUTIONS FOR INDONESIA

Two key charging infrastructure models are used globally—home charging and battery swap stations. Each have their advantages and disadvantages.

Home charging requires minimum home wattage of 1,600 W, slightly above Indonesia's common 1,300 W domestic electricity supply. This not only creates inefficient charging dynamics but also raises the risk of hazardous fires. Home charging infrastructure requires higher upfront costs, but potentially provides lower TCO over the longer term as only a power supply and charger are required. A full charge typically takes five to eight hours.

Battery swap stations can facilitate a battery swap in eight minutes or less, although they require close proximity to a battery swap station to be effective. BSS are still in pilot trials in Indonesia, but growing demand will ensure the feasibility of more user-centric, high-density networks. BSS model involves lower upfront costs, but higher TCO in the long term given the need for operators to be commercially viable.

Industry standardization

Industry standardization across the end-to-end value chain from components, batteries, vehicles, through to charging infrastructure helps foster innovation and encourage mass-adoption. India, mainland China and Taiwan introduced policies to ensure the safety and compatibility of e2W and e4W batteries with BSS infrastructure, including size, weight, capacity of batteries. India and mainland China also introduced programs to encourage specifications parity between e2W and e4W with ICE vehicles and spur technology innovation, while the US, EU, and South Korea all introduced directives to mandate standardized charging station specifications.

Key considerations for Indonesia: Minimum product and equipment standards can help foster innovation and customer acceptance and trust, while standardizing battery specifications and charging stations help ensure nationwide compatibility.

Comparison of Indonesia against peers

Indonesia is moving in the right direction to capture this significant value opportunity, with a broad range of policies across demand, supply, and infrastructure and enablers designed to spur EV adoption. Greater depth of coverage could accelerate this value generation potential, and more rapidly move the nation towards a position as a regional leader.

Prioritization of future efforts would unlock the most value. End-user financial incentives, grants or loans for battery and vehicle manufacturers, complemented by CAPEX/ OPEX support for charging infrastructure (including battery swap stations) are critical in the short and medium term.

Exhibit 9. Comparison of Indonesia vs. peers

		Global best practices	Thailand	Indonesia	Additional measures (Prioritized / *Deprioritized*)
Demand	1a. End-user fin. incentives	✓	✓	✓	End-user subsidies prioritizing BEV
	1b. End-user tax incentives	✓	✓	✓	*Removal of recurring taxes (e.g., road tax) prioritizing BEV*
	1c. Preferential access	✓	○	✓	*(Low priority - preferential access for e2W over ICE could face resistance)*
Supply	2a. Manufacturer fin. incentives	✓	○	✓	Grants/ loans directly from gov. prioritizing battery and vehicle manufacturers
	2b. Manufacturer tax incentives	✓	✓	✓	*Relatively sufficient - could consider less stringent local content criteria in short-term*
	2c. Regulatory hurdle reduction	✓	○	✓	*(Low priority)*
	2d. Capabilities building	✓	✓	✓	*Training & certification, R&D funding prioritizing battery & EV manufacturing*
Infra. & enablers	3a. Sale & emission regulations	✓	○	○	(Long-term) minimum quotas and emission regulations to force BEV prod./ sales
	3b. Charging network support	✓	✓	✓	CAPEX/ OPEX support for battery swap stations
	3c. Industry standardization	✓	✓	✓	*Standardization of battery specs for battery swapping*

Source: Desk research; BCG analysis

Existing policies in Vietnam and Thailand offer a valuable peer comparison to understand Indonesia's current position and inform potential future policies. Vietnam has relatively limited support in place, with discounts on registration fees for BEVs, excise tax deduction, and import tax exemption on EV production.

Thailand has more comprehensive measures across dimensions of demand, supply, and infrastructure and enablers. In particular, Thailand has been able to differentiate itself in the region via its subsidy programs to stimulate end-user demand. This is supplemented by various tax deductions or exemptions, charging network support, and initial efforts for industry standardization.

Exhibit 10. Existing policies in Thailand and Vietnam

4W + 2W 4W only

	Policy clusters	Thailand	Vietnam
Demand	End-user financial incentives	• Subsidy program to support purchase of EV & e2W	• BEV 50-100% exemption/discount from registration fee for the next 5 years
	End-user tax incentives	• Excise tax deduction for e4W from 8% to 2% & e2W down to 1%	• Excise tax reduced to a fifth of original level until 2027
	Preferential access		
Supply	Manufacturer financial incentives		
	Manufacturer tax incentives	• Import duty deduction for EV production • CIT tax holiday for investment in EV industry (batteries, EV components/assembly) for projects with a total investment value of THB 5 b ($160 m) or higher	• Import tax exemption for EV production
	Regulatory hurdle reduction		
	Capabilities building	• Tax deduction of costs incurred in R&D (300% of investment or expenses incurred), training (200%)	
Infra. & enablers	Sales & emission regulations		
	Charging network support	• Reduce requirements for entities to obtain CIT incentives regarding EV charging stations • CIT tax holiday for EV charging station investors for 3-5 years	
	Industry standardization	• Drafted standards for EV-specific industry (e.g., EV specs, safety) • Enforced charging specs for 4W EV & charging stations	

Source: International Trade Administration; Vietnamese government decree; Thai National Electric Vehicle Policy Committee

D. Policy scenario to realize vision

To recap, Indonesia has strong ambitions for its EV industry, particularly for e2W—the Ministry of Industry's EV roadmap targets 25% annual sales penetration with 2.5 m annual production capacity by 2030.

Efforts to deliver on these ambitions will need to be focused in overcoming key ecosystem challenges. On the demand side, that includes addressing challenges around higher costs (upfront and TCO), insufficient vehicle specifications, and home charging capacity constraints. On the supply side, Indonesia will need to address challenges around limited charging infrastructure, limited BEV supply chain, and high capital investment needs for new EV production.

Given Indonesia's strong ambitions and remaining challenges, additional policy support beyond existing measures can be considered. These measures have also found success in other benchmarked markets illustrated in earlier sections. In the short to medium term, the following policy support areas could be prioritized:

1. **End-user financial support**
2. **Manufacturer financial support for localization (grants/loans)**
3. **Charging or BSS infrastructure support**

1. End-user financial support

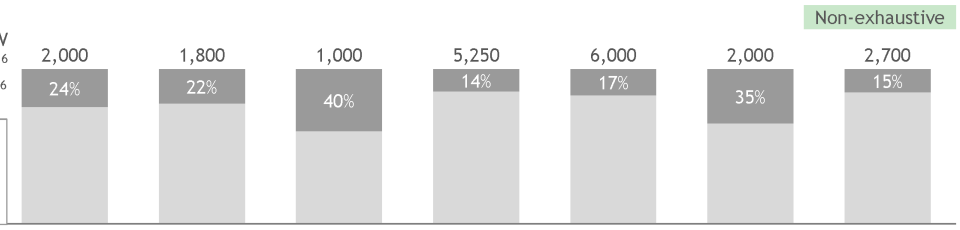
End-user financial incentives are particularly powerful universal tools to drive adoption, and benefit from the ability to be uniquely tailored to specific criteria based on additional intended outcomes.

Subsidized pricing for e2Ws is in place in many markets around the world, including neighboring Thailand where eligible purchasers enjoy a 24% reduction on average purchase prices, India (22%), mainland China (40%), South Korea (35%) and Taiwan (15%).

Exhibit 11. End-user financial incentives benchmarks

Key takeaways for Indonesia

Encourage ZEV for maximum impact on EV development; prioritize low-mid price segment for the benefit of the masses; encourage ICE trade-in to accelerate shift from ICE to EV



Tiered criteria	Criteria outcome	Thailand	India	Mainland China	US *(California)*	Germany	S. Korea[4]	Taiwan
Vehicle emissions[1]	Encourage lower emissions		✓	✓	✓		✓	
Vehicle pricing[2]	More accessible, wider EV adoptione lower emissions	✓	✓	✓	✓	✓	✓	✓
Type of vehicle[3]	Channel sale of specific EV type	✓	✓	✓	✓	✓	✓	✓
Voluntary ICE trade-in	Reduce stock of ICE & emissions				✓	✓		✓[5]
Vehicle range	Foster battery innovation	✓	✓	✓		✓		

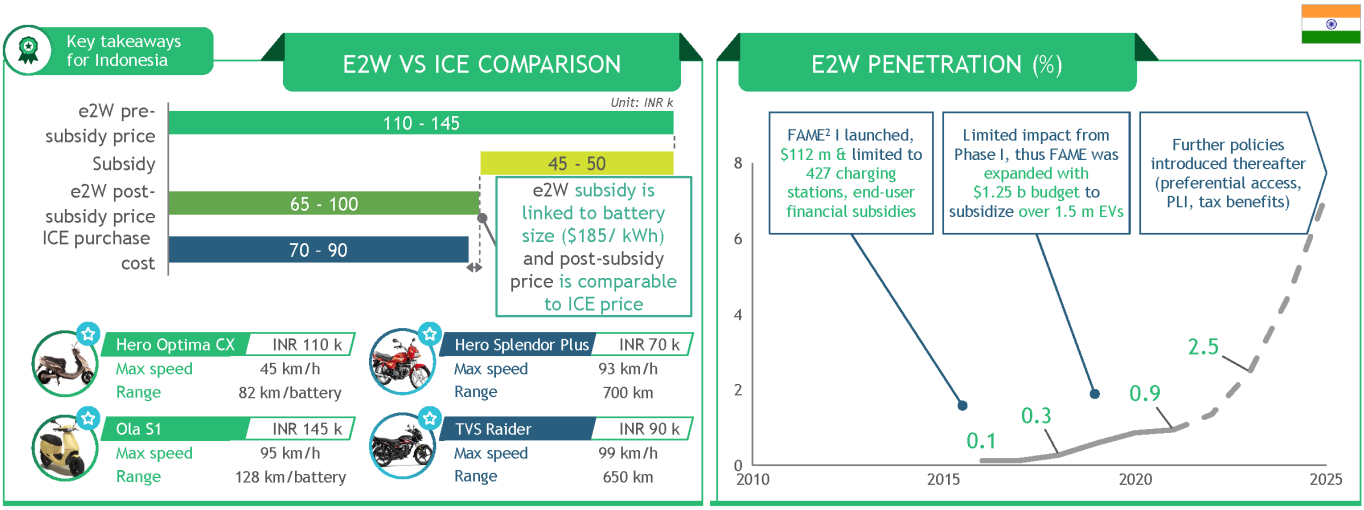
Note: Some tiered criteria for 4W only 1. Measured in CO2/ km; lower emissions attracts a higher subsidy 2. Lower priced vehicles with a higher subsidy 3. Differentiated subsidy depending on type, e.g., BEV, PHEV; vehicle type such as 2W, 4W 4. Capped at 20 k e2W; preference give to e2W for commercial use 5. Applicable in some cities (e.g., Taoyuan) 6. Price and subsidy will depend on model and eligibility

Source: European Automobile Manufacturers' Association (ACEA); IEA; Press releases; BCG analysis

India's recent efforts to spur EV adoption offer a valuable peer example that could inform Indonesia's own end-user financial incentives. Its subsidies are linked to the battery size of the e2W, providing a subsidy of USD 185/kWh, reducing e2W costs to roughly equivalent to an ICE model.

India's Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme was launched with USD 112 m investment in 2015. However, the limited budget meant the impact on adoption was minimal. Only after extending to a meaningful budget of USD 1.25 b did India's e2W penetration begin to take off.

Exhibit 12. Deep-dive into India's end-user financial support



Key takeaways for Indonesia

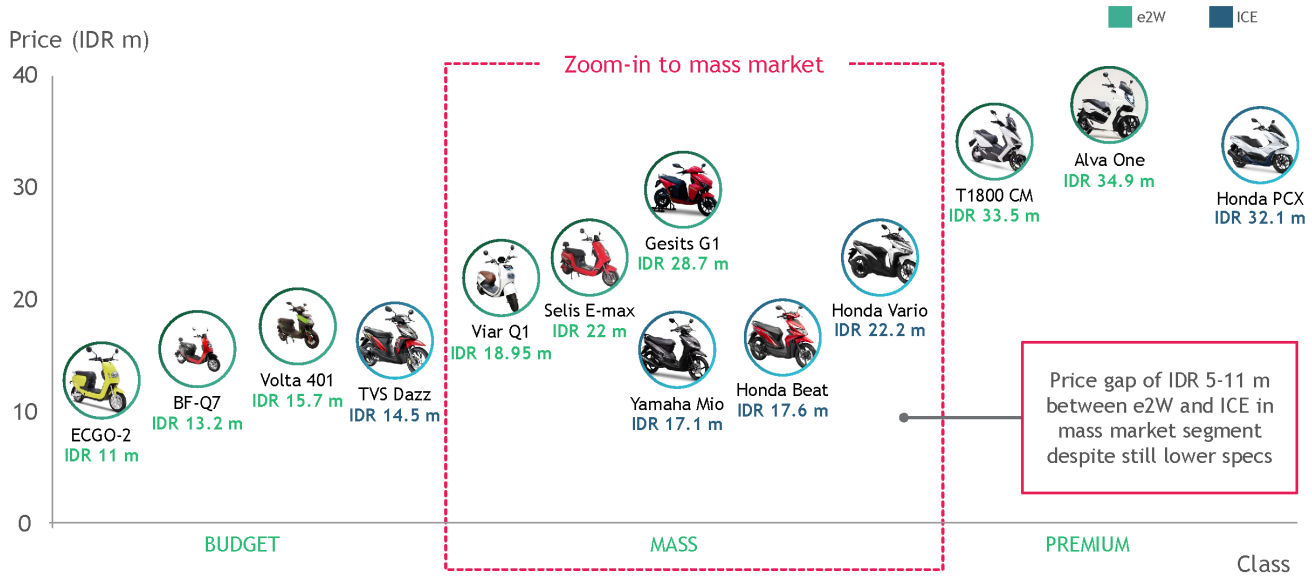
Incentives for end-users required to catalyze the industry and bring e2W & ICE price parity closer

Source: Desk research

India's adoption initiatives reveal the important role end-user incentives will play in Indonesia to achieve cost parity between e2W and ICE, in order to jump-start EV industry growth.

Our analysis indicates that closing that gap between ICE and e2W for the mass market segment in Indonesia will required IDR 5 m to IDR 11 m in incentive per vehicle, despite the lower specifications of e2Ws.

Exhibit 13. Indonesia e2W examples



Source: Desk research

2. Manufacturer financial support for localization (grants/ loans)

As illustrated in earlier sections, in addition to tax incentives, markets globally are leveraging manufacturing financial incentives which are tailored across relevant criteria to drive development of local supply chain and vehicle manufacturing. Such incentives come in the form of grants and loans and can be applied on activities along EV value chain. This demonstrates the broad opportunities Indonesia is presented with to stimulate industry growth.

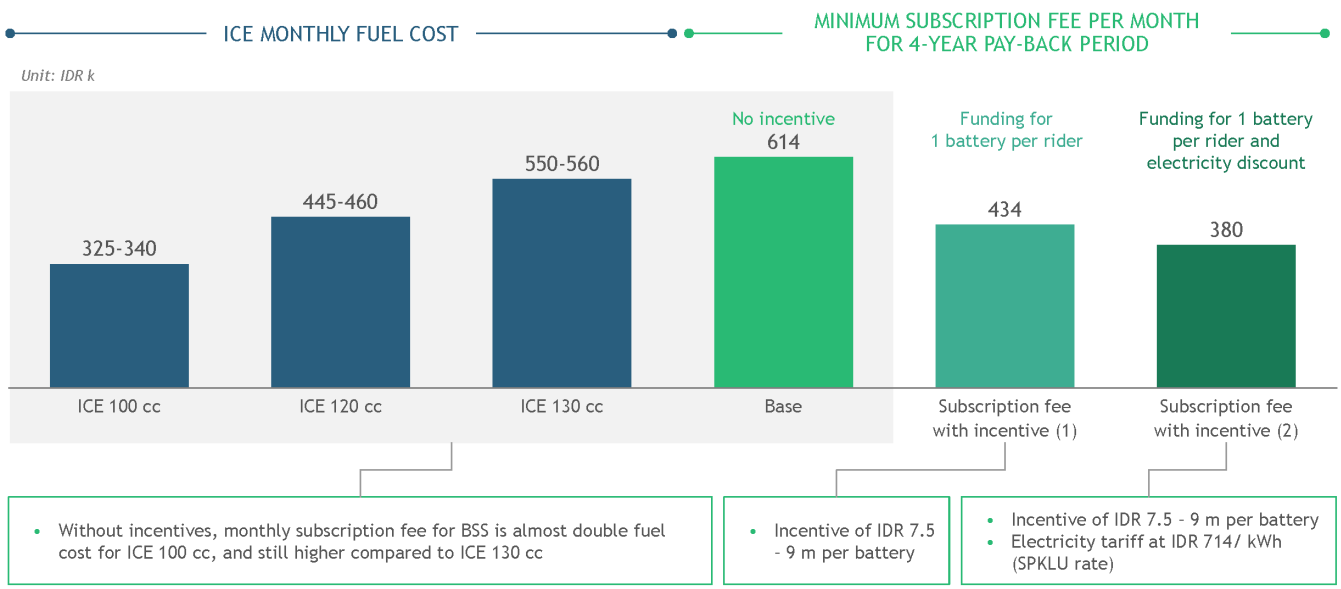
Provision of financial incentives via grants or loans is an important factor driving choice of location for manufacturers along the EV value chain. Attracting investments in local manufacturing is vital for economic value creation in Indonesia. To establish a regionally competitive position, introducing manufacturer financial support may be critical for Indonesia.

3. Charging or BSS infrastructure support

One key intervention in Indonesia is likely to be provision of a charging model fit for the local landscape. BSS is likely to be the most effective solution in this regard, bypassing challenges around home charging suitability.

In the event a BSS model is chosen, funding for one battery per rider and electricity tariff discounted to SPKLU rate is required for commercial viability.

Exhibit 14. Comparison of ICE fuel costs and e2W subscription fees for BSS model



Note: Assume average travel distance per vehicle per day is 50 km, ICE fuel efficiency is 50 km/ l, electricity efficiency is 50 km/ 1.4-1.7 kWh

Source: GoTo pilot study; Press search; BCG analysis

Without incentives, the monthly subscription fee for BSS is almost double the fuel cost for a 100 cc ICE vehicle, and still significantly more than a 130 cc ICE vehicle. Funding for one battery per rider would reduce this monthly cost to IDR 434,000 per month for a typical EV, and the addition of an electricity discount setting a tariff to IDR 714/kWh would reduce the monthly cost to IDR 380,000—roughly on par with a 100 cc ICE vehicle.

THREE GUIDING QUESTIONS FOR POLICY SCENARIO

There are three key questions which should be asked to help guide decision makers and policy makers in Indonesia:

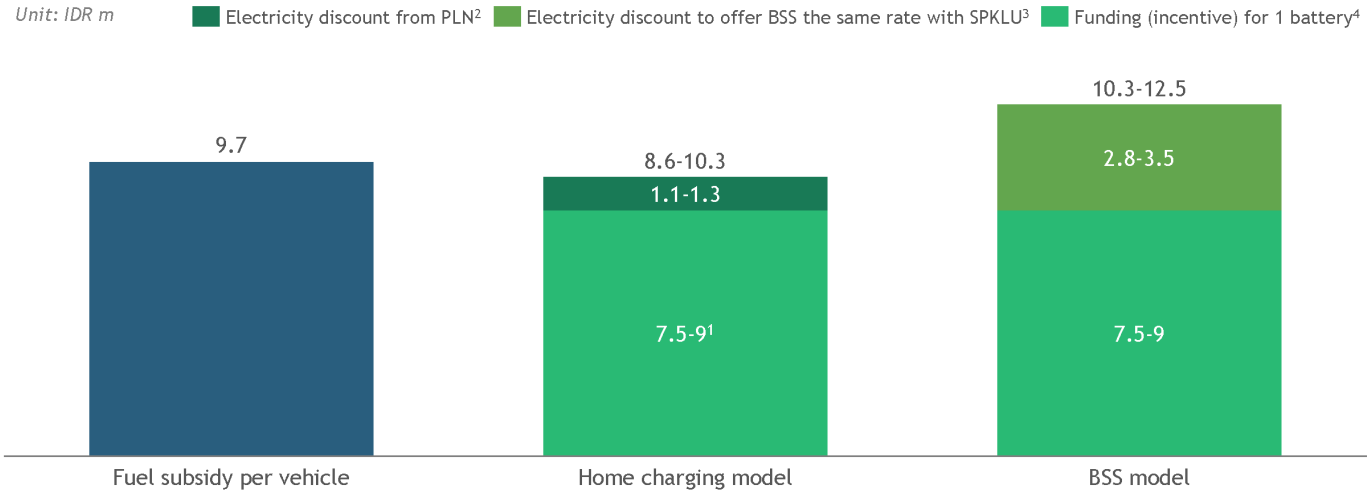
1. **Funding:** How can the required policy support be funded?
2. **Phasing:** How can we best phase policies, including timing, eligibility criteria, parts localization, and infrastructure rollout?
3. **Stakeholder mapping and coordination:** How are responsibilities and roles mapped across government stakeholders, and how would coordination work?

1. Funding

Over an average six-year lifetime of an ICE vehicle, roughly IDR 9.7 m is spent on fuel subsidies. This amount is roughly similar to the funding of cost of one battery per rider (per vehicle) and electricity costs (for either home charging or BSS model).

That said, the challenge of high upfront cash costs to fund incentives remains.

Exhibit 15. Comparison of fuel subsidy spending for ICE and incentives required for e2W over 6-year lifetime



1. Within range of price gap of up to IDR 11 m between e2W and ICE 2. Based on average electricity subsidy from PLN 3. Subsidy needed to reduce from IDR 1644/ kWh to IDR 714/ kWh in electricity tariff for BSS 4. For battery of 1.7-3 kWh with the price of $200-300/ kWh

Note: Assume 6 years as e2W lifetime, average travel distance per vehicle per day is 50 km, ICE fuel efficiency is 50 km/ l, electricity efficiency is 1.4-1.7 kWh/ 50 km

Source: Press search; BCG analysis

While analysis of cumulative spending incentives indicates a total cost higher than the projected savings on subsidized fuel via shift to e2W, looking at the wider cumulative economic value creation offers a more encouraging picture for Indonesia. It's estimated that Indonesia could unlock IDR 746.3 tr of cumulative economic value creation through accelerated adoption of EVs and rapid industry development by 2030.

This cumulative economic value creation is 15-times the gap between incentive spending and fuel subsidy savings via shift to e2W by 2030.

Exhibit 16. Comparison of incentive spending, fuel subsidy saving and economic value creation by 2030

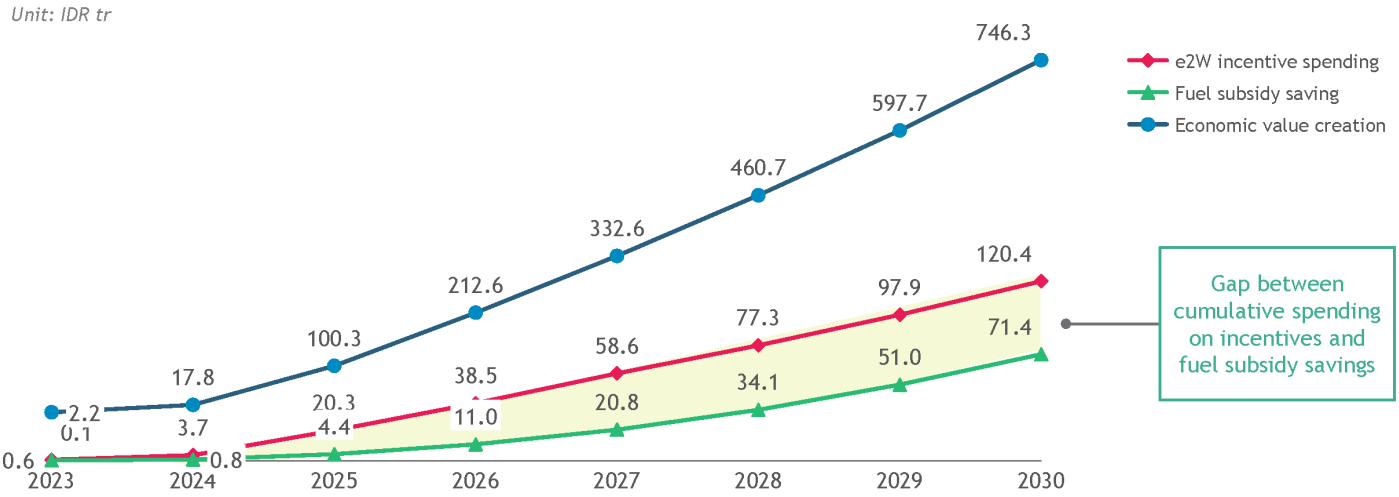
Note: Assume 6 years as e2W lifetime, average travel distance per vehicle per day is 50 km, ICE fuel efficiency is 50 km/ l, electricity efficiency is 1.4 kWh/ 50 km, subsidy for fuel is IDR 4,450/ liter, subsidy for electricity is IDR 343-930/ kWh, Multiplier effect of economic value creation is 2.5

Source: BCG analysis

The gap between cumulative spending on incentives and fuel subsidy savings remains, and indeed expands slightly, on current projections.

However, the cumulative economic benefits grow at a rate which far outpaces this shortfall.

Exhibit 17. Cumulative spending on incentives, fuel subsidy savings and economic value creation



Note: Assume 6 years as e2W lifetime, average travel distance per vehicle per day is 50 km, ICE fuel efficiency is 50 km/ l, electricity efficiency is 1.4 kWh/ 50 km, subsidy for fuel is IDR 4,450/ liter, subsidy for electricity is IDR 343-930/ kWh, Multiplier effect of economic value creation is 2.5

Source: BCG analysis

2. Phasing

The optimal approach for Indonesia is likely to be a phased policy strategy, which jump-starts local adoption and local manufacturing in the short term, while optimizing long-term costs. The most effective short-term interventions are likely to be demand-side incentives which aim for price/ TCO parity, while grants and loans are introduced on the supply side to stimulate manufacturing, supported by relaxed regulation on import of key parts and achievable local content requirements which are critical to ensure local manufacturing is feasible in the short-term. Support to roll out BSS and charging infrastructure, particularly in densely populated urban areas, will also be a critical immediate-term step.

In the medium to long term, Indonesia's demand-side incentives can be tightened and phased out, as EV penetration grows to deliver a more organic market ecosystem. Increased local content requirements and phased down tax and financial incentives can be considered as the supply chain matures on the supply side. Infrastructure and charging system enablers can be rolled out to further tier 2 and tier 3 cities while gradually lowering financial support, at the same time ramping up EV sales targets and production quotas.

Exhibit 18. Policy phasing strategy

	Policies		Immediate-term	Medium-term	Long-term
	Existing	Potential enhancements	Provide initial catalyst to kick-start industry	Phase-down incentives and tighten criteria	Phase-out incentives and introduce quotas
Demand	Lower risk weight for EV loans, luxury goods tax reductions, road restriction exemptions	End-user financial incentives	Catalyze adoption: strong incentives for price/ TCO parity	Phase-down gradually: lower incentive value and tighten eligibility criteria	Phase-out: phase out financial incentives (as EV adoption matures)
Supply	Lower risk weight for EV value chain loans, tax/ duty reduction and holidays, technology access, certifications	Manufacturer financial incentives for localization (grants/ loans)	Catalyze local production: grants/ loans to kick-start local production, allow parts import	Ramp-up localization and phase-down incentives: increase local content requirements as supply chain matures and phase-down tax/ financial incentives	Phase-out: phase out tax/ financial incentives (as EV industry matures)
Infra. & enablers	Capacity upgrade discounts, electricity rate discounts, simplified charging station licensing, product standards	Charging/ BSS infra. support Minimum EV quotas (long-term)	Roll out infra. support in urban cities: CAPEX/ OPEX support in high vehicle/ population density areas	Expand geographical coverage while tightening incentives: Extend support to tier 2/ 3 cities and towns while gradually lowering incentive amount	Introduce EV quotas: gradually ramp up minimum EV sales/ production quotas to reinforce EV industry maturation

Source: Stakeholder interviews; Desk research; BCG

End-user incentive strategy. Typically, eligibility criteria for end-user incentives are tightened over time as EV adoption grows, with markets tightening criteria in line with their own intended objectives and market conditions. Leading EV market mainland China cut down incentives and tightened eligibility as EV adoption expanded, from subsidies of around USD 10,000 per e4W in 2012 to far more limited subsidies applying only to high-specification EVs by 2021 when penetration had reached over 15%.

Localization strategy. In order to build a sustainable industry ecosystem, Indonesia can look to a strategic long-term view of localization requirements to facilitate short-term vehicle production and long-term local supply chain development. In the short term that can include a defined national strategy with clear prioritization of value-chain activities in areas such as battery manufacturing, with minimum local content requirements and duty exemptions to ensure improved commercial viability for vehicle manufacturing.

As the industry matures in the medium term, a robust industry assessment can be undertaken to identify those components still reliant on imports, with targeted measures to provide availability of these components for imports while tightening localization requirements in other areas. With the industry approaching a fully mature status in the longer term, as the majority of components reach scale and commercial viability, local content requirements can be tightened to foster further local supply chain development. For Indonesia, phasing of localization requirements is needed to facilitate vehicle production in the short term and local supply chain development in the long term

Infrastructure strategy. Infrastructure support could be most effectively targeted at Indonesia's major urban centers to have the greatest early impact, prioritizing areas such as DKI Jakarta, East Java, and West Java, where population and vehicle ownership is high.

Putting in place measures that require operators to share infrastructure rollout plans to access government incentives could be a valuable addition to this strategy, while also prioritizing government support for operators investing in infrastructure in major population centers.

3. Stakeholder mapping and coordination

An integrated and aligned policy strategy is key to delivering holistic benefits for t he nation. To e nable this, a clear strategic framework and delineation of responsibilities across key agencies and decision makers is required:

- Clear designation of an entity or entities for coordination and final decision making
- Clear delineation of roles and responsibilities across entities
- Aligning mutual interests to reach consensus across agencies
- Inclusion of private sector and industry associations to collect inputs and feedback on policy drafts

For example, in Taiwan, electric scooter maker Gogoro acted to align with the agenda of various government agencies, engaging in discussions to inform industry growth, resulting in a number of incentives to promote e2W BSS infrastructure. Government in turn had to look to balance this promotion of EVs with demands by ICE manufacturers seeking government support to align with emission standards, and potential price wars between ICE and EV technologies.

Government established how EV adoption could align with key national agendas such as The Environmental Protection Agency's goal to reduce emissions, with the Ministry of Transport and Communication (MOTC) aiming to deliver 35% e2W penetration by 2030, backed by standardized charging infrastructure, while the Ministry of Economic Affairs (MOEA) announced net-zero targets by 2050. The Ministry of Finance (MOF) was given responsibility for budgets for financial incentives for EVs, while the MOTC was responsible for measures related to broader transport strategy. Central government subsidies were delivered by MOEA, Ministry of the Interior (MOI), and MOF, further supported by various local government incentives.

Gogoro collaborated with government to address the prohibitive cost of e2W batteries, and the TCO of the technology compared to ICEs. It aligned with government targets to reduce pollution, deepen penetration of e2Ws, and lead on the net-zero goal through low-carbon transport. By partnering with government, CAPEX investment in BSS was split 45%-55% with the government, and a 30% e2W subsidy resulted in end-users paying a reduced cost, with dealers claiming back subsidy costs from government.

The success of this initiative offers a valuable insight for decision makers in Indonesia, revealing how mutually beneficial partnerships can align private sector needs with government ambition to catalyze EV industry growth.

In India, design and execution of the FAME strategy involved multiple stakeholders, with the ministry in charge of decision-making delegating coordination to a public policy think tank National Institute for Transforming India (NITI). This strategy integrated parties including the Prime Minister's Office, Ministry of Heavy Industries (MHI), Ministry of Road Transportation (MRT), Ministry of Power (MOP), Ministry of Finance (MOF), and NITI. MHI and MRT led execution from the public angle, and manufacturers and sellers led the private-sector implementation.

Coordination of this initiative was undertaken using a roundtable format, bringing parties together to inform guidelines, with the funding ministry having the final say. Private sector players engaged with soft lobbying to pass industry knowledge and expectations on to decision makers.

India's approach shows how clearly defined roles and responsibilities, backed by a roundtable format for open discussion and feedback from both public and private entities, could from an effective strategy in which the private sector plays an active role.

In Indonesia, presidential decree no.55 2019 has provided a nationwide agenda to define the country's EV journey, with a coordinating body—led by the Coordinating Minister of Maritime and Investment Affairs—set to assist in realizing this vision. This delegated body is complemented by key ministries. Ministry of Industry, Ministry of Transportation, Ministry of Home Affairs, Ministry of Energy and Mineral Resources, Ministry of Tourism and Creative Economy, Ministry of Foreign Affairs, Ministry of Trade, local governments and state-owned enterprises were assigned to applicable programs within the overarching strategy over established timeframes for industry growth.

Coherent and effective collaboration provides a path to future industry growth, with widespread socio-economic and environmental benefits ready to be unlocked in Indonesia, driven by a rapidly emerging e2W industry poised to generate up to USD 11.4 b (~IDR 171 tr) in economic value by 2030, adding up to ~215,000 jobs, providing a low-carbon transport solution for the future, and delivering a cumulative economic value creation of up to IDR 746 tr by 2030.

Acronyms

2W	Two wheeler
b	Billion
BEV	Battery electric vehicles
BSS	Battery swapping station
CAPEX	Capital expenditure
e2W	Electric two-wheeler
e4W	Electric four-wheeler
EVITP	Electric Vehicle Infrastructure Training Program
FAME	Faster Adoption and Manufacturing of Electric Vehicles
GST	Goods and Service Tax
GWh	Gigawatt hour
ICE	Internal combustion engine
k	Thousand
km	Kilometers
km/h	Kilometers per hour
kWh	Kilowatt hour
m	Million
OPEX	Operational expenditure
PHEV	Plug-in hybrid electric vehicle
PLI	Production-linked Incentives
POS	Point Of Sale
TCO	Total cost of ownership
tr	Trillion
W	Watts
ZEV	Zero-emission vehicle

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