

# Executive Summary

The main findings from the analysis are summarised below.

## Chapter 1

Amongst the Association of Southeast Asian Nations (ASEAN) countries, the deployment of electric vehicles (EVs) is considered an important option to move away from oil dependence, improve local air quality, and mitigate climate change. Some countries such as Indonesia and Thailand consider EVs an important option for developing manufacturing. Indonesia has laid out a plan for developing the battery manufacturing industry with the use of local resources, whilst Thailand aims to become the regional hub for the EV manufacturing industry. Each country's current plan and/or target as well as the key economic incentives for the wider diffusion of EVs is summarised below:

- **Brunei Darussalam** plans to set EV sales at 65% of vehicle sales by 2035.
- No incentives are provided to EV owners yet.
- **Indonesia** has set a target to abandon sales of internal combustion engine (ICE) vehicles by 2040. Indonesia also intends for alternative vehicles to account for 20% of total vehicle production by 2025.
- The luxury tax rate is differentiated by the powertrain. EV owners can enjoy zero luxury tax. Electricity off-peak rate is provided to EV owners.
- **Malaysia** has outlined the electrification of the transport system under the 'Low Carbon Mobility Blueprint 2021-2030'. In the blueprint, Malaysia aims to increase the share of EV sales of passenger vehicles. The targets are 9% in 2025 and 15% in 2030.
- EV specific incentives are planned in the blueprint. Excise tax and value added tax are (planned to be) exempt for EV owners.
- **Thailand** has announced a new roadmap to lead the country to become a hub of EVs in ASEAN countries in 5 years. Under the roadmap, it is planned to set a target to produce 250,000 EVs and 3,000 electric public buses by 2025, and to increase EV production to 30% of total annual automotive production or about 750,000 units out of 2.5 million units by 2030.
- EV owners can enjoy lower excise tax at 2% in contrast to that of ICE vehicles at 30%. The excise tax rate for hybrid electric vehicles (HEVs) is 10.5%.
- **Viet Nam** does not have a policy or goal relating to the introduction of EVs. The excise tax rate is differentiated by powertrain (EVs at 3% and ICE vehicles at 70%).

## Chapter 2

The tank-to-wheel emissions are almost the same level amongst the countries since the fuel efficiencies of automobiles are identical. Emissions are relatively lower in Thailand, where biofuels are introduced. On the other hand, the differences in the well-to-tank emissions amongst the countries are large. The emissions by using liquid fuels do not differ much, meanwhile the emissions from using electricity vary greatly not only amongst countries, but also in terms of the time axis and the scenarios (based on climate change measures).

The differences in the power generation mix affect the amount of well-to-wheel emissions. HEVs are the lowest emitters when the generation mix depends on fossil fuels, whilst battery electric vehicles (BEVs) are the lowest emitters when it is clean. In the advanced policy scenario where power is cleaner, BEVs become the best option in terms of the well-to-wheel basis emissions by 2040 at the latest in all the five countries. It is essential that automobile electrification progress along with the decarbonisation of the power generation mix.

## Chapter 3

The five analysed ASEAN countries offer different incentives for the wider diffusion of EVs. The methods are mainly focused on passenger vehicle ownership, in a form of differentiated luxury tax (Indonesia), exemption of excise tax (Malaysia), and lower excise tax (Thailand and Viet Nam). Discounts on electricity price as provided by Indonesia can benefit EV owners as well. No countries have yet provided subsidies for EV owners.

As the tipping point analysis indicates, the analysed countries may require continue providing economic incentives up to 2025 when the benefit of owning an EV would outweigh that of ICE vehicles.

Aside from the initial cost of vehicle purchase, operational costs – particularly energy prices – should continue to be the important factor for an owner's decision on vehicle purchase. Time of use pricing for electricity may encourage the purchase of EVs under the maintained high international crude oil price.

In countries – such as Indonesia and Viet Nam – where fuel economy for buses and trucks is relatively low, the benefits of shifting to EVs can be felt earlier than other analysed countries. The respective countries' relative electricity price (more than 40% lower than that of diesel in tons of oil equivalent terms) also adds value to the use of EVs.

To realise the potential benefits of the use of EVs, investing in infrastructure for charging stations would be important, particularly for those countries of which tipping point (buses and trucks) would be sometime before 2025.

The benefits of driving e-motorcycles have already outweighed those of conventional motorcycles (excluding the case in Brunei Darussalam).

Charging infrastructure development as well as business development should be ready for the expected rise in e-motorcycles.

## Chapter 4

With the strengths, weaknesses, opportunities, and threats (SWOT) analysis, the five analysed ASEAN countries share common issues that are required to overcome.

- The five ASEAN countries need to accelerate the decarbonisation of the power sector.
- It is also important to invest in the power grid capacity and reliability improvement so that the electricity demand increase from the expected rise in EV charging will be sufficiently met.
- The five ASEAN countries should accumulate knowledge and experiences on EV charging, for which implementation needs to be carefully considered with financial and technical support from the respective government that may be in cooperation with the donor agencies.

Depending on the different levels of progress in the electrification of the transport sector, implications can be drawn as below.

- **Indonesia and Viet Nam:** For the transport sector electrification, these countries are better positioned to start from motorcycle electrification in view of the current consumers' heavy dependence on motorcycles.
- **Brunei Darussalam, Malaysia, and Viet Nam:** At the initial stage of electrifying the transport sector, these countries may need to focus on public bus electrification.
- **Indonesia and Thailand:** As these countries aspire to become the BEV production hub, they may need to develop the rules for regulations and standards for BEV battery reuse and recycling.