

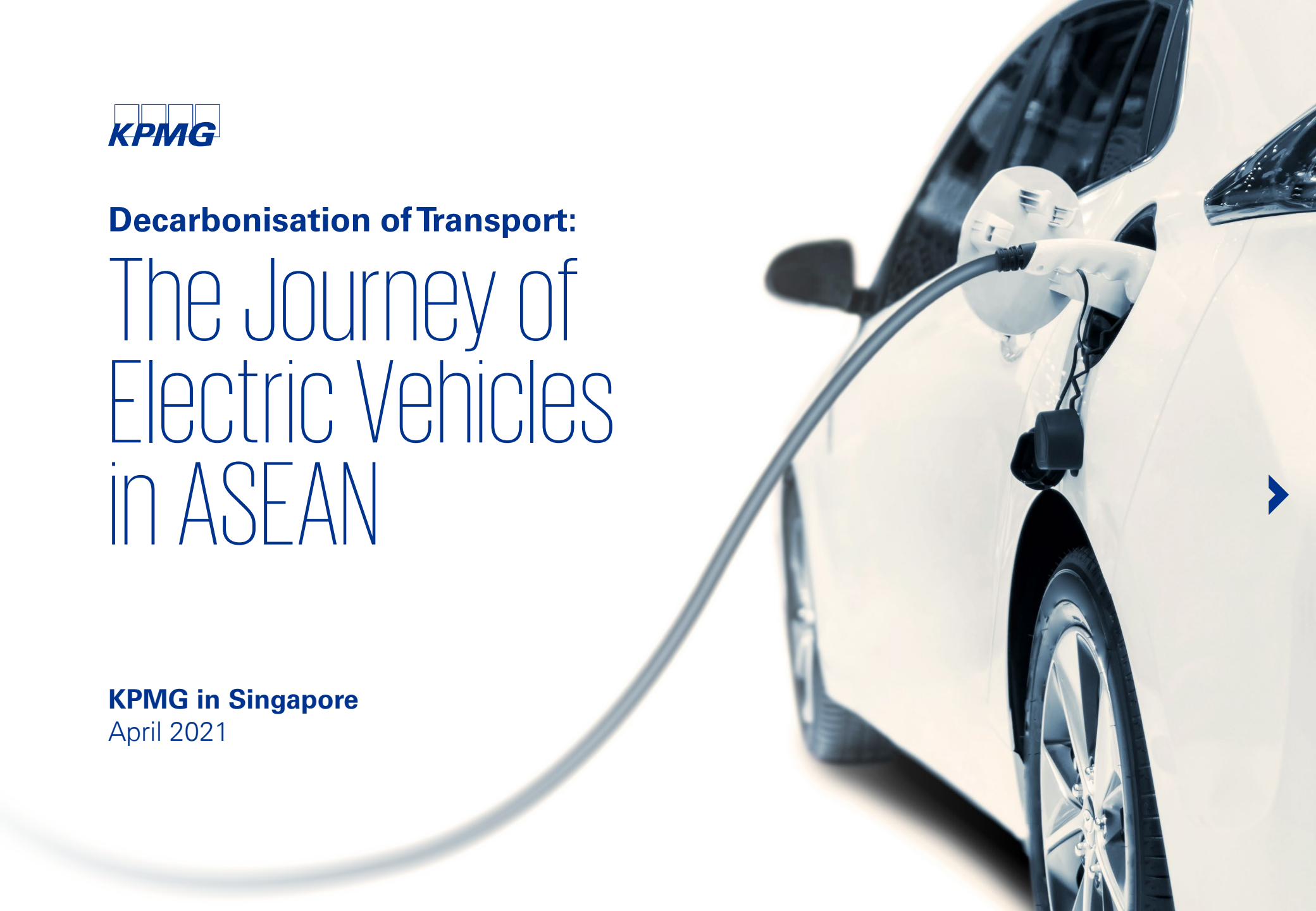


Decarbonisation of Transport:

The Journey of Electric Vehicles in ASEAN

KPMG in Singapore

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Foreword

With the growing focus on mitigating climate risks and achieving the Paris Agreement goals for 2050, countries worldwide are realising the importance of decarbonising the transport sector—which accounted for one-fourth of the global greenhouse gas (GHG) emissions in 2019. ASEAN governments and businesses have a once in a century opportunity to shape and participate in building a significantly decarbonised land transport sector. Covid-19, which has significantly changed the ways of working and commuting, provides this opportunity to alter the trajectory of how land transport ecosystems evolve in the biggest ASEAN cities.

In many ways, the catalyst for these developments has been China's bold stated ambition of net zero by 2060, which Japan and Korea following with their own net zero goals. In transport, the development of Electric Vehicles (EVs) is the most significant development, with significant capital being committed to the rapid commercialisation of this technology and the value chain to support it. Other nascent technologies like hydrogen hold much promise and will have a vital role to play in decarbonising the transport sector also. The entire transport sector will be altered beyond recognition in the next few decades with the convergence of the automotive, energy and transport sectors and there will be winners and losers in the geopolitical contest.

This report examines the current state of play in key ASEAN markets and outlines key recommendations for building a vibrant decarbonised land transport sector in ASEAN.



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The race to decarbonise - Impact of China's net zero ambition on Asia

33
percent

China, Japan and South Korea
together contribute 33 percent
to global carbon emissions

On 22 September 2020, President Xi Jinping announced China's plan to become "carbon neutral" before 2060, establishing itself as a climate leader, racing ahead of the US. China's Net Zero goals could avoid the release of nearly 215 billion tonnes of CO₂ over the next four decades. If successful, this effort alone is expected to cut about 0.2°C to 0.3°C from global warming projections, helping contain the mean global temperature rise to 2.35 °C above the pre-industrial levels by 2100, instead of 2.59 °C. The country is aiming to reduce its emission intensity by 65 percent by 2030 from 2005 levels.

China's announcement is expected to influence other developing countries including those in ASEAN to follow suit. In fact, Japan and South Korea made their net zero commitments public within weeks of China's announcement, setting the tone for decarbonised economic growth in Asia. While it is too soon to extrapolate the onset of a trend, their commitments set a precedent and put pressure on big emitters to scale-up their carbon reduction targets. It also creates big opportunities which would be unleashed by the wave of investment into decarbonisation technologies.



Decarbonisation in transport

**70
percent**

An electric car's average lifetime emissions are up to 70 percent less than a petrol car in countries such as France and Sweden (with high share of renewable- and nuclear-generated electricity)

With growing focus on mitigating climate risks and achieving the Paris Agreement goals for 2050, countries worldwide are realising the importance of decarbonising the transport sector — which accounts for one-fourth of the global greenhouse gas (GHG) emissions in 2019.

Direct electrification of transportation (use of electric vehicles or EVs) and the use of green electrolytes (when direct electrification is not possible) are being considered as the most efficient means of reducing sector emissions. However, this has also led to the need for decarbonising electricity generation.

According to a study by the universities of Nijmegen, Exeter and Cambridge, an electric car's average lifetime emissions are up to 70 percent¹ less than a petrol car in countries such as France and Sweden (with high share of renewable- and nuclear-generated electricity), and nearly 30 percent lower in the UK. This has led to a heightened demand for renewable electricity and electro fuels, including hydrogen, to promote clean mobility.

¹ University of Cambridge
<https://www.cam.ac.uk/research/news/electric-cars-better-for-climate-in-95-of-the-world>



Overview of global EV landscape

Among the different forms of transportation, road vehicles, which account for the majority of GHG emissions, are expected to lead the way for electrification. For instance, according to the sustainable development scenario (SDS)² of the International Energy Agency (IEA), the fleet of EVs (excluding two/three wheelers) is expected to expand by 36 percent every year to account for 30 percent share in all transportation modes, reaching 245 million in 2030 — over 30 times higher than in 2019. In terms of market performance, the fallout from the pandemic led to a dramatic decline in the global sales of EVs in 2020.

However, going forward, EVs are expected to show greater resilience than the rest of the automobile industry given the growing emphasis on climate change as the single biggest disruptor. Factors such as growing competitiveness in EV total cost of ownership (TCO), increasing government support and subsidies in many countries are expected to accelerate global sales of EVs.

But the biggest push would be provided by the falling cost of EV batteries. Prices of sales-weighted battery pack average US\$156³ per kWh in 2019 and US\$137⁴ per kWh in 2020, clocking a significant reduction from over US\$1,100 per kWh in 2010. The Bloomberg New Energy Finance (BNEF) expects prices to decline to US\$100 per kWh by 2023, providing a further boost to the EV market.

Prices of sales-weighted battery pack (average) by year



² SDS includes the targets defined by the EV30@30 Campaign that was launched in 2017 at the Eighth Clean Energy Ministerial. China, Canada, France, Finland, Japan, India, Mexico, Norway, Netherlands, Sweden and the UK are the participating countries

³ International Energy Agency

⁴ BNEF



Hydrogen's role in decarbonising transportation

While the global automotive industry is currently focusing on EVs to transit to a carbon-neutral future, hydrogen is being explored as a next-generation fuel. Still in the early stages of its life cycle for implementation, hydrogen holds the potential to completely disrupt and transform the global energy market, especially the road transportation sector. Auto makers worldwide are looking at fuel cell vehicles (FCVs which use hydrogen to produce electricity) as a critical environmental technology to achieve carbon neutrality in the transportation sector, especially heavy-duty vehicles. As a result, global new FCV sales touched 12,350 in 2019, more than double of 5,800 in 2018, according to the International Energy Agency (IEA).

Hydrogen production, however, is not free from emissions; natural gas steam methane reforming (SMR) is the most common method of (grey) hydrogen production that leads to CO₂ emissions of 10 tCO₂/tH₂⁵. Volume of blue hydrogen (production retrofitted with carbon capture and storage technology) and green hydrogen (produced

using renewable sources) is very low but the scenario is changing fast. Accelerated decline in cost of electrolyzers is expected to soon make green hydrogen a commercially viable fuel option. Based on anticipated contracting prices of electrolyzers and renewable energy, the cost of green hydrogen could fall below US\$1.4/kg by 2030 and US\$0.8/kg by 2050, according to Bloomberg New Energy Finance (BNEF).

Despite reducing operational costs, FCV costs remain higher than other vehicle classes. According to a study by the Economic Research Institute for ASEAN and East Asia (ERIA), the TCO of an FCV is two to three times higher than a conventional diesel or gasoline vehicle in ASEAN, depending on the vehicle fleet, vehicle usage and pathway of hydrogen supply. However, enhanced focus on developing the hydrogen economy (from Europe, the US, China, Japan and India), aggressive R&D, and interest from the private sector are expected to bring down the costs at par with conventional vehicles and EVs by 2030, potentially creating a compelling market structure in which FCVs and EVs co-exist.

Estimated cost of green hydrogen



⁵ According to "Net Zero – Pathways to Success, Part 1 – Unlocking the green hydrogen opportunity including its bankability" report by KPMG



China's position in the global EV market

The global EV market receives pivotal support from China — which now occupies a leading position in terms of both consumption and production. Driven by a strong regulatory push, government incentives and severe pollution problems, the country has solidified its position in the global EV market. Beijing drives a strong agenda of positioning the country as an EV manufacturing leader, and to that end, it has put in place a meticulous strategy of creating a conducive ecosystem.

The country pre-empted future needs and implemented a policy aid to spur plug-in EV adoption by providing subsidies to EV buyers since 2009. However, the cost differential between EVs and conventional internal combustion engine (ICE) vehicles has put financial burden on the government, prompting a 20 percent cut in subsidies in 2021, though the subsidies have helped it to scale manufacturing (relative to other key EV manufacturing hubs in the world) and encouraged equal focus on all aspects of the supply chain development.

As a result, China has secured the top spot in the global EV market, accounting for nearly 50 percent of worldwide sales. Considering China's current position and its strong focus on expanding in the EV market, 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 strategising to extend its EV success beyond borders into the international EV markets. It offers a supportive policy regime and an established base of EV components and parts (especially battery) suppliers. As a result, foreign manufacturers, including BMW and Tesla, have already started using the country as a manufacturing hub to power exports. Alongside, a reverse trend is taking shape as domestic EV makers, such as Aiyways, Xpeng and Nio, are making their way into developed countries, indicating strong emergence of Chinese brands on the global map.



China's position in the global EV market



EV market size

China leads the global EV market as it holds more than 51 percent share in global EV sales



Electric car market

In 2019, China held the largest electric car fleet of 3.4 million (nearly 47 percent of all electric cars on road)



EV models

In 2019, about 279 EV models were available globally, of which China held nearly 171 models — the largest number



Two- / three-wheeler market

Out of 350 million electric two-/three-wheelers, China holds a dominant share



Electric bus market

In 2019, 75,000 new electric bus registrations were made, about 95 percent of which were made and sold in China



Electric trucks market

In 2019, more than 6,000 units of electric trucks were sold globally — most of which were sold in China



Publicly accessible fast chargers

China holds about 81 percent of publicly accessible fast chargers, out of a total of 264,000



Private slow chargers

The country accounts for the highest share of about 37 percent out of a total of 6.5 million private slow chargers



Access to private chargers

It is estimated that about 70 percent of EV owners have access to private chargers in China



Emergence of the ASEAN EV market

Electrification of transportation, or e-mobility, is gaining increased interest in ASEAN countries. In the context of transformation in the transportation industry and the push towards decarbonisation⁶, electrification is a game changer. The movement is being driven by the strong will of all stakeholders — the government, corporates (including commercial fleet owners) and consumers — who, as part of their own personal carbon journeys, are increasingly skewing towards EVs.

As a result, the region has developed a favourably evolving policy environment to provide the right push to the EV market and attract foreign players. However, China remains a critical part of ASEAN's EV dreams. The country has a free trade agreement (FTA) with ASEAN countries that makes EV imports from China tax free. This adversely impacts local and other foreign EV makers in ASEAN, such as those from Japan, who have to pay 20 percent import duty under their FTA with Thailand.

A snapshot of the status of EVs market in ASEAN:

Brunei

- The Brunei Darussalam National Council on Climate Change recently launched The Brunei Darussalam National Climate Change Policy (BNCCP), the first climate change policy of the country.
- BNCCP focuses on 10 core areas, including EVs, with targets to be implemented in the next 15 years
- The country, reportedly, is eyeing to grow EV share to 60 percent in total vehicle sales.

Indonesia

- In 2019, nearly 15,500 units of electric two-wheeler motorcycles and about 24 electric passenger vehicles were sold (compared with one unit sold in 2018).
- Indonesia intends to become a manufacturing hub of EVs and to achieve this target, it is aiming to export 200,000 electric cars by 2025 — which is nearly 20 percent of one million cars exported by the country in one year.
- For four or more-wheeler EVs, the country has only one local producer that manufactures electric buses with an annual capacity of 1,200 units. For two and three-wheeler EVs, there are about 15 producers with an annual capacity of 877,000 units.
- Also, the country has nearly 20 charging stations held by a state-owned electricity corporation, PT Perusahaan Listrik Negara, which holds a monopoly in the charging infrastructure segment.

Malaysia

- Malaysia recorded sales of only 32 EVs in 2019, up from two in 2018.
- The major reason for the highly restricted growth in the sector is lack of a coherent policy framework. The National Automotive Policy 2020 does not explicitly call out the incentives and the support the government will provide to EV makers.
- OEMS, however, have managed to push the government to relook at the EV policy.

⁶ It is estimated (according to a 2019 research study by the ADB Institute) that adoption of e-mobility solutions will help in reducing global carbon emissions by 1 million tonnes per year



A snapshot of the status of EVs market in ASEAN:

Singapore⁷

- Singapore had 1,125 electric cars in early 2020, accounting for only 0.18 percent of total vehicle population.
- The country announced to phase out ICE vehicles by 2040.
- In the recently announced budget 2021, the government has announced to extend more incentives to drive EV adoption.
- The country will develop 60,000 charging points by 2030 (from the current 1,700 points) at public car parks and private premises.
- The government has announced its decision to stop the issuance of diesel-powered cars and taxi licenses in 2025, five years ahead of its initial plan of 2030.
- In October 2020, Hyundai broke ground on a S\$400 million (US\$301 million) 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 e-cars.

Thailand

- Thailand is one of the leading EV markets in South East Asia. As of 2020, the country had about 2,854 EV registrations of which about 1,572 were new cars — a surge of 380 percent from 2018. Also, the number of hybrid and plug-in hybrid EVs reached 153,184.
- As of November 2020, the country had about 647 charging stations held by 10 service providers.
- Going forward, the country has a roadmap to manufacture about 1.2 million⁸ EVs and establish 690 charging stations by 2036.

The Philippines

- The use of EVs is limited in the country and dominated by e-tricycles. However, the proportion of other EVs, including e-motorcycles, e-jeepneys and e-utility vehicles, is also increasing.
- As of 2018, the country had about 7,000 registered EVs for local use and the Electric Vehicle Association of the Philippines (EVAP) estimates that the market will grow at a rate of 8 percent to 12 percent to reach sales of 200,000 by 2024.
- The EV market has about 54 manufacturers/importers, 11 parts manufacturers, 18 dealers/traders and nearly 19 charging stations.

Vietnam

- Vietnam has a promising EV market, particularly in the motorbike segment. The country has an expanding middle class and 96 million motorbike riders, presenting a ready opportunity for EV manufacturers to tap into.
- The country is making strong strides in the EV space:
 - VinFast, the first domestic car maker in Vietnam, is slated to kickstart production of its first electric models this year and will target the US and Europe in 2022. The company has inked a JV with LG Chem of South Korea to manufacture lithium-ion batteries.
 - However, the expansion in EV infrastructure will put additional pressure on the already strained grid of the country. Vietnam, one of the fastest growing economies in Asia, is increasingly becoming more dependent on imported energy to support its economic growth.

⁷ According to the KPMG Autonomous Vehicles Readiness Index (AVRI) index, a tool to help measure the level of preparedness for autonomous vehicles (AVs) across 30 countries and jurisdictions, Singapore ranked #1 while China ranked #20 in 2020. Since majority AVs will be EVs, the ranking gives an insight into the country's potential

⁸ Thailand's Automotive Industry and Current EV Status, Electric Vehicle Association of Thailand



Growing strength of battery manufacturing

The region has not only become a hot zone for EVs, but also for battery manufacturing. The growing appetite for EVs and learnings from China have encouraged the member states to invest in battery manufacturing capabilities.

- Thailand is taking a lead in battery market in the region, with Honda, SAIC, Mercedes and Toyota operating manufacturing plants in the country. The Thai Board of Investment introduced a slew of incentives to account for key components of the supply chain. It includes approving 10 battery manufacturing projects with an annual capacity of 0.5 million units and two charging station manufacturing projects that will produce more than 4,400 outlets each year.
- Indonesia has plans to build battery plants by 2023 to support EV development. The country is endowed with abundant nickel reserves, the main component of EVs, giving it the confidence to venture into the battery manufacturing space. The Indonesian government is looking to set up a state-owned battery holding company to claim its share in global market. The entity will be founded by

Mind Id, PLN and Pertamina and is likely to establish an end-to-end EV battery supply chain and manufacture 8 to 10 GWh worth of batteries annually in next four years. The country is also seeking support from multinational vehicle manufacturers to develop its battery supply chain. It is primarily focusing on lithium-cobalt-nickel-aluminum and nickel-cobalt-manganese battery blends, two of the most known EV lithium-ion batteries, indicating the country's ambitions to become a global battery major.

- The Philippines aims to emerge as a key node in the global EV battery landscape. The Electric Vehicle Association of the Philippines (EVAP), with assistance from the Department of Trade and Industry (DTI), joined forces with the Power Battery Application Committee of China Industrial Association of Power Sources (CIAPS-PBA) to foster EV battery technology development and manufacturing. CIAPS-PBA has also partnered with the Philippine Nickel Industry Association (PNIA) to help broaden the role of the Philippines' nickel industry in the global battery supply chain.



Charging infrastructure investment in ASEAN and China

Though most ASEAN countries are adopting EVs, the strength of the market's future growth, to a large extent, depends on establishing adequate charging infrastructure — which is currently a challenge in many parts of the region. However, the region can take a cue from China — a clear leader in the EV market, thanks to the advantage of scale it holds and establishment of a value chain of manufacturers that rely on the growth of the industry.

At about 1.2 million in 2019, China has the highest number of charging stations and aims to add another 600,000 more stations. To achieve this target, the country provided an infrastructure stimulus package of US\$1.4 billion in 2020, which will be solely used for building EV charging infrastructure.

- Since 2014, the Chinese government (both state and local) has been offering various incentives and introduced national charging infrastructure programs and policies for facility planning, construction and operation, land acquisition, power access and electricity prices, and others.

- The government encourages the development of charging stations by setting targets and mandate standards. For instance, in 2015, the state council released guidance on expediting the construction of EV charging infrastructure under which it has not only laid down set targets but also called for public private partnerships to develop charging infrastructure.
- Shenzhen provides subsidies of up to US\$3,092.3 (RMB20,000) to buyers for vehicle insurance and charging equipment installation.⁹
- In 2017, the Beijing municipal government mandated that all parking areas in new residential buildings should leave space for EV chargers and new government/state-owned enterprise buildings were asked to install chargers at 25 percent of parking spots.



Strategies in ASEAN

EV and charging infrastructure strategies vary from country to country in ASEAN. While some member states might enter into partnerships to establish the charging infrastructure, others would maintain their 100 percent ownership. However, the bottom line remains — power utilities and oil and gas players are altering their business models to adapt. To leverage the immense opportunity and combat challenges presented by EVs, including increased demand pressure on the grid and unreliable charging behavior, utilities are actively participating in the EV market.

- In Singapore, a joint venture between Singapore Power Group (SP Group) and Hyundai has been formed. As per the agreement, Hyundai supplies vehicles and SP Group provides the charging infrastructure. Together, the two companies lease and manage 200 vehicles at attractive prices.
- In some countries, local players are gaining dominance in the field of charging infrastructure. For instance,
 - In Indonesia, state-owned PLN developed 200 charging stations in 10 cities. It also intends to install at least 1,000 charging stations by 2025.
 - In Thailand, Energy Absolute, an electric services company, established and operated 1,000 EV charging stations.





EV policy in ASEAN states and the region's response to China's dominance in the EV space

ASEAN countries have begun to wake up to the opportunity in the EV space. While the journey in the region has been slow, it cannot be called dull. The region appears promising in pockets, with Singapore, Thailand, Indonesia and the Philippines showing momentum.

ASEAN member states have introduced regulatory changes as well as tax benefits and subsidies for consumers and manufacturers to propel sector growth.

The following table provides an overview of key policy changes across some of the ASEAN states.

An overview of key policy changes across some of the ASEAN states

Thailand

Roadmap

- In 2020, the country introduced a roadmap to establish itself as a hub of electrified vehicles in ASEAN by 2025.
- As per the roadmap, the government aims to produce 250,000 EVs, 3,000 electric public buses and 53,000 e-motorcycles by 2025.

Tax incentives

In 2020, Thailand's Board of Investment announced tax incentives for the EV industry:

- The incentive package is provided for electric four-wheeler vehicle, ships and motorcycles. Under the package, PHEV projects worth a minimum of US\$163.8 million will be eligible to avail a three-year corporate tax exemption. BEV projects of same minimum value will be eligible to avail an eight-year corporate tax exemption.
- For PHEV and BEV projects worth less than US\$163.8 million, the tax holiday will be limited to three years.
- Projects involved in developing electric motorcycles, three wheelers, buses and trucks can receive a three-year corporate income tax (CIT) exemption and projects involved in producing vessels of less than 500 gross tonnages can receive eight years of (CIT) exemption.



An overview of key policy changes across some of the ASEAN states

Singapore

Tax incentives

In the 2021 budget, the Singapore government offered various incentives to boost the adoption of EVs:

- The government plans to launch an early adoption incentive scheme for consumers who purchase EVs during 2021–23. Under the scheme, a 45 percent rebate on the car's Additional Registration Fee with a cap of US\$20,000 per vehicle will be provided.
- The government extended the Vehicular Emissions Scheme to light commercial vehicles.
- Under the new budget, the government will:
 - Inject S\$30 million (US\$23 million) in EV initiatives over the coming five years.
 - Reduce the Additional Registration Fee floor to zero for e-cars from January 2022 to December 2023.
 - Adjust road tax for e-cars to lower the differential with ICE cars.

Indonesia

Tax and loan incentives, supply chain strengthening

- In 2020, the country eased rules on lending and risk calculation and credit assessments to increase the accessibility of loans for purchasers of electric cars in the country.
- It announced rules to remove loan down payment requirements for the purchase of green vehicles.
- The country aims to boost domestic production of EVs and has stopped the export of unprocessed nickel ore to maintain adequate supply of the metal for use in upcoming domestic battery chemical plants.
- It is formulating a strategy to create an integrated EV supply chain; the strategy would focus on attracting OEMs, setting up a state-owned battery maker and boosting Li-ion battery manufacturing.



Impact of adoption of EVs on automobile industry

Automakers moving towards adoption of EVs

As EVs gain wider acceptance across the automotive industry, many automobile manufacturers are becoming increasingly involved in the area. For example, in 2019, Mercedes-Benz, in partnership with local players, Thonburi Automotive Assembly Plant (TAAP) and Thonburi Energy Storage Systems (TESM), introduced a production facility in Bangkok at an investment of nearly US\$120 million. This move reflects the high demand for green mobility solutions in the country. The country also has EV manufacturing facilities by SAIC, Honda and Toyota.

- In Singapore, Hyundai Motor Co. opened a research and development center with a small-scale EV production facility at an investment of US\$295 million. Through the manufacturing plant, the company aims to produce 30,000 EVs¹⁰ per year by 2025

¹⁰ Hyundai begins building electric vehicle hub in Singapore, Economic Times



Automakers are not only showing interest in manufacturing EVs but also in building the requisite charging infrastructure. For instance:

- In February 2021, the Vietnamese car manufacturer, VinFast announced its plans to install more than 2,000 charging stations this year in the country. The stations will have more than 40,000 charging ports for bikes and cars. It set up the first of its stations in January in Hanoi's Gia Lam District.
- In 2019, it opened a new manufacturing facility, which has an annual production capacity of about 250,000 electric scooters.

In some countries, such as the Philippines, private automobile players are driving the EV market. For instance, in the Philippines, as of 2020, the private sector had generated investments worth US\$27.1 billion (PHP1.305 billion¹¹) with an annual production capacity of 150,000. The government, having realized the growing interest of private players, is also undertaking initiatives to further encourage them. For example, in 2019, the Philippine Nickel Industry Association (PNIA) signed an MoU with the Power Battery Application Committee of China Industrial Association of

Power Sources (CIAPS-PBA) in 2019. As per the MoU, CIAPS-PBA will closely work with the country to develop EV batteries. Consequently, a local EV manufacturer named Tojo Motors signed an agreement with a CIAPS-PBA member — Jiangsu Highstar Battery Manufacturing Company for the assembly of EV batteries.

However, the rise of EVs is not without its challenges. As the manufacturing of EVs is gaining pace, it is leading to multiple changes in the supply chain of traditional ICE based automobiles. One of the most prominent supply chain disruptions is a relatively shortened supply chain. This is because EVs have fewer moving parts and do not use major systems (such as exhaust systems, fuel systems and others) that are used in vehicles with an ICE-based engine. The change has created problems for the producers of such systems, as many of them are now struggling with the financial bandwidth and technological expertise required to transform their manufacturing plants. In response to this, suppliers of such auto parts are now diversifying their business models. For instance:

- Delta Electronics Thailand announced plans to shift from manufacturing electronic components for conventional automobiles to

producing electronic components that are required in EVs.

Also, EVs use certain components such as car batteries, power inverters, on-board chargers that are not used in ICE-driven engines. The development of such components is largely concentrated in China, Japan and Germany. Therefore, manufacturers in other regions will have to largely rely on imports of such parts, which could lead to delays or increase in cost of production.

Lastly, with increase in the usage of EVs, suppliers will have to face challenges related to procurement of lithium-ion batteries. As sourcing of batteries involves mining activities, the suppliers will face an additional pressure to address ethical sourcing considerations and politicisation of resources before procuring the metal. The surging demand for metals and minerals will also create circular economy solutions,¹² which through product redesign, reuse, recycling and repurposing, can alleviate pressure off the resources to meet demand and stimulate the pace of energy transition.

¹¹ Private sector drives EVs in PH, Philippines Nickel Industry Association

¹² For more information, refer to "[Resourcing the Energy Transition: Making the World Go Round](#)" by KPMG published in March 2021



Reorganised job market

According to a study by the European Association of Electrical Contractors (AIE), the transition to electric mobility can create twice as many new jobs as would be lost by the replacement of ICEs. It is estimated that by 2030, a total of 200,000¹³ permanent new jobs could be created of which, nearly 57 percent would be generated in areas related to installation, operation and maintenance of charging points.

Opportunities will be created in EV component manufacturing. However, the downside is that jobs in current ICE engines and ICE-specific components would be lost. Moreover, EVs are more durable than conventional ICE vehicles. EVs also have fewer moving parts and rely heavily on sensors, and therefore, relatively less labour intensive to manufacture. Consequently, various automakers have planned job cuts. As of 2019, global automakers announced plans to eliminate more than 80,000¹⁴ jobs over the next few years

out of which, Daimler and Audi are responsible for more than 20,000 job reductions.

To meet the challenge of potential job losses, governments and private players are resorting to various solutions. Some of which are:

- Countries such as Vietnam and Indonesia are focusing on domestic production of EVs (by retrofitting the current motorcycles with electric engines) so that the job losses created by the displacement of ICEs are absorbed in local manufacturing.
- Countries such as Thailand have realized the need to upskill their current workforce. In 2020, the ministries of Industry and of Higher Education, Science, Research and Innovation collaborated with the Vocational Education Commission to provide advanced skills required for the e-mobility Industry.



¹³ Powering a new value chain in the automotive sector: the job potential of transport electrification, European Association of Electrical Contractors

¹⁴ Carmakers Shed 80,000 Jobs as Electric Shift Upends Industry, Bloomberg



Conclusion



China has sent a strong message by setting a bold goal of net zero by 2060. The country has adopted a multipronged strategy to create a robust net zero roadmap, encompassing:

- all possible pathways of decarbonisation, including carbon capture technologies;
- accelerated transition to renewable and clean energy sources, and decarbonising key energy-guzzling sectors, including transportation;
- technology development to increase equipment efficiency.

Its rapid advances in renewable technology with impressive cost compression over the last decade have given it a fair chance of replicating this success with battery and other emerging clean technologies for transportation over the next decade.

China's march towards net zero presents a once-in-a-lifetime opportunity for ASEAN to shape its carbon-free future. Decisions made by governments, businesses and investors in the region in the following areas have the potential to create significant value for all the stakeholders.



1. Setting Net Zero goals

While Japan and Korea have quickly followed China in setting their own ambitions, none of the ASEAN countries has yet put forward their concrete goals. The current economic landscape in these countries will require careful consideration of the consequences before setting these goals so that they are credible and achievable. However, setting these national goals will provide clear direction to policymakers, businesses and consumers and potentially galvanise action on climate change and other environmental issues.

2. Developing and implementing a comprehensive urban planning and land transport masterplan

High carbon intensity is an outcome of disjointed urban planning and consequential transport sector inefficiencies. To move toward net zero, at least the big cities in each ASEAN country need to start thinking holistically about urban and transport planning. Reducing average distance travelled and increasing public transport modal share is a key goal of such planning. The current structure of incentives and available infrastructure make private transportation in most ASEAN countries the preferred mode. To nudge the trend towards public transport, a two-pronged approach will have to be adopted:

- Increase ubiquity and convenience of public transportation, which is more energy efficient and drives development of economic corridors;
- Encourage electrification of private vehicles, which are close to achieving TCO parity with ICEs. China has already done the heavy lifting by bringing down battery costs through extensive investments in battery technology and providing subsidies for EV adoption. ASEAN countries should build on this by setting sunset targets for ICE vehicles in their countries.



3. Government push

Countries such as Singapore have begun to incentivise EV adoption and make ICEs less attractive, and in the short-term, other countries should follow a similar path. Support from government is considered as the strongest force to boost the market for EVs in ASEAN. Therefore, to implement effective measures, the ASEAN governments should focus on introducing different policies for different stakeholders involved in the EV supply chain. To especially drive consumer interest in EVs, governments should bring strong policy interventions with incentives at the core.

- An increasing number of consumers are showing interest and readiness to purchase an EV in Asia, largely driven by growing awareness of and familiarity with EVs. Though buyers feel that the introduction/magnification of tax

exemptions on purchase of EVs, which would lower vehicle cost, work as the best incentive to drive the adoption. However, power drainage and vehicle safety hamper consumer readiness. To overcome these barriers, the governments should focus on creating more awareness on the use of EVs.

- To promote consumer acceptance, governments can impose stringent environment protection laws against the use of conventional fuel type vehicles, provide more government subsidies, focus on development of storage space. But over the medium term, these subsidies will have to be calibrated down and investments to build out charging infrastructure may have to become the focus of governments.

4. Expanding charging infrastructure

This is the biggest wave of disruption facing the National Oil Companies (NOCs) of ASEAN countries. They should lose no time in acting in concert with the energy production, transmission and distribution companies in ensuring that this does not become a barrier in EV adoption. Range anxiety remains a key deterrent for consumer adoption and setting up charging infrastructure is key. It is heartening to see that some NOCs and state utilities are making the right moves in setting up charging assets as well as partnering with overseas battery players. These should be encouraged and developed further.



5. Attract investments to build out EV value chain

For several decades, Japanese companies have dominated both the four-wheeler and two-wheeler ICE market in the largest ASEAN countries. They have set up manufacturing hubs in Thailand over time and built sophisticated value chains across the region, creating enormous value for both the companies and citizens. Member states now have an opportunity to build entirely new value chains for EVs, which will potentially be simpler. There will be winners and losers, and countries such as Singapore have already moved to set up EV manufacturing. We expect significant investments in EV and battery manufacturing in the largest ASEAN markets of Indonesia, Thailand and Vietnam.

- Member states can also introduce a plan as drafted by Thailand (named 'Electric Vehicle Promotion Plan for Thailand') to encourage manufacturing of EVs in the country.
- As Thailand and Indonesia are aiming to become regional manufacturing hubs for EVs, the remaining member states can adopt a networked approach and use these countries as central export units.

However, incumbents with large ICE value chains will have to retool their strategies to continue to thrive in the region. Apart from the Japanese and Korean manufacturers, the Chinese players will be a force to reckon with in this regard.

6. Creating innovation ecosystem for the future

By acting quickly, countries can reap a significant first-mover advantage to attract global capital into their markets. As can be seen from the analysis in the report, there are several investment and joint venture opportunities that ASEAN will present as new value chains are built in the future, creating jobs and business opportunities. The market evolution will also usher in new avenues of financing, thus creating a truly innovation-driven ecosystem in the region.



7. Technology development and advancement

Developments, particularly in increasing battery life, are instrumental in transitioning to EVs. Improvements in battery life and efficiency have made EVs more viable for long distance travel and reduced range anxiety, a key deterrent in EV adoption. Advancements in battery technology have also helped lower costs of EVs. Going forward, there is scope to develop new alternatives (aluminum-graphite, graphene-polymer, micro-capacitors, miniaturised solid oxide fuel cells and sodium-based batteries) for expensive lithium-ion batteries that are currently used. Such alternatives could further bring down the TCO of EVs and boost the market.

- However, developments are not restricted to existing areas of technologies. Rapid strides in emerging technologies, such as hydrogen, is bringing into focus the testing and demonstration of such options. Both public and private stakeholders should continue to encourage test-bedding to explore both greener and lower cost alternatives.

8. Workforce development

Decarbonisation presents significant opportunities and challenges for the workforce across the transportation value chain. It is becoming evident that the employment intensity of the EV value chain is lower than that of the ICE automotive sector. While this presents critical policy challenges for the governments, 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.



9. Make payments contactless by driving digitalisation of payments in transport

Another critical area of transportation that demands focus is payments. Payment systems, especially in public transport, are complex and currency-or plastic-intensive. One of the easiest ways to trim transaction costs, drive effective implementation of fare policies, create better visibility for consumers and reduce carbon footprint is to switch ticketing and payments to automated fare collection (AFC) and other advanced technologies. Further, COVID-19 has shown cash and contact-based payments to be a virus vector and contactless payments reduce transmission risk. Some of the emerging payment solutions include:

- **App-based payments**, where a driver can scan an application-based interface to make payments. Via this method, customers can simply drive in and charge their vehicle.

- **Mobile website-based payments**, where a driver could visit a website and make ad-hoc payments.
- **Connected car**, where a smart car is equipped with vehicle payment solutions, which drivers can use to pay for charging and other services.

10. Designate a single nodal government agency

Decarbonisation is not only disrupting business models, but also the government's approach to developing and regulating sectors, such as energy, utilities and transport. The convergence of these sectors needs to be recognised and ASEAN governments should create nodal agencies which will take responsibility for the EV ecosystem working closely with other parts of the government machinery. Singapore has made a beginning in this regard by assigning responsibility for creating charging infrastructure to the Land Transport Authority.

ASEAN has the potential to capitalize on the wave of decarbonisation in transport, with China serving as springboard for the region to look ahead. However, to prepare for a carbon-neutral future, member states in the region need to develop a sense of measured urgency, and make the right policy choices to set themselves firmly on the path to creating value for their businesses and people.



Annexure

Decarbonisation plans, policies and targets of ASEAN

Country	Plans	Policies	Targets
Indonesia	<ul style="list-style-type: none"> No ambitious emission targets, with focus majorly on economic growth Five-year development plan (2020–24) to increase renewable power capacity over three times Had 33 GW of operating coal-fired power generation in 2020, plans for additional 31 GW 	<ul style="list-style-type: none"> Government implemented policies to increase the number of EVs and charging stations; also to develop local EV manufacturing industry EV policy targets 2,200 EV units, 711,000 hybrid units, and 2.1 million electric motorcycle units by 2025 	<ul style="list-style-type: none"> Committed to cut emissions from the business-as-usual scenario by 29 percent by 2030, or 41 percent with international assistance
Singapore	<ul style="list-style-type: none"> Ramp up solar energy capacity Phase out internal combustion engine vehicles by 2040 Invest in research into emerging low-carbon and carbon capture utilisation and storage technologies Establish carbon markets and regional power grids Well-regulated carbon markets to allow the country to purchase carbon credits to offset its emissions Tap renewable energy sources such as wind or geothermal energy with regional power grids 	<ul style="list-style-type: none"> Long Term Low Emissions Development Strategy to reach 33 million tonnes CO₂ equivalent by 2050 Carbon tax, targeting upstream emissions from large emitters, started at S\$5/tonnes CO₂e (US\$4/tonnes CO₂e) from 2019 Policies expected to be reviewed by 2023 with intention of increasing it to S\$10/tCO₂e–S\$15/tCO₂e (US\$11/tonnes CO₂e) by 2030 Carbon tax far too low compared to Intergovernmental Panel on Climate Change (IPCC) estimates 	<ul style="list-style-type: none"> Expect emissions to reach at its peak by 2030 — 65 million tonnes CO₂ equivalent (MtCO₂e) Aims to reach 33 MtCO₂e by 2050



Decarbonisation plans, policies and targets of ASEAN

Country	Plans	Policies	Targets
Thailand	<ul style="list-style-type: none">National Climate Change Master Plan (2015–50) refers to the carbon market as a potential mechanism to achieve targeted emission reductions in key industries and promote energy efficiencyBy 2036, increase renewable energy capacity to about 20,000 MWBy 2036, 15–20 percent renewable energy in electricity productionPrioritise transportation sector for energy efficiency and conservation measures	<ul style="list-style-type: none">Upcoming Climate Change Act is expected to call out specific instruments to prepare for a national emission trading system, with cabinet decision due in 2022	<ul style="list-style-type: none">Reduce GHG emissions by 20–25 percent in 2030 or equivalent to 110 to 140 MtCO₂eq

Conversion rates:

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