

Chapter 4

SWOT Analysis of EV Introduction in Brunei Darussalam, Indonesia, Malaysia, Thailand, and Viet Nam

March 2023

This chapter should be cited as

ERIA Study team (2023), 'SWOT Analysis of EV Introduction in Brunei Darussalam, Indonesia, Malaysia, Thailand, and Viet Nam', in Naoko Doi, Alloysius Joko Purtanto, Shigeru Suehiro, Toshiya Okamura, Kazuhisa Takemura, Masami Iwai, Akira Matsumoto, Keita Katayama (eds.), *Study on Policies and Infrastructure Development for the Wider Penetration of Electrified Vehicles in ASEAN Countries*. ERIA Research Project Report FY2022 No. 18, Jakarta: ERIA, pp.73-98.

Chapter 4

SWOT Analysis of EV Introduction in Brunei Darussalam, Indonesia, Malaysia, Thailand, and Viet Nam

1. Introduction

This chapter presents the result from strengths (S), weaknesses (W), opportunities (O), and threats (T) (SWOT) analysis regarding electric vehicle (EV) deployment strategies for five Association of Southeast Asian Nations (ASEAN) countries: Brunei Darussalam, Indonesia, Malaysia, Thailand, and Viet Nam. A summary of the five countries' SWOT is shown in the Table, SWOT Reference. Based on the analysis, the study draws a few policy implications for each country for their wider diffusion of EVs.

2. Brunei Darussalam

- **Bus electrification (public bus and school bus) may be the best initial target.**

(Energy, Climate Change)

(O): The national transportation policy, Land Transportation Master Plan recognises the importance of energy efficiency and CO₂ reduction.

(Policy on Transport Electrification)

(S): The National Green development policy has a year 2035 target to reduce CO₂ emissions by 40% during the morning peak hours.

(S): The National Green development policy has target with public bus transportation system development increase by 22% by 2035, especially developing the national school bus system.

(Transport Infrastructure)

(O): The government of Brunei recognises the importance of energy efficiency with a vehicle fuel efficiency standard and the public bus system deployment.

- **The government of Brunei Darussalam may want to make sizable investments on clean power resources, when the fossil fuel export brings large revenues.**

(Energy, Climate Change)

(S): The electricity tariff is inexpensive by government control.

(W): Power generation is almost entirely dependent on domestic fossil fuels.

(W): The power consumption per capita is big enough, as much as the top consumption Singapore, more than twice as much as Thailand or Indonesia.

(T): Until the power sector CO₂ emissions are reduced with fewer fossil fuel generations, the greenhouse gas (GHG) reduction by transportation electrification will remain minimum.

3. Indonesia

- **To establish an EV production hub in Indonesia, it is important to become one of the top battery production countries. The government may want to keep close partnerships with Chinese and the Republic of Korea's battery manufacturers to establish domestic production factories. Making EV manufacturing early commitment to purchase the good size of domestic batteries, in return for tax incentives, may help the initial stage of domestic battery production business.**

(Energy, Climate Change)

(S): Indonesia has plenty of precious minerals, such as nickel and cobalt.

(Auto Manufacture Industry)

(S): Indonesia's auto industry is the second largest in ASEAN region.

(S): A new battery production company has been established with four national corporations as a joint investment.

(O): Indonesia has an advantage of battery production by abundant precious mineral resources.

(T): The battery electric vehicle (BEV) production investment policy incentives are not equivalent with those by Thailand.

- **Considering the size of investments on domestic battery production factories, the domestic EV production factories, and the EV charging infrastructure, with relatively higher prices of EVs, Indonesia may want to start with motorbike electrification. The electric motorbike cost barrier is not significant and electric motorbikes may not require many charging stations for a while. The big size of motorbike electrification may also help to decrease the gasoline demand growth as well as improving air quality in big cities.**

(Energy, Climate Change)

(W): Increasing gasoline demand is worsening the international trade balance.

(Policy on Transport Electrification)

(W): There is limited charging infrastructure.

(O): Trials of battery-swapping are carried out with electric motorbikes.

(T): Battery swapping model may not become a popular model.

(Auto Market)

(S): The motorbike market size is four times bigger than the car market, and it will keep growing.

(O): With a large market size of motorbikes, electric motorbike deployment may result with a sizable GHG reduction as well as the decrease of gasoline demand growth.

- **The government may want to accumulate the knowledge and experiences on charging stations development as well as effective charging tariff development through government support pilot projects, with the lead of PLN.**

(Policy on Transport Electrification)

(O): The development of charging infrastructure, the charging tariff, and the transportation electrification policies are well under control of the government.

(O): Official licensing of the electricity business is required for a charging business; players should have adequate technology and safety skills.

(O): Trials of battery-swapping are carried out with electric motorbikes.

(T): A robust system of charging service business with a requirement of licensing may prevent business innovations with continuous technology evolution and market changes.

(T): Battery swapping model may not become a popular model.

(Auto Manufacture Industry)

(W): EV/battery knowledge and experiences are limited, and more skilled human resources are required.

(W): The battery knowledge and engineering are dominated by Chinese and Republic of Korean players.

- **It is important to decrease the dependence on fossil fuel power and to accelerate the clean power resources development.**

(Energy, Climate Change)

(W): Power generation may keep depending on fossil fuels.

(T): Until the power sector CO₂ emissions are reduced with less fossil fuel generation, the GHG reduction by transportation electrification will remain minimum.

- **It is important to invest in the power grid capacity and reliability, so that electricity demand increase by growing the economy and the additional EV charging loads will be met.**

(Energy, Climate Change)

(W): The efficiency of power generation and the transmission may need to improve.

(W): Geographical islands separation hinders the cross regional power transmission capacities.

(W): The politically-controlled low electricity tariff has limited the grid investment. The grid capacity improvement is necessary.

4. Malaysia

- **With the smaller domestic auto industry with lower growth in car sales, government investment on EV production may not be effective compared with neighbouring Thailand and Indonesia. Two national car manufacturers may lead the EV deployment in the domestic market.**

(Policy on Transport Electrification)

(W): Lower EV deployment target, compared with neighbouring ASEAN countries.

(W): A fewer policy incentives are provided, compared with neighbouring ASEAN countries (Thailand, Indonesia).

(Auto Market)

(W): The car sales market is already saturated.

(Auto Manufacture Industry)

(S): Malaysia has two national car manufacturers, Proton and Perodua.

(W): The EV production incentives are not attractive enough to bring manufacturing investment.

(T): Two national car manufacturers are both practically managed by (i) a Chinese entity (Proton with GWM), and (ii) a Japanese entity (Perodua by Daihatsu). Their business strategy may not perfectly align with the government policy.

(Transport Infrastructure)

(W): There is limited charging infrastructure.

- **Malaysia has advantages in digital technologies. Malaysia may be able to develop a unique position to provide software platforms and services, such as charging service applications, optimum charging control, car sharing/ride hailing platform, and battery assessment.**

(Auto Market)

(O): Malaysia Automobile Robotic IOT Institute (MARii) and PEKEMA (Automobile Import Association) are jointly investing in the EV Center of Excellence (COE). The COE intends to become the regional hub for EV maintenance, repair, and customer support.

5. Thailand

- **Thailand has already implemented key strategic policies to enhance the BEV production industry to become a global production hub of electric vehicles and parts. Additional measures to strengthen the key technology, namely EV battery production will be the focus policy area.**

(Policy on Transport Electrification)

(S): The government of Thailand has clear BEV focus policies, especially to become the global BEV production hub.

(O): The government has a clear policy to become an EV global production hub by keeping the car industry strength. More domestic and international EV policy communication will help to understand such policies.

(O): The government of Thailand is considering the update of EV30@30 plan to EV50% by 2030.

(Auto Market)

(O): Many auto manufacturers are starting to enter the BEV market.

(T): Available BEV models are either in high-end import models with longer range of 200–480 kilometres, or the low-end models with less than 160 kilometre range. There is less choice in the most needed middle range.

(Auto Manufacturing Industry)

(O): Many auto manufacturers are starting to enter the BEV market.

(O): PTT and Foxconn (Taiwan) has set a joint venture to develop an EV production platform.

(T): Although there are incentives for BEV production, the standalone battery import is still subjected to import taxes, and auto manufactures need to speed up domestic battery production.

- **The government of Thailand may want to develop a new electricity tariff for EV charging.**

(Energy, Climate Change)

(O): The transport sector has a big potential in reducing GHG emissions, the sector is currently responsible for as much as 30%of emissions.

(T): The decrease of cheap domestic natural gas production with more expensive LNG import increase are affecting the electricity rates rise.

(Policy on Transport Electrification)

(S): The government of Thailand has clear BEV focus policies, especially to become a global BEV production hub.

(O): The government of Thailand is considering the update of EV30@30 plan to EV50% by 2030.

(Auto Market)

(T): The share of xEVs in new cars sales is increasing as much as 6% in 2021, the share of BEV remains as low as 0.3% (2021).

(Transport Infrastructure)

(O): Egat is developing EV charging infrastructure and charging applications, with collaborations with auto manufacturers such as Audi, BMW, Mercedes, Nissan, Porsche, and GM.

(O): Chinese EV auto makers (SAIC, GWM) are developing their own charging networks.

- **It is important to invest in the capacity of the power grid capacity and increase in reliability so that the increase in electricity demand from the growing economy and the additional EV charging loads will be met.**

(Energy, Climate Change)

(O): The transport sector has a big potential to reduce GHG emissions. The sector is currently responsible for as much as 30%.

(T): Thailand will need to increase investment in the power grid to meet the increasing demands, increasing the renewables, and improving the supply reliability.

(Policy on Transport Electrification)

(S): The government of Thailand has clear BEV focus policies, especially to become a global BEV production hub.

(O): The government is considering the update of EV30@30 plan to EV50% by 2030.

- **EV battery recycling standards and regulations should be developed. A few pilot projects involving EV and battery manufacturing and regulatory parties will help to understand the design of the battery recycling industry.**

(Policy on Transport Electrification)

(S): The government of Thailand has clear BEV focus policies, especially to become a global BEV production hub.

(W): There are only a few recycling standards and regulations on hazardous materials, including EV batteries.

(O): The government of Thailand has a clear policy to become an EV global production hub, by keeping the car industry strength. Greater domestic and international EV policy communication will help to understand such policies.

(O): The government of Thailand is considering the update of EV30@30 plan to EV50% by 2030.

(Auto Manufacture Industry)

(S): A good car industry base exists, the top in ASEAN region, 10th largest in the world.

(O): PTT and Foxconn (Taiwan) has set a joint venture to develop an EV production platform.

- **Thailand is one of the most susceptible countries to climate change, and the country's investment on climate change mitigation, including transition to clean electricity and electrification of the transport sector should bring effective results. It is recommended that the incentive policies keep tracking the expected GHG reduction performance.**

(Energy, Climate Change)

(T): Thailand is one of the most susceptible countries to climate change risks, with sea level rising and severe floodings, which may affect more than half the country's population.

(Policy on Transport Electrification)

(S): The government of Thailand has clear BEV focus policies, especially to become a global BEV production hub.

(S): The government of Thailand has already implemented BEV incentives with exempting import taxes to key BEV parts and excise tax redemption.

(Auto Manufacture Industry)

(S): A good car industry base exists, top in the ASEAN region, and 10th largest in the world.

- **It is recommended that the Thai government invest in human resources using joint projects with international institutes on battery production, charging infrastructure development, and battery recycling. Using ODA financing should help on top of the investment incentives.**

(Policy on Transport Electrification)

(W): There are few recycling standards and regulations on hazardous materials, including EV batteries.

(Auto Manufacture Industry)

(S): A good car industry base exists, top in the ASEAN region, the 10th largest in the world.

(W): Thailand will need more experienced and knowledgeable human resources on EV batteries and EV charging.

(W): There are only limited numbers of EV charging infrastructure facilities.

(T): Although there are incentives for BEV production, the standalone battery import is still subjected to import taxes, and auto manufacturers need to speed up domestic battery production.

6. Viet Nam

- **By utilising the hydropower resources and the constant renewable resources in the power sector, the transportation electrification policy may effectively reduce GHG emissions.**

It is important to ensure the deployment of solar and wind resources as planned in the 8th Power Development Plan. Without improving the GHG emissions factor in the power sector, transportation electrification may not be able to deliver effective GHG reduction.

(Energy, Climate Change)

(S): Plenty of hydropower resources (>25% of total power production), thanks to many big rivers.

(W): Relatively high dependency on fossil fuel power generation for a while, especially with coal.

(O): Viet Nam updated the NDC in 2020 to continue the commitment to the Paris Agreement.

(O): There is a policy to increase renewable power sources by 2030. The 8th Power Development Plan aims for renewable capacity as much as more than double by 2030.

(T): Frequent droughts and water shortage prevent constant hydropower production.

- **It is also important to invest in the power grid capacity and reliability increase so that the electricity demand increase by growing the economy and the additional EV charging loads will be met.**

The investment in the power grid becomes internationally recognised as important in almost every country, and Viet Nam is no exception. The increase of renewable resources and the electricity demand growth from continuous economic growth in Viet Nam and the EV charging load will demand a new level of power grid planning and thus investment. The world is experiencing a challenging time with securing the energy resources and maintaining the energy tariff stable. The government will need a careful design to make the grid investment plan whilst adequately managing the electricity rate.

(Energy, Climate Change)

(W): Less investment on the power grid due to controlled low electricity tariff.

- **Considering the mobility market size and the EV charging infrastructure readiness, a two-wheel (motorbike) electrification policy looks like a wise choice.**

Motorbikes are the predominant transportation measure in Viet Nam, and the size of the motorbike market is one of the world's largest. The automobile demand (four-wheels) will keep increasing, whilst the relatively higher ownership cost, the current higher price tags of BEVs, and the smaller size of the automobile industry compared with neighbouring ASEAN countries, a motorbike (two-wheels) electrification strategy seems a wise choice for the government. E-bikes have already become popular in the country, and electric motorbikes may be suitable for home charging with an option of battery-swapping station use. City municipals may want to introduce e-bike-friendly policies, such as creating e-bikes priority access zones and/or street lanes and support investing in e-bikes for rental/ride-hailing/delivery service businesses.

(Auto Market)

(S): 4th largest motorbike market in the world.

(Auto Manufacture Industry)

(W): The smaller scale of the auto manufacturing industry in Viet Nam, compared with neighbouring Thailand and Indonesia. No major BEV and key components factories in Viet Nam.

(Transport Infrastructure)

(W): Narrow streets with heavily congested roads in major cities due to large numbers of motorbikes.

(W): A small public transport system and the development of reliable and convenient public transport may take decades.

(W): Very limited numbers of public EV charging stations.

(O): An e-bike driver's licence allows easy use of e-bikes for students and others by test-free licensing.

(O): There is a good amount of awareness of air pollution and noise problems in cities with too many motorbikes.

(T): Most Japanese automakers are slow in electrification.

- **It is necessary to build confidence in the policy as well as accumulate experiences and knowledge through a series of pilot projects in mobility electrification.**

The need for mobility electrification may be hard to understand in the early deployment stage, because users may not see immediate problems in using internal combustion engine vehicles. One of the barriers to EV use is the anxiety of charging and the distance that can be travelled with a battery. Most EV users become comfortable with the charging behaviour and the practical drivable distance, whilst business users with many fleets will find a new challenge in the charging schedule and the charging infrastructure investment. There is no textbook solution for the optimum charging design, and the only effective tool is 'to learn from experiences'. It is, therefore, highly recommended to start pilot projects with business EV fleet

operators, such as public bus operators, taxi operators, rental/ride-hailing operators, and delivery service companies.

(Policy on Transport Electrification)

(T): A lack of knowledge and experience due to the limited pilot programmes on EV deployment and EV charging infrastructure development. Because of the lack of technical and business understanding, it is not easy to design effective policy support.

(Auto Market)

(S): 4th largest motorbike market in the world.

(Auto Manufacture Industry)

(W): The smaller scale of the auto manufacturing industry in Viet Nam, compared with neighbouring Thailand and Indonesia. No major BEV and key components factories in Viet Nam.

(W): Lack of human resources with skilled and experienced engineers or business development.

(O): A new auto manufacturer/retailer VinFast is rapidly expanding its presence in all automobile markets (four-wheels, two-wheels, e-buses, and EV charging stations).

(Transport Infrastructure)

(W): Narrow streets with heavily congested roads in major cities due to large numbers of motorbikes.

(W): A small public transport system and the development of reliable and convenient public transport may take decades.

(W): Very limited numbers of public EV charging stations.

(O): An e-bike driver's licence allows easy use of e-bikes for students and others by test-free licensing.

(O): There is a good amount of awareness of air pollution and noise problems in cities with too many motorbikes.

7. Conclusions

From the SWOT analysis, it was found that 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.

In most countries, coal and natural gas power generations have been the most affordable choices for a few decades. Renewable generations, such as solar PV and wind power cost are continuously decreasing with battery storage use. Transportation electrification does not

result in sizable CO₂ emission reductions until the CO₂ emissions from power generation decreases.

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 through implementing pilot projects. The implementation needs to be carefully considered with the financial and technical support from the respective government that may be in cooperation with the donor agencies.

ASEAN countries are in the very early stage of charging station development. There are many challenges in the charging infrastructure development, both in hardware and software. The former includes the AC/DC charging stations' optimum allocations, design/engineering standards, the safety system standard, and the home/office charging equipment distribution and installation. The latter includes the charging electricity tariff development, the optimum charging scheduling, the battery-friendly charging support application, the payment system, and the charging support applications.

Depending on different level of progress in the electrification of the transport sector, different 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.

Motorbikes are the main mode of transport in Indonesia and Viet Nam. The purchase cost of motorbikes is much more affordable even in electric motorbike models, compared with EV cars (four wheels). Electric motorbikes charging can be mostly managed by AC charging both at home and offices, whilst the public DC charging stations deployment may take years. With the very big size of the motorbike market, the electric motorbike deployment will help decrease oil demand, less air pollution, and fewer noises in big cities.

- **Brunei Darussalam, Malaysia, and Viet Nam:** At the initial stage of electrifying the transport sector, these countries may want to focus on public bus electrification because Public transportation development is one of the key transportation policies in many countries, including ASEAN region countries. They may want to consider using EV buses to mitigate GHG emissions increases, reduce traffic congestion, reduce air pollution, and also avoid problems with fewer charging stations.

- **Indonesia and Thailand:** As these countries aspire to become the BEV production hub, they may need to develop the rules for regulation and standard for BEV battery reuse and recycling.

Early BEV market development and the recent incidents of raw materials price soaring indicate the importance of battery reuse and recycling. There are challenges with battery recycling, and the recycling business will need long-time span views in both economical as well as safety.

8. Table. SWOT Reference

8.1. Brunei Darussalam

| Domestic Environment | |
|--|--|
| Strength | Weakness |
| <ul style="list-style-type: none"> - The electricity tariff is inexpensive by the government control. - The National Green development policy has a year 2035 target to reduce CO2 emission by 40% during the morning peak hours. - The National Green development policy has target with public bus transportation system development increase by 22% by 2035, especially developing the national school bus system. - The sizable wealthy pollution has exceptionally high automobile ownership rates in ASEAN region, as much as 720 per 1000 capita. - The ownership increased more than three folds from 2000 to 2015. | <ul style="list-style-type: none"> - Power generation is almost entirely dependent on domestic fossil fuels. - The power consumption per capita is big enough, as much as the top consumption Singapore, more than twice as much as Thailand or Indonesia. - The annual mileage per capita is exceptionally big in ASEAN region, as much as 30,000 km. - The EV production incentives are not attractive enough to bring manufactures investment. - Brunei has a wide range of problems in transportation sector. The GHG reduction is not always the government's higher priority. |

| | | | | |
|-----------------------------|--------------------|---|---|-------------------------------|
| External Environment | Opportunity | <ul style="list-style-type: none"> - Brunei has submitted NDC plan in 2020. The country has a target of EV sales share as much as 60% by 2035. - In 2019, the government of Brunei has established a joint taskforce (EV Joint Task Force) to develop strategies on domestic EV production and the charging infrastructures development. - Vehicle licensing fee is exempted for EV during the 2-year pilot programme, starting March 2021. - With practically zero EV market, the government has a challenging target of 65% sales share by 2035. - The national transportation policy, the Land Transportation Master Plan recognises the importance of energy efficiency and CO₂ reduction. - Land Transportation Master Plan recognises that the fuel efficiency regulation may be effective to reduce CO₂ emission from road transport sector. | Strength x Opportunity | Weakness x Opportunity |
| | | | (1) Bus electrification (public bus and school bus) may be the best initial target. | |

| | | | | |
|--|---------------|---|--------------------------|--|
| | Threat | - Until the power sector CO ₂ emissions are reduced with fewer fossil fuel generations, the GHG reduction by transportation electrification will remain minimum. | Strength x Threat | Weakness x Threat |
| | | | | (2) The government may want to make sizable investments on clean power resources, when the fossil fuel export brings large revenues. |

8.2. Indonesia

| Domestic Environment | |
|---|---|
| Strength | Weakness |
| <ul style="list-style-type: none"> - Indonesia has plenty of fossil fuels (coal, natural gas) - Indonesia has plenty of precious minerals, such as nickel and cobalt. - The government of Indonesia has been developing and promoting low-emission fuels, such as diesel CN 48 and Gasoline RON 80. - The excise tax has reformed to reflect CO₂ emissions with exemption to zero emission by BEVs. - Transportation electrification is one of the core areas in National Green Development Strategy. | <ul style="list-style-type: none"> - The power generation may keep depending on fossil fuels. - The efficiency of power generation and the transmission may need to improve. - Geographical islands separation hinders the cross regional power transmission capacities. - The politically controlled low electricity tariff has limited the grid investment. The grid capacity improvement is necessary. - Increasing gasoline demand is worsening the international trade balance. |

| | |
|--|---|
| <ul style="list-style-type: none"> - The government of Indonesia has published EV roadmap in 2020. - The government of Indonesia has implemented various tax incentives for EV users and EV manufactures. - Indonesia is one of the most populated countries in ASEA region and the auto market is expected to grow steadily with population increase and the economic growth - The motorbike market size is four times bigger than the car market, and it will keep growing. - Indonesia's auto industry is the second largest in ASEAN region. - Indonesia has motorbike industry factories. - A new battery production company has been established with four national corporations as a joint investment. | <ul style="list-style-type: none"> - There are limited numbers of charging infrastructures. - xEV share in the new car sales remains minimum as much as 0.36% in 2021. - Vehicle ownership has not penetrated in the growing middle-class. - The car market has not yet recovered from COVID19 pandemic effect in 2021, with the 2020 market had decreased to half of 2019. - EV battery knowledge and experience is limited, and more skilled human resources are required. - Battery knowledge and engineering is dominated by Chinese and Republic of Korean players. - Increasing motorbikes and vehicles worsen air pollution and congestion in cities. - A lack of development of public transportation system. |
|--|---|

| External Environment | Opportunity | <ul style="list-style-type: none"> - The development of charging infrastructure, the charging tariff, and the transportation electrification policies are well under control of the government of Indonesia. - Official licensing of electricity business is required for charging business, players should have adequate technology and safety skills. - Trials of battery swapping are carried out with electric motorbikes. - With a large market size of motorbikes, electric motorbike deployment may result with a sizable GHG reduction as well as the decrease of gasoline demand growth. - Indonesia has an advantage of battery production by abundant precious mineral resources. | Strength x Opportunity | Weakness x Opportunity |
|----------------------|-------------|---|---|--|
| | | | <p>(3) The government may want to accumulate the knowledge and experience on charging stations development as well as the effective charging tariff development through the government support pilot projects, with the lead of PTPLN.</p> <p>(2) Considering the size of investments on domestic battery production factories, the domestic EV production factories, and the EV charging infrastructures, with relatively higher prices of EVs, Indonesia may want to start with the motorbike electrification. The electric motorbike cost barrier is not significant and the electric motorbike may not require many charging stations for a while. The big size of motorbike electrification may also help decreasing the gasoline demand growth as well as improving the air quality in big cities.</p> <p>(1) To establish the EV production hub in Indonesia, it is important to become one of</p> | <p>(4) It is important to decrease the dependence on fossil fuel power and to accelerate the clean power resources development,</p> <p>(5) It is important to invest in the power grid capacity and reliability increase, so that the electricity demand increase by growing the economy and the additional EV charging loads will be met.</p> |

| | | | | |
|--|---------------|--|---|-------------------|
| | | | the top battery production countries. The government of Indonesia may want to keep close partnership with Chinese and Korean battery manufactures to establish the domestic production factories. Making EV auto manufactures early commitment to purchase the good size of domestic batteries, in return to the tax incentives, may help the initial stage of domestic battery production business | |
| | Threat | <ul style="list-style-type: none"> - Until the power sector CO₂ emission is reduced with fewer fossil fuel generations, the GHG reduction by transportation electrification will remain minimum. - Indonesia is experiencing negative effects from climate changes. - A robust system of charging service business with a requirement of licensing may prevent from business innovations with continuous technology evolvement and market changes. - Battery swapping model may not become a popular model. | Strength x Threat | Weakness x Threat |
| | | | | |

8.3. Malaysia

| Domestic Environment | |
|---|--|
| Strength | Weakness |
| <ul style="list-style-type: none"> - Low Carbon Mobility Blueprint was published in 2021. - Malaysia has two national car manufactures, Proton and Perodua. | <ul style="list-style-type: none"> - The power generation may keep depending on fossil fuels. - A fewer EV deployment target, compared with neighbouring ASEAN countries. - Fewer policy incentives are provided, compared with neighbouring ASEAN countries (Thailand, Indonesia). - The car sales market has already saturated. - The EV production incentives are not attractive enough to bring manufactures investment. - Transport sector is responsible of 25% of total GHG emissions. - There are limited numbers of charging infrastructure. |

| | | | | |
|-----------------------------|--------------------|--|-------------------------------|---|
| External Environment | Opportunity | <ul style="list-style-type: none"> - Malaysia is committed to tackle climate change, with an updated NDC in 2021. - BEVs are exempted with import taxes and excess taxes. - Malaysia Automobile Robotic Institute and Automobile Import Association are jointly investing in an EV Centre of Excellence (COE). The COE intends to become the region hub of EV maintenance, repair, and customer support. - The government expects transportation electrification may help in reducing air pollution. | Strength x Opportunity | Weakness x Opportunity |
| | | | | (2) Malaysia has advantages on digital technologies. Malaysia may be able to develop a unique position to provide software platforms and services, such as charging service applications, optimum charging control, car sharing/ride hailing platform, and battery assessment. |
| | Threat | <ul style="list-style-type: none"> - Two national car manufactures are both practically managed by Chinese entity (Proton with GWM) and Japanese entity (Perodua by Daihatsu). Their business strategy may not perfectly align with the government policy. - Most of the domestic production factories are responsible with the final assembling. There is less key components production. | Strength x Threat | Weakness x Threat |
| | | | | (1) With the smaller domestic auto industry with a fewer growth in the car sales, government investment on EV production may not be effective compared with neighbouring Thailand and Indonesia. Two national car manufactures may lead the EV deployment in the domestic market. |

8.4. Thailand

| Domestic Environment | |
|---|--|
| Strength | Weakness |
| <ul style="list-style-type: none"> - Renewable resources are increasing, exceeding 30% of total power production capacities. - The government has clear BEV focus policies, especially to become the global BEV production hub. - The government has already implemented BEV incentives with exempting import taxes to key BEV parts and excise tax redemption. - A relatively large domestic auto market, the second largest in ASEAN. - A long relationship with Japanese auto manufacturers to develop the country's production industry and the big car market. - New Chinese players are emerging in the middle-class vehicles market, including GWG using a popular MG brand. - A good car industry base exists, the top in ASEAN region, 10th largest in the world. | <ul style="list-style-type: none"> - The power generation still depends on natural gas, as much as 60% as of 2021. - There is few recycling standards and regulations on hazardous materials, including EV battery. - Thailand will need more experienced and knowledgeable human resources on EV battery and EV charging. - There is only a limited number of EV charging infrastructure. |

| | | | Strength x Opportunity | Weakness x Opportunity |
|-----------------------------|--------------------|--|---|---|
| External Environment | Opportunity | <ul style="list-style-type: none"> - Transportation sector has a big potential in reducing GHG emissions, the sector is currently responsible as much as 30%. - The government of Thailand has a clear policy to become the EV global production hub, by keeping the car industry strength. More domestic and international EV policy communication will help understanding such policies. - The government of Thailand is considering the update of EV30@30 plan to EV50% by 2030. - A relatively high vehicle ownership in ASEAN region, 267 per 1000 capita. - The new trading agreement with China exempts import taxes from vehicles from China and imported EV models are increasing. - Many auto manufacturers are starting to enter to BEV market. - Although the current numbers of registered EVs are small, they are fast increasing at the rate of 24% (2021– | <p>(1) Thailand has already implemented key strategic policies to enhance the BEV production industry to become the global production hub of electric vehicles and parts. Additional measures to strengthen the key technology, namely EV battery production will be the focus policy area.</p> <p>(2) The government may want to develop a new electricity tariff for EV charging.</p> | <p>(4) The EV battery recycling standard and regulation should be developed. A few pilot projects involving EV and battery manufacturers and regulatory parties will help understanding the design of the battery recycling industry.</p> |

| | | | | |
|--|---------------|---|--|--|
| | | <p>2016), the fastest growth in the market.</p> <ul style="list-style-type: none"> - The Board of Investment of Thailand provides various support for domestic EV production investments. | | |
| | Threat | <ul style="list-style-type: none"> - Thailand is one of the most susceptible countries by climate change risks, with sea level rising and severe floodings, which may affect more than half of country's population. - The decrease of cheap domestic natural production decrease with more expensive liquefied natural gas imports increases are affecting the electricity rates increase. - Thailand will need to increase the investment on the power grid to meet the increasing demands, increasing the renewables, and improving the supply reliability. - The share of xEVs in new cars sales in increasing as much as 6% in 2021, the share of BEV remains as low as 0.3% (2021). | Strength x Threat | Weakness x Threat |
| | | | <p>(5) Thailand is one of the most susceptible countries from climate changes, and country's investment on climate change mitigation, including clean electricity transition and the transportation electrification should bring effective results. It is recommended that the incentive policies keep tracking the expected GHG reduction performance.</p> <p>(2) The government may want to develop a new electricity tariff for EV charging,</p> <p>(3) It is important to invest in the power grid capacity and reliability increase, so that the electricity demand increase by growing the economy and the additional EV charging loads will be met.</p> | <p>(6) It is recommended that the government should invest in human resources using joint projects with international institutes on battery production, charging infrastructure development, and battery recycling. Using official development assistance financing should help on top of the investment incentives.</p> |

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| | | <ul style="list-style-type: none">- Available BEV models are either in high-end import models with longer mileage range of 200-480km, or the low-end models with less than 160 km mileage range.- There is less choice in the most needed middle-class.- Although there are incentives for BEV production, the standalone battery import is still subjected to import taxes, and auto manufactures need to speed up domestic battery production.- The constant increase of labour cost is pushing up the domestic car production cost. | | |
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8.5. Viet Nam

| Domestic Environment | |
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| Strength | Weakness |
| <ul style="list-style-type: none"> - Plenty of hydropower resources (>25% of total power production), thanks to number of big rivers. - Less expensive electricity tariff - Historical relationship with Japanese motorbike manufacturers results in a very big motorbike market. - 4th largest motorbike market in the world. | <ul style="list-style-type: none"> - Relatively high dependency on fossil fuel power generation for a while, especially with coal. - Fewer investment on the power grid due to controlled low electricity tariff. - Oil import is increasing due to the decline of domestic oil production. Oil price is higher, compared with cheaper electricity tariff. - No clear policy on transportation electrification. Less policy incentive programmes on BEV promotion. - Hazardous material regulations on recycling have not been developed yet, including BEV battery recycling. - Compared with neighbouring Indonesia and Thailand, the policy incentive programmes on EV manufacturing is not sufficient to attract international manufacturers' investment. |

| | | | Strength x Opportunity | Weakness x Opportunity |
|-----------------------------|--------------------|--|---|---|
| External Environment | Opportunity | <ul style="list-style-type: none"> - Viet Nam updated the NDC in 2020 to continue the commitment on Paris Agreement. - There is a policy to increase renewable power sources towards 2030. The 8th Power Development Plan aims renewable capacity as much as more than double by 2030. - An incentive for BEV purchase by decreasing excise tax rates for BEV, especially between 2022/3 and 2027/2. - The population of middle-class income is strongly increasing, and a strong automobile demand growth is expected. - A small number of second-hand cars are on the road. - A new auto manufacture/retailer VinFast is rapidly expanding the presence in all automobile markets (four-wheels, two-wheels, e-buses, and EV charging stations). - An e-bike driver's licence allows easy use of e-bikes for students and others by test-free licensing. | <p>(1) By utilising the hydro power resources and the constant renewable resources in the power sector, the Transportation Electrification policy may effectively reduce GHG emissions.</p> <p>(3) Considering the mobility market size and the EV charging infrastructure readiness, 2-wheels (motorbike) electrification policy looks like a wise choice.</p> | <p>(2) It is also important to invest in the power grid capacity and reliability increase, so that the electricity demand increase by growing the economy and the additional EV charging loads will be met.</p> |

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| | Threat | <ul style="list-style-type: none"> - A frequent drought and water shortage starts preventing constant hydro power production. - A-world-wide oil supply shortage may continue for a while. - A lack of knowledge and experiences due to the limited pilot programmes on EV deployment and EV charging infrastructure development. Because of the lack of technical and business understanding, it is not easy to design an effective policy support. - Most Japanese auto makers are slow in electrification. | Strength x Threat | Weakness x Threat |
| | | | (4) It is necessary to build confidence in the policy as well as accumulating experiences and knowledges through a series of pilot projects in mobility electrification. | |