

Zero-emission vehicle deployment: ASEAN markets

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OVERVIEW

ASEAN¹ countries accounted for only 3% of the global new vehicle market in 2020, but a growing vehicle fleet is fueling increases in climate emissions and air quality impacts in the region. As Figure 1 shows, under currently adopted policies (Baseline scenario), well-to-wheel CO₂ emissions from vehicles (excluding 2&3 wheelers) will reach 1.4 billion tonnes in 2050, 2.8 times the 2020 level. An accelerated transition to zero-emission vehicles (ZEVs²) in the region could instead reduce CO₂ emissions to 25% below the 2020 level by 2050 (Ambitious scenario). This reduction will be even greater if 2&3-wheelers are included,³ as ASEAN countries account for more than 80% of global 2&3 wheeler sales. ZEV fleets will play an important role in reducing levels of traffic-related localized air pollution and related health effects for the ASEAN region, with especially large benefits if the region also decarbonizes its electricity grid.



Figure 1. Estimated well-to-wheel CO₂ emissions from cars, vans, buses, and trucks in ASEAN countries (million tonnes CO₂ per year)

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1 Association of Southeast Asian Nations, including Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

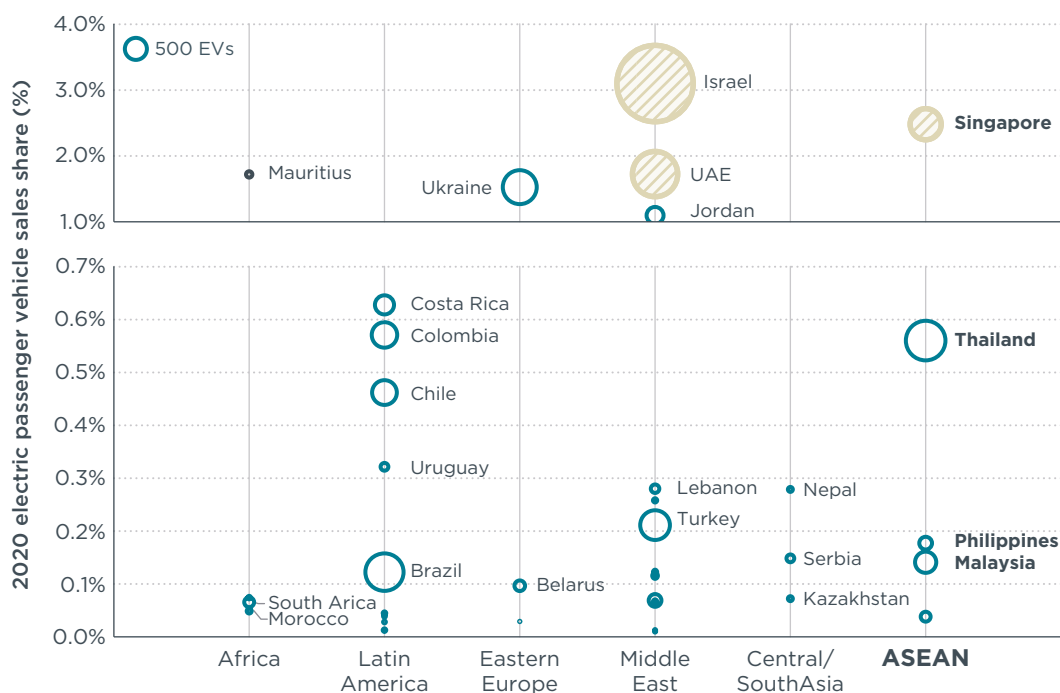
2 Zero-emission vehicle (ZEV) technology includes battery electric vehicles and fuel cell electric vehicles.

3 Due to data limitations and time constraints, 2&3Ws were outside of the modeling scope of the study by Sen and Miller (forthcoming ICCT paper) that estimated the well-to-wheel vehicle CO₂ emissions for various regions and scenarios.

This briefing gives an overview of the status of ZEV development in the ASEAN economies. A full version of the work and a complete list of references are available in the ICCT white paper “A critical review of ZEV deployment in emerging markets.” Sister briefings focused on the emerging markets of Africa, Eurasia, and Latin America can be found at theicct.org.

ZEV TRANSITION STATUS

Some ASEAN countries are scaling up electric vehicle (EV)⁴ sales for passenger vehicles (Figure 2), with the EV market share varying between 0.04% and 0.6% of all vehicle sales. Thailand has the highest EV share, at 0.6%, but this is lower than Singapore, a high-income country in the region. As with developing countries in other regions, EV uptake for passenger vehicles is at a very early stage in the ASEAN countries.



Note: Israel, UAE, and Singapore are high-income countries

Figure 2. EV sales share (%) for passenger vehicles of non-ZEV Transition Council (ZEVTC⁵) countries of key regions for 2020.

Data Source: EV Volumes⁶; OICA⁷; ICCT roadmap model.

The ZEV transition in ASEAN countries is fastest in the 2&3-wheeler category. As of 2020, Vietnam had 262,000 electric 2-wheelers, for a sales share of 8.3%, followed by Philippines at 1.4%, Indonesia at 1.1%, and Malaysia at 0.8%. Thailand and Cambodia have electric 2&3-wheeler sale shares of 0.1%. As of 2019, the Philippines had 3500 e-trikes that are used as public or private transportation.

A few countries in the region have a small stock of electric buses. Thailand had a total of 215 electric buses as of 2020, representing 0.14% of its bus stock overall. Electric buses in Singapore, Malaysia, Philippines, and Indonesia total 2 to 35.

4 Electric vehicles (EVs) include battery electric vehicles, plug-in hybrid vehicles, and fuel-cell electric vehicles.

5 ZEVTC, the Zero Emission Vehicle Transition Council, is made up of Ministers and representatives from some of the world’s largest and most progressive car markets and ZEV-leading countries.

6 EV VOLUMES.COM The Electric Vehicle World Sales Database (2020), <https://www.evvolumes.com/>.

7 OICA International Organization of Motor Vehicle Manufacturers (2020), <https://www.oica.net/production-statistics/>.

ZEV POLICY STATUS

A few ASEAN countries have announced non-legally binding EV targets. Some targets include provisions for hybrid vehicles and low-emitting vehicles; hence they are not exclusive to EVs. Targets for selected countries include:

- » **Brunei:** 10% of fleet stock and 60% of new vehicle sales are to be EVs by 2035.
- » **Indonesia:** 20% of vehicle production to be EVs or hybrids by 2025; stock targets set at 2 million electric passenger vehicles and 13 million electric motorcycles by 2030.
- » **Malaysia:** 100% of all private transport vehicle stock, and 40% of all public transport (across all modes), to be electrified or fueled by CNG/LPG/biofuel, by 2030.
- » **Thailand:** cumulative production by 2025 of 250,000 EVs, 3,000 electric buses, and 53,000 electric motorcycles; in addition, 30% of all vehicles produced, including 2&3-wheelers, light-duty vehicles, and urban buses, should be EVs by 2030.
- » **Singapore:** 100% of new car and taxi sales to be clean energy models (which are assumed to be EVs) by 2030; ICE phase-out target is set for all vehicles by 2040.

Table 1 categorizes existing EV policies for ASEAN countries active in supporting electrification. The five broad policy categories including regulation, incentives, infrastructure, ZEV access, and fleet deployment are those that have proven effective in leading ZEV countries. The “Others” category summarizes actions that could be particularly beneficial for ZEV emerging countries.

Table 1. Existing EV policies for selected ASEAN countries

Country	Phase-out target	Regulations		Incentives		Infrastructure	Demand		Industrial development		Others		
		CO ₂ standard	ZEV regulation	Subsidy/tax	In-use	Strategy/Support	Special fleet	Shared mobility	Manufacturing	Assembly	R&D and capacity building	Business model	International support
Thailand				●		●		●	●	●	●	●	●
Malaysia				●		●		●	●	●			
Philippines				●	●	●		●	●	●	●	●	●
Indonesia				●		●	●	●	●		●		●
Vietnam				●		●	●	●	●	●			●

● indicates that a given country has at least some policy actions for the given policy category

Interventions by countries listed in Table 1 consist primarily of developing charging infrastructure, promoting EVs through incentives, establishing EV and battery manufacturing capacity and assembly, targeting electrification for the 2&3-wheeler segment, and tapping international support.

OPPORTUNITIES AND SUCCESS STORIES

- a) **EV & battery manufacturing:** Some ASEAN countries already have major auto manufacturers, and some have rich reserves of raw materials for batteries, giving them the potential to lead in battery and ZEV production and export. **Thailand** reduces the import tax of raw materials for batteries and provides corporate income tax exemptions and corporate tax holidays to incentivize EV production and R&D. **Indonesia** has two lithium-ion battery manufacturing industries. The government provides generous tax holidays to EV and battery manufacturers, exempts customs duties on production-related capital goods, and exempts luxury

sales taxes for the BEVs that meet local content requirements. **Malaysia** used to provide various incentives for EV manufacturing including exemptions on excise duties and taxes, corporate income tax exemption, and a 100% investment tax allowance on qualified capital for a set timeframe. **Philippines** waives excise taxes, duties, and VAT for purchasing EV parts; exempts tariffs for imported EV components; and gives a six-year income tax holiday for EV project investors.

- b) Charging infrastructure:** A standardized region-wide and robust charging infrastructure network facilitates ZEV uptake across countries in the region. Some ASEAN countries have undertaken initiatives for development of charging infrastructure. In **Thailand**, a public-private partnership has been established to install more than 1000 new fast chargers and to make a fast-charging facility available every 50 km along the planned charging network. The Thai government has also contracted with a private company to install more than 120 fast chargers every 100 km on the main transportation routes across the country. **Indonesia** offers a 75% to 100% discount for upgrading the installed residential power capacity to households that use EVs.
- c) Electric 2&3 wheelers and other low-speed EVs:** 2&3-wheelers are the predominant transport mode in ASEAN countries. This segment could potentially be electrified at a large scale because of low cost and less dependence on charging infrastructure such as with battery swapping or renting. In **Vietnam**, electric mopeds and scooters from multiple manufacturers reached 8.5% of market share in 2020. In **Indonesia**, 15 2&3-wheeler manufacturers set up manufacturing facilities in Indonesia and have started to produce EVs as of November 2020. In Jakarta, Indonesia, a public-private partnership introduced three battery swap stations for electric two-wheelers. The 2&3W manufacturers in Indonesia are producing battery-swappable EV models. In the **Philippines**, local government programs support electric 3-wheeler adoption and the national government offers incentives for replacing old public utility vehicles such as jeepneys with e-jeepneys and modernized diesel vehicles by providing loans and subsidies to partially cover the purchase price.
- d) Purchase and usage incentives:** Some countries offer varieties of consumer-based purchase and usage incentives that make EVs cost-competitive with ICE vehicles. **Thailand** has a CO₂ emissions-based tax for passenger cars and tax exemptions for EVs, which make EVs cost-competitive with their ICE counterparts. **Indonesia** has EV incentives including a preferred lower interest rate, a 75% to 100% discount for upgrading installed power capacity at residences, and lower parking tariffs. **Malaysia** offers significantly lower excise duties for EVs compared to conventional ICE vehicles. **Philippines** exempts EVs from circulation restrictions that are intended to reduce traffic congestion, and waives motor vehicle user charges for EVs.
- e) Bus electrification:** Some countries have introduced electric buses. **Thailand** and **Manila, Philippines** have launched electric buses or minibuses in collaboration with international manufacturing companies. In addition, **Thailand** and **Malaysia** have national targets for acquisition and production of electric buses.
- f) Raise public awareness:** **Thailand** has an EV technology and innovation learning center which provides a platform for developing and learning EV technology for entrepreneurs, government officials, and the public, to generate awareness of EVs. **Malaysia, Philippines, and Singapore** also have EV associations that are very active in bringing electric mobility to the mainstream and creating awareness among the public.

TOP BARRIERS AND CHALLENGES

ASEAN nations face a number of challenges to accelerating a ZEV transition. These include:

- » Higher EV prices compared with low-cost ICE vehicles
- » Lack of ZEV-related regulations that would convey a strong signal to auto manufacturers regarding adoption of ZEV technology
- » Insufficient charging infrastructure in most of the countries
- » Lack of technical expertise related to EV batteries and EV production and operation, and
- » Lack of public awareness of ZEV benefits and operation/usage in the region.

POLICY IDEAS FOR COUNTRY COLLABORATION

- a) **Develop a ZEV roadmap, regulations, and exclusive ZEV supply-based incentives to send clear policy signals.** Regionally coordinated long-term roadmaps, ZEV regulations such as CO₂ emissions standards, and ZEV production incentives and mandates will send out a strong development signal and encourage investment in the ZEV transition in the region.
- b) **Introduce consumer-based ZEV incentives through budget-neutral mechanisms or international financing.** Introduce mechanisms that require polluters to pay for the ZEV transition or introduce international financing to reduce the upfront cost of ZEVs.
- c) **Promote targeted electrification of 2&3 wheelers with battery swapping or renting.** Prioritize the leapfrogging of electric 2&3 wheelers. Offer direct incentives or a financing benefit for the production and purchase of electric 2&3-wheelers. Explore low-cost e-mobility options such as battery swapping and renting.
- d) **Improve ZEV access by incentivizing manufacturers and establishing standards and regulations.** Incentivize domestic manufacturing and assembly industries; collaborate with international ZEV manufacturers; set technical standards and certification procedures for ZEV and ZEV component production and import; set mandates for ZEV purchase and gradual replacement of certain fleets.
- e) **Enable innovative e-mobility business and financing models in shared mobility.** Encourage introduction of ZEV-based businesses and cooperative finance models, with a particular focus on electric buses, taxis, and 2&3 wheelers, for ride-hailing, delivery services, leasing, and battery renting/swapping.
- f) **Demonstrate ZEV technology through exhibition, experience center, and pilot projects to raise public awareness.** Collaborate with the private sector, EV associations and international entities on promotion events and demonstrations of ZEVs and charging methods, to increase public awareness and familiarity with ZEV technologies.
- g) **Establish a robust region-wide network of charging infrastructure.** Develop a dense network of charging stations across the region, supported by consistent electricity supply and uniform charging standards. Reform building norms to require the installation of charging infrastructure and leverage renewable energy to ensure a successful ZEV transition.

INTERNATIONAL SUPPORT FOR THE ZEV TRANSITION

ASEAN countries are receiving financial and technical support for ZEV transitions from a wide range of international agencies and philanthropic institutions, from the Asian Development Bank and the United Nations to the Climate Technology Center and Network. Over the past four years, these organizations supported at least four countries with approximately \$8 million in non-profit funding, and one country with a \$45 million loan,⁸ for infrastructure development, policy interventions, and ZEV demonstration projects. The non-profit funding, on a per-country basis, ranges from \$200,000 to \$5.4 million.

Creation of communities of practice and e-mobility marketplaces in the region, supported by global working groups that facilitate global ZEV advocacy, will enable the fundraising required to support the ASEAN countries in their shift to zero-emission mobility.

Current international support is far from the levels needed to facilitate ZEV leapfrogging in the region. A five-year goal to bring cumulative ZEV sales to 10% of 2020 sales of passenger vehicles, bus, and 2&3-wheelers in the next five years, and to provide funding at a rate of \$30 per kWh of battery capacity, would require a funding level of approximately \$318 million for all vehicle segments. This is a rough estimate, but it reveals the gap between existing and needed international support. The funding could be used for various purposes including, but not exclusive to, technical support, policy interventions, infrastructure, R&D, and loan service to support ZEV leapfrogging in the ASEAN countries.

⁸ Statistics based on available public information. It is expected that some activities are not captured by this analysis.