



# THAILAND

## E-mobility Country Profile

### Background

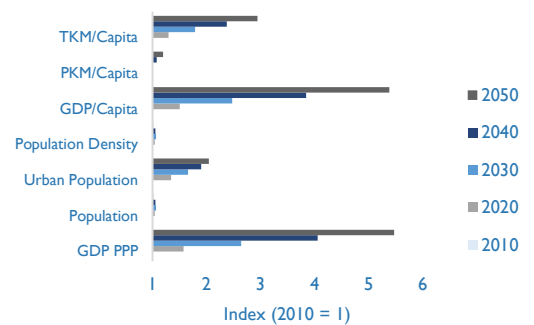
Thailand is geared towards continued growth in transport activity drivers such as economic growth urbanisation. Leading up to 2050, it is estimated that more than half a million people will be added to urban areas per year, and the GDP per capita is expected to grow at an annual average of 4.3%.<sup>1</sup> Such growth in transportation activity drivers are estimated to result in an average annual growth of 1.0% in passenger transport activity (passenger-kilometers), and 2.7% average annual growth rate for freight transport activity.<sup>2</sup>

Such growth in transport drivers and demand is expected to result in significant growth of vehicle fleets. For example, it is estimated that more than 10.2 million two and three-wheelers will be added between 2020-2050, along with 10.3 million light-duty vehicles (i.e. cars, pick-up trucks).<sup>3</sup> It is projected that by 2050, the motorization rate would be 886 vehicles per 1000 people,<sup>4</sup> which is at par with the current motorization rate, in say, the USA. It must also be noted that the country is facing an ageing population: with the number of persons aged 60 and above are projected to double between 2015-2050,<sup>5</sup> which would impact how transportation demand, and supply would develop in the future.

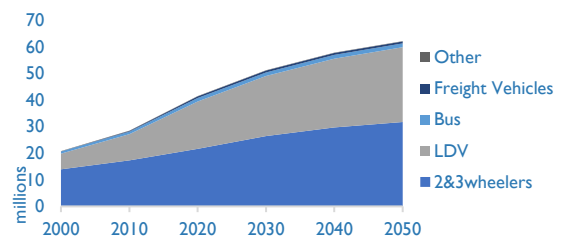
The transportation sector is one of the major contributors to air pollution and greenhouse gas (GHG) emissions in Thailand. It is estimated that the transportation sector contributes 29% of the fuel combustion GHGs in the country (total of 243 million tons in 2020). Ninety-six percent (96%) of the transport GHG emissions are estimated to be from the road sector.<sup>6</sup>

In terms of ambient air pollution, the road transport sector is estimated to contribute 8.3% of the total burden of disease related to Particulate Matter 2.5 (PM2.5) — in Thailand. Road transport air pollution is also deemed to have significant contributions to the burden of disease related to ischemic heart disease (25%), and chronic obstructive pulmonary disease (10%) in the country.<sup>7</sup> PM2.5 concentrations in available data for sample cities in the World Health Organisation’s (WHO) open database was, on average, 25 µg/m<sup>3</sup>. In 2018 . The World Health Organization’s (WHO) guideline value for PM2.5 is 5 µg/m<sup>3</sup>. It is estimated that in 2019, more than 29.5 thousand people died prematurely due to PM2.5 in Thailand.<sup>8</sup>

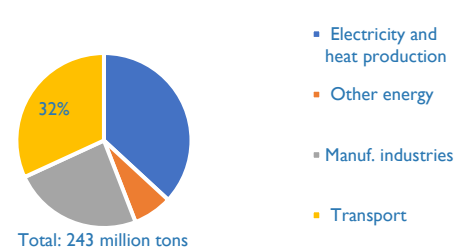
### Socio-economic & Transport Indicators



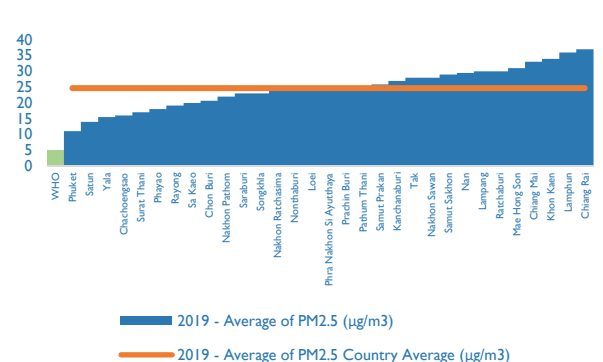
### Vehicle Stock Projections



### 2020 Fuel Combustion CO2: % By Sector



### PM2.5 (µg/cubic meter)



## E-mobility at a Glance

The automotive sector plays a crucial role in Thailand's economy, accounting for approximately 10% of the GDP. It has been dubbed as the Detroit of Asia, and has become the 11<sup>th</sup> largest automotive production base globally. The total production output in 2022 was 1.7 million units, and the industry employs approximately 850 thousand people.<sup>9,10</sup> Now, it is positioning itself as a leading EV production hub in the Asian region.

As per the Electric Vehicle Association of Thailand (EVAT), electric vehicle registration has reached 430 thousand as of June 2023, up by 29% from the end of 2022, and essentially doubling the figure in 2020 (192 thousand). Ninety-one percent (91%) of the total registrations are cars, followed by motorcycles at 8%. Seventy-one percent (71%) of the registrations are HEVs, followed by BEVs at 17%, and PHEVs at 11%.<sup>11</sup> Even with promising figures in terms of new registrations, the proportion of registered EVs to internal combustion engine vehicles remain relatively small, estimated at 2% in 2020.<sup>12</sup>

The EVAT also documents that there are currently 38 models of battery electric cars (21 companies) that are available in the Thai market in 2023. The EVAT itself is composed of 229 members that work across the e-mobility chain.<sup>13</sup>

As the automotive industry is a crucial pillar of the country's economy, Thailand is striving to achieve the goals set towards "Thailand 4.0" featuring an industrial transition towards technological advancement and high level services in its automotive industry. The government is pushing for "next-generation automotive" development targeting top industries and is providing support for EV-related businesses to position itself towards the leading EV production hub in Southeast Asia.

Thailand is playing a key role in becoming a regional hub for EV production, but, as with other countries, is facing challenges such as insufficient EV infrastructure, high EV and battery purchase costs.<sup>14</sup>

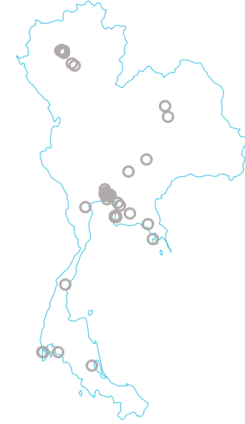
Thailand has geared up in terms of the development of its charging station network, with approximately 1,482 public charging stations, from 12 developers nationwide in the country as of May 2023. The figure on the upper right depicts those charging stations that had been reported under the Open Street Map platform.<sup>15</sup> Out of the total 4,628 charging points, 61% of these are AC Type 2, 32% are DC CSS2, and 7% are DC CHAdeMo compatible.

Moving towards electric mobility is also deemed to alleviate the risks associated with high dependency on imported fuels. Thailand is still heavily reliant on imported energy. In 2022, the value of its energy imports was 6 times what it exported. Thailand's net imports of energy amounted to about 1.57 million barrels of oil equivalent per day.<sup>16</sup>

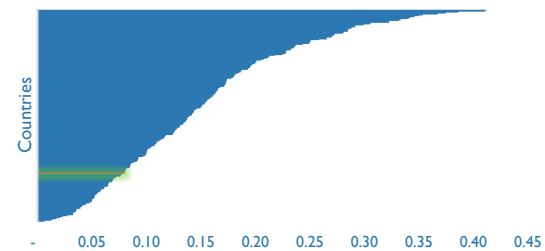
The average price of electricity in Thailand (2021) was estimated to be 0.11 kWh.<sup>17</sup> This is on the lower end of the global range, and ranks 83<sup>rd</sup> out of 237 countries. Considering overall access to electricity, Thailand had more or less achieved full electrification in the late 2000s.

In terms of the emissions impact of the electricity grid, the national average is estimated at 507 kgCO<sub>2</sub> is emitted per MWh, which ranks at 147<sup>th</sup> place out of 225 countries globally.<sup>18</sup> The average grid emission factor has marginally declined steadily since the turn of the century, wherein in 2000, the emission factor was at 540 kgCO<sub>2</sub>/MWh. The nation's electricity grid is still dominated by natural gas in terms of power generation, constituting 53% of the generation in 2022. Renewables and hydropower generated 13% of the electricity in 2022.<sup>19</sup>

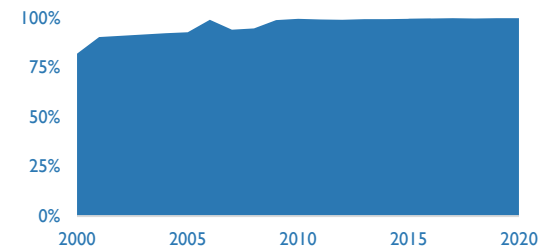
### Charging Stations



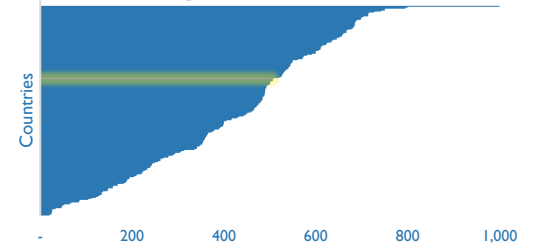
### Thailand: 0.11 USD/kWh



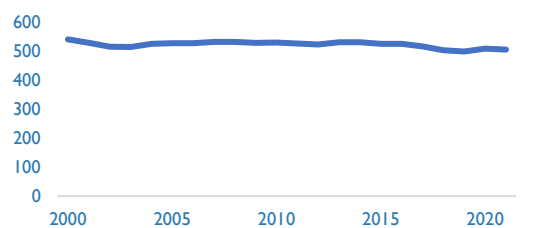
### % Population with Access to Electricity



### Thailand: 507 kgCO<sub>2</sub>/MWh



### Thailand Historical Grid kgCO<sub>2</sub>/MWh



## Policy Measures: Highlights

Thailand has offered incentives (e.g. exemptions from corporate income tax) for investments directed at the production of advanced vehicle technologies – i.e. as part of the Eco-Cars program launched in 2012, these had been characterized as general forms of support for the automotive industry in general. In 2015, a cabinet resolution acknowledged that “next-generation” automotive industry is one of the ten key industries moving towards the future. In 2017, the government approved measures to promote electric vehicle production in Thailand. Its 20-year National Strategy also mentions the shifting of the automotive industry into the smart electric vehicle industry.<sup>20</sup>

On February 2020, a subject notification towards the appointment of a National Electric Vehicle Policy Committee was signed by the Prime Minister (No.38/2563). The said Committee’s goal is to drive the electric vehicle industry in the country.<sup>21</sup> In February 2022, support schemes towards covering various types of electric vehicles towards achieving a target of 50% zero emission vehicle (ZEV) registration by 2030 was announced by the National Electric Vehicle Policy Committee. This is also aligned with the 30@30 policy, which states that at least 30% of all automotive production in 2030 would be ZEVs.<sup>22</sup> The 30@30 policy was unveiled in 2021 together with a 3-phase development plan for the EV industry:

- Phase 1 (2021-2022): promotion of electric motorcycle and support infrastructure
- Phase 2 (2023-2025): achieve economies of scale through the production of 225,000 cars and pick-up trucks, 360,000 motorcycles and 18,000 buses/trucks by 2025, including batteries
- Phase 3 (2026-2030): produce 725,000 EV cars and pick-up trucks, 675,000 EV motorcycles, including batteries ; accounting for 30% of all automotive production.

In 2022, the Thai Cabinet approved an incentive package featuring customs duty and excise tax measures to support the EV industry. The following incentives apply to 27 model types of EVs such as: eco-cars with 10 seats or less; electric pick-ups; hydrogen fuel cell-powered trucks; EVs with 10 seats or less; plug-in four-door passenger pick-ups.<sup>23,24</sup>

- 40% point reduction (from 80% to 40%) in import duties for BEV completely built-up units (CBUs) priced up to 2 million baht (~62K USD) from 2022 to 2023
- 20% point reduction (from 80% to 60%) in import duties for BEV CBUs priced up to 7 million baht (~211K USD) from 2022 to 2023
- Excise tax cut from 8% to 2% for imported EVs.

Aside from these, an earlier set of package in the same month which provides the following for eligible manufacturers:

- 70,000 baht subsidy per passenger car EV with 10 to 30 kWh battery capacity for CKD and CBU
- 150,000 baht subsidy per passenger car EV with >30 kWh battery capacity for CKD and CBU
- 18,000 baht subsidy for e-motorcycle from eligible manufacturers.

Import duties exemption on significant electrical parts are also provided (2022-2025).<sup>25</sup> Income tax rates were also slashed from 35% to 17% for skilled foreign professionals in targeted industries and economic zones.<sup>26</sup> In September 2021, the BOI agreed to improve its investment promotion policy for BEV platforms (consisting of a charging module, energy storage system, front & rear axel modules) which are deemed to provide economies of scale, shorter production development time, and more flexibility. The Board also approved the promotion of electric bicycles with tax incentives offered include a minimum of 3 years of corporate income tax exemption.<sup>27</sup>

In November 2020, the BOI approved an incentive package covering the production of various EVs (passenger cars, buses, trucks, motorcycles, tricycles, ships):<sup>28</sup>

- Projects focusing on four-wheelers worth at least 5 billion baht will be granted with 3-year income tax holiday for PHEVs; 8-year holiday for BEVs. Such can be extendable in case of R&D investments/expenditures.
- Projects on four-wheelers less than 5 billion baht for PHEVs and BEVs will be granted with a 3-year income tax holiday. For BEV projects, the holiday period can be extended if the project meets the following: commencement of production by 2022, additional part production, minimum production of 10,000 within 3 years.
- Qualified projects focusing on motorcycles, tricycles, buses and trucks will be granted a 3-year income tax exemption, which can be extended as well.
- Electric-powered ship production projects for vessels with less than 500 gross tonnage will be eligible for 8 years income tax exemption.
- Projects focusing on critical parts such as high voltage harness, reduction gear, battery cooling system, and regenerative braking systems would receive 8 years corporate tax exemption, exemption on import duties on machinery and raw/essential materials. Other critical parts for EVs identified are: battery, traction motor, compressor for BEVs, battery management system, driving control system, inverter air conditioning; DCDC converter; front/rear axle for EV bus; electrical circuit breaker; portable EV charger; smart charging system; on-board charger.<sup>29,30</sup>
- Battery modules and battery cells for the local market will be granted with 90% reduction in import duties for 2 years on raw or essential materials not available locally.

## Policy Measures: Highlights

The Thai government also provides exemption of import duties on machinery for HEVs, PHEVs, BEVs and battery electric buses, as well as excise tax deductions, subject to conditions.<sup>31</sup> The Excise Department has implemented favorable excise tax rates for electric-powered passenger vehicles with seating for up to 10 individuals. From January 1, 2020, to December 31, 2022, the tax rate has been set at 0%, while from January 1, 2023, to December 31, 2025, it stands at 2%. These reduced rates apply to vehicles endorsed by the BOI. Even outside of the BOI endorsement, electric-powered passenger cars still benefit from a comparatively low excise rate of 8%. In contrast, conventional engine passenger cars are subject to higher excise rates ranging from 25% to 40%.<sup>32</sup>

The government is also aiming to expand the country's DC fast charging stations to 2,200-4,400 stations by 2025, from approximately 1,500 in May 2023.<sup>33,34</sup> The Board of Investment (BOI) projects that quick chargers are to rise by 4,400 by 2025, 12,000 by 2030 and 36,500 by 2035.<sup>35</sup> To bolster charging infrastructure and services provision, Thailand's BOI recently enhanced investment incentives and conditions for charging station developers and operators.<sup>36</sup>

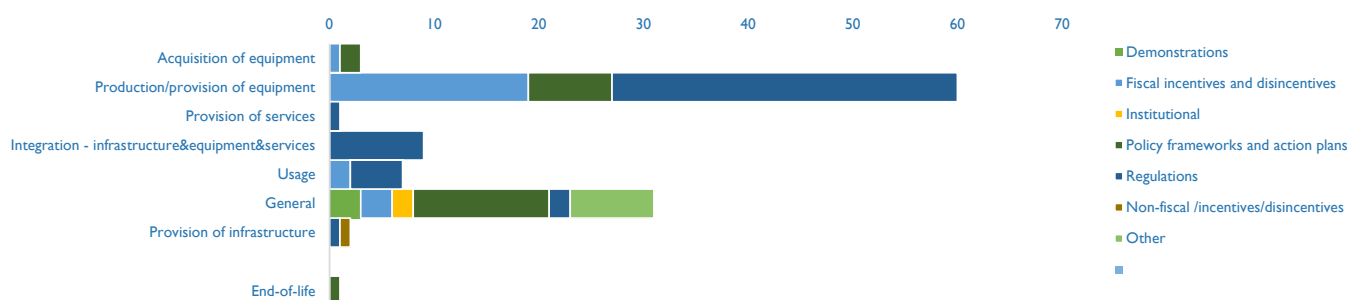
- Investments in charging stations with 40 or more chargers (10 being DC) are eligible for corporate income tax exemption for 5 years
- Investments in charging stations with 16 (to <40) chargers can be eligible for corporate income tax exemption for 3 years
- Simplified the process for applying for BOI investment promotion by repealing the following: ineligibility for more investment incentives granted by other agencies ; mandatory ISO certification
- Investors now only must abide by the relevant safety regulations and submit a plan to either implement an EV smart charging system or connect to an EV charging network operator platform.

The Electric Vehicle Association of Thailand has also been instrumental in bolstering the charging network in the country, as it initiated the Charging Consortium Project which paves the way for cooperation between 12 public charging station service providers towards developing the charging network. EVAT, together with the Electricity Generating Authority of Thailand, has recently organized a contest for business opportunities for electric motorcycle conversion., which attracted more than 90 teams.

The electrification of transport also is included / mentioned as a key strategy in several other high level policies and strategies, such as the Nationally Determined Contribution Action Plan for Transport, Energy Efficiency Plan (2015-2036), and the Thailand Integrated Energy Blueprint.

The figure below shows a summary of the documented policy measures (including enacted and proposed) related to e-mobility in Thailand. The policy measures are grouped according to the "stages" (left axis) and types of policy measures. Additional details are contained in the table on the next page.

Distribution of Policy Measures



## Snapshot of E-mobility Policy Measures

Pillar	Stage	Category	Type of Policy Measure		
Charging equipment and components	Production/provision of equipment	Fiscal incentives and disincentives	Import tax exemption/ reduction - raw materials, supplies, components Corporate income tax reduction/holiday - charging equipment		
		Regulations	Charging connector and cable standards Charging systems standards(general) Charging safety standards Battery swapping standards		
			Regulations	EV Charging Communication standards	
			Regulations	Charging protocol standards	
	Provision of services	Regulations	Time-of-use rates		
	Integration - infrastructure&equipment&services	Regulations	Demonstrations - charging technologies		
	General	Demonstrations	Demonstrations - charging technologies		
EVs and EV components	Acquisition of equipment	Fiscal incentives and disincentives	EV-specific cash-for-clunker scheme		
		Policy frameworks and action plans	Public fleet electrification target		
	Production/provision of equipment	Fiscal incentives and disincentives	Corporate income tax reduction/holiday - manufacturers of Evs/ components Fiscal incentives - general Import duties reduction for EVs and components Import tax exemption/ reduction - raw materials, supplies, components Excise tax waiver for EV and components - supply side Safety requirements for incentives		
			Policy frameworks and action plans	EV production targets	
			Regulations	EV safety standards EV specifications, standards and Type approval EV standards - multidimension Standards - charge port Test specifications - Evs	
				Regulations	EV operating characteristics EV performance standards Registration system revision to accommodate Evs
		Usage	Fiscal incentives and disincentives	Registration tax waiver or reduction for EV and components	
		General	Other	EV Demonstration Projects (blank)	
	Policy frameworks and action plans			EV end-of-life management policy	
	General	General	Fiscal incentives and disincentives	Finance for research, development and promotion of RE Income tax reduction for personnel working on Emobility Cross-subsidy	
			Institutional	National EV board/committee	
			Policy frameworks and action plans	Dedicated National EV Policy/Roadmap/Strategy General pronouncement of support for emobility Renewable energy targets General pronouncement of investments EV included in NDC	
				Regulations	Standards - general
				Other	Carbon market Energy attribute certificate
Infrastructure			Integration - infrastructure&equipment&services	Regulations	Standards for Charging Stations Grid integration standards
			General	Policy frameworks and action plans	Electric infrastructure targets
			Provision of infrastructure	Regulations	EV charging station labeling/markings
	Non-fiscal /incentives/disincentives	Strategic deployment of public charging infrastructure			

Note: The graph and the table pertaining to the e-mobility policy measures are mainly those that the authors had been able to collect, collate, and categorize. The authors make no claims about the completeness of the list, nor the accuracy of the categorization. These are presented to provide an approximation of the developments that are happening in terms of e-mobility policy measures, but may not be fully representative of the actual situation.

## Endnotes

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