

Electric 2/3-wheeler market overview for the Asia region

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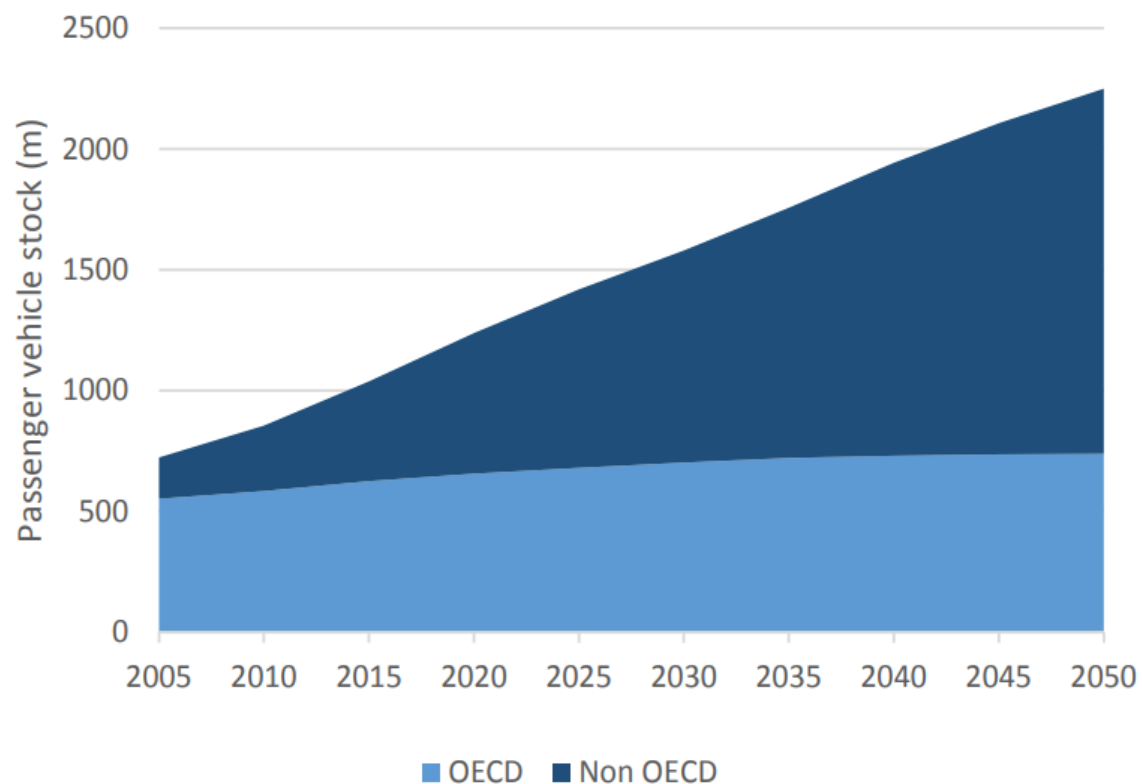
T.8 Ramping Up Electrification of Transport

Training Session of the E-Mobility Platform for Asia and the Pacific

Friday 17 May 2024 (9-12:30) @ Auditorium Hall 3/ADB HQ



UNEP Global Electric Mobility Programme



- The global vehicle fleet is set to double by 2050
- All of this growth, 1+ billion vehicles, will take place in non-OECD countries
- The transport sector is set to go from one quarter to one-third of all energy related GHG emissions
- Many conventional vehicles are still going to be added, with a time-lag in fleet turnover of 20 years

Pillars of the Programme



Electric 2&3 wheelers

- Economically viable
- Technically mature
- Charging at home outlets feasible
- High growth rates of two-wheeler market in Asia and Africa



Electric light duty vehicles











- Close to break-even with conventional cars
- Technically mature
- Highest mitigation potential of global transport energy use and emissions

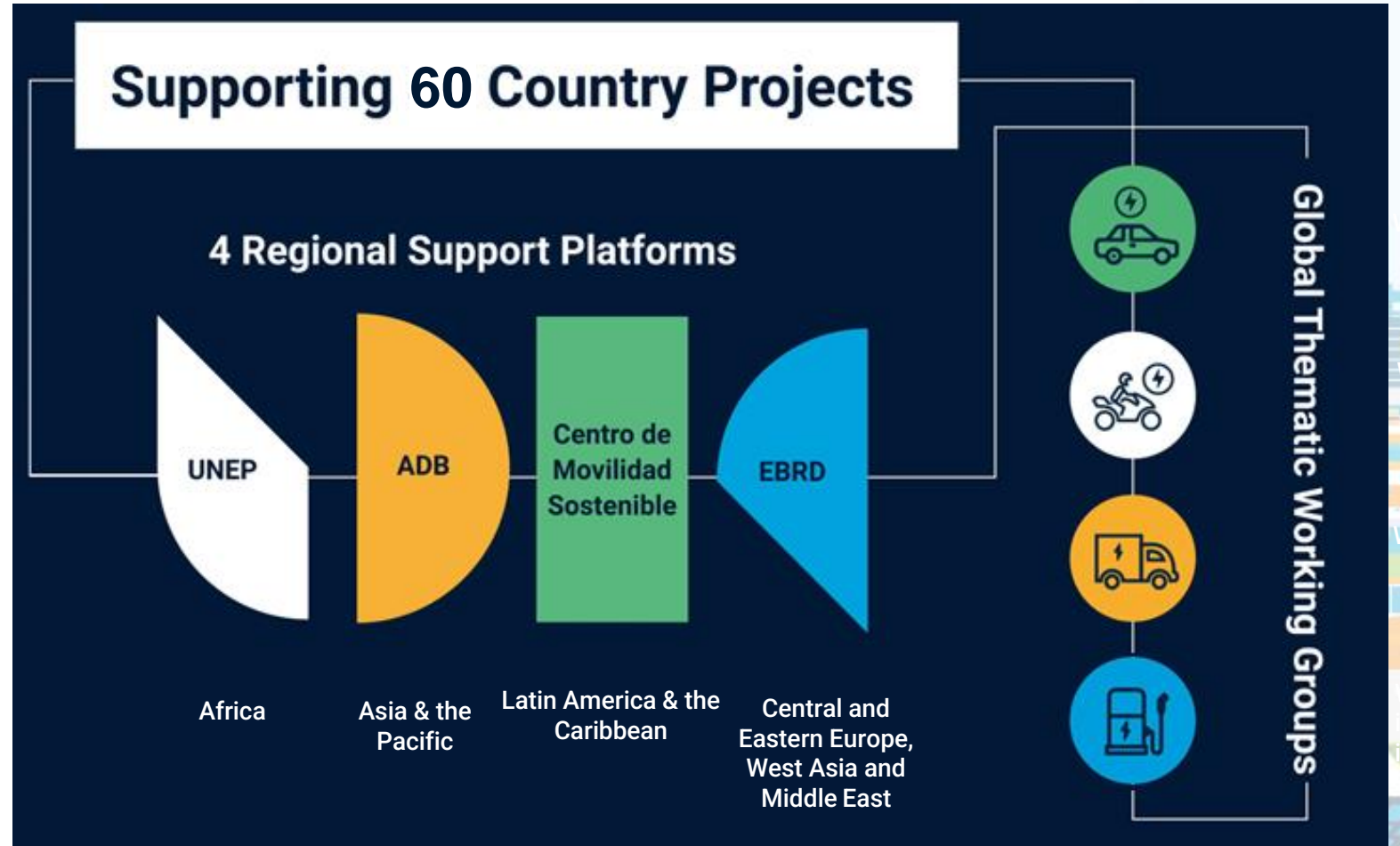


Electric buses

- Economically viable on high-capacity lines
- High potential to improve local air quality
- Manageable charging infrastructure requirements

Structure of the Programme

Asia		
Bangladesh		UNDP
India		UNEP / ADB
Indonesia		UNDP
Malaysia		UNIDO
Maldives		UNEP
Nepal		UNEP / SOL+
Philippines		UNEP / SOL+ UNIDO
Sri Lanka		UNEP
Thailand		UNEP / UNIDO
Viet Nam		UNEP / SOL+



WG 1: I
WG 2: I
WG 3: I
WG 4: I
Infra
Integra

- Supports more than 60 low and middle-income countries with more than USD 130 million in grants and over USD 250 million in loans at the national, regional and global level
- Funded by the GEF, the German Climate Initiative, the EU, the IEA Clean Energy Transitions Programme & EVI members, foundations and bilateral development aid
- Jointly implemented with partners such as ADB, EBRD, IEA, Centro Mario Molina Chile, UNDP, UNIDO and the SOLUTIONSplus project

UNEP Recent Report on e2&3w Global Emerging Market



Electric Two and Three Wheelers

Global Emerging Market Overview

UNEP Global Electric
Mobility Programme



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2 | Electric two- and three- wheelers: A Global Emerging Market Overview

- An estimated **570 million** 2&3W today globally (**490 million in Asia**), providing transport at lower cost
- 2&3W are **low-hanging fruit for electrification**, and are the farthest EV segment ahead
- Need for further support to accelerate the transition, including import tax reductions or industrial incentives

UNEP Visualizer (beta) on e2&3w Global Emerging Market

Global Electric Two and Three Wheeler Emerging Market Overview

This is a simple visualizer of key data from the database. You can consult the complete database (and all terms of use) [here](#)

Consider selecting a region or country from below fields, and all graphs in the visualizer will adjust automatically based on your selection.

Region

Country Available (Name)
Enter a value

Vehicle types

Vehicle Type	Percentage
Scooter	50.7%
Motorcycle	42.3%
Passenger tuktuk	
Cargo tuktuk	
Trimoto	
Passenger Tuktuk	

Country availability by country of manufacture

Battery voltage by vehicle type

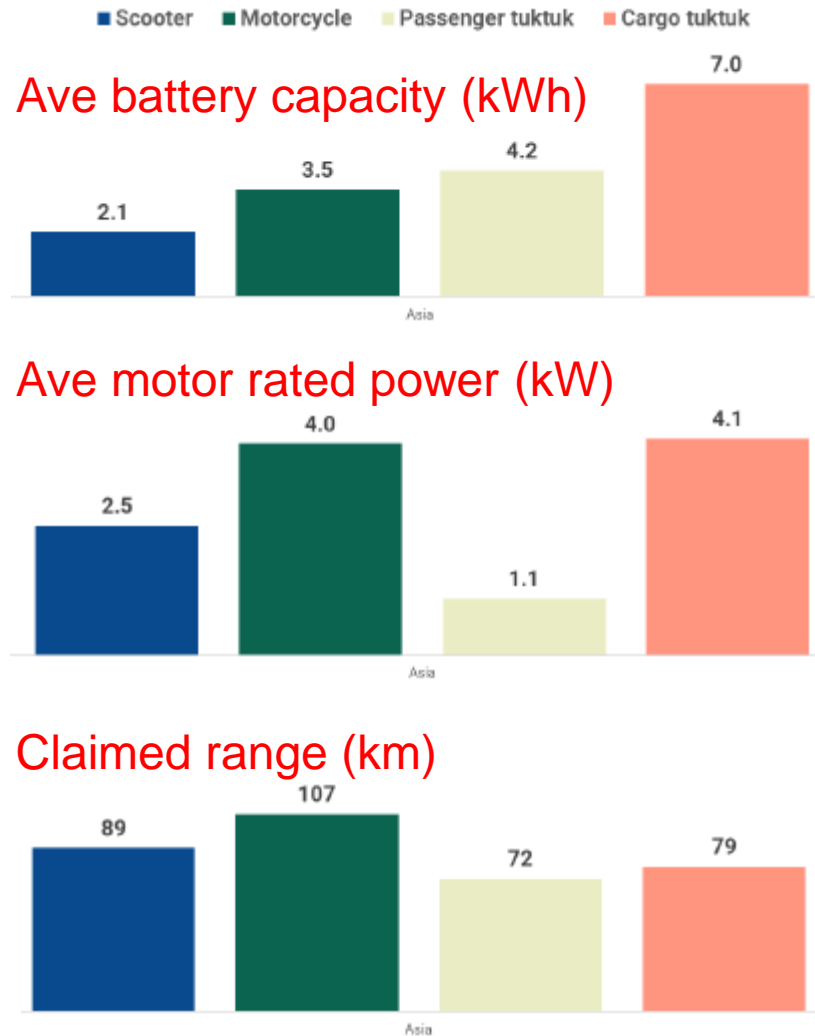
Vehicle Type	Battery Voltage
Scooter	~40%
Motorcycle	~40%
Passenger tuktuk	~40%
Cargo tuktuk	~40%
Trimoto	~40%
Passenger Tuktuk	~40%

- Sourced from interviews and internet searches
- 800 models in the database
- Open for viewing, edit upon request
- Linked to dashboard

Model	Year	Region	Vehicle Type	Battery Voltage	Other Data
...

Transition of ICE 2&3w to e2&w in Asia

- Already has the majority of the worlds 2&3w – 490 million
- High personal usage throughout
- Commercial passenger usage in several Southeast Asian countries
- Delivery usage increasing everywhere



- e2&3w first pushed in China with regulations over 10 years ago
- Initially using lead-acid battery, moving to Li-on
- Battery swapping first pioneered by Gogoro in Taiwan
- 55% of 2022 3w in India is e3w

Landscape of e2&3w in Asia

Characteristics

- E-scooters most common
- Expanding Battery-as-a-Service (BaaS) to ease transition
- 30% larger battery capacity (kWh) and 4 times higher motor power (kW) for cargo e3w on the average to carry higher load with similar travel range
- e3w largely still lead-acid battery (50% in 2021 for India) with transition to Li-ion

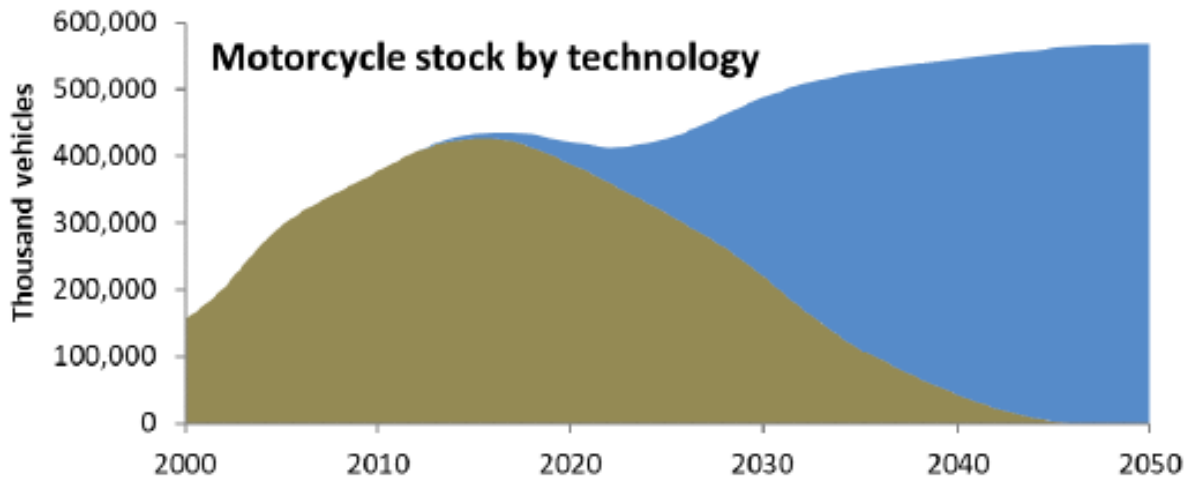
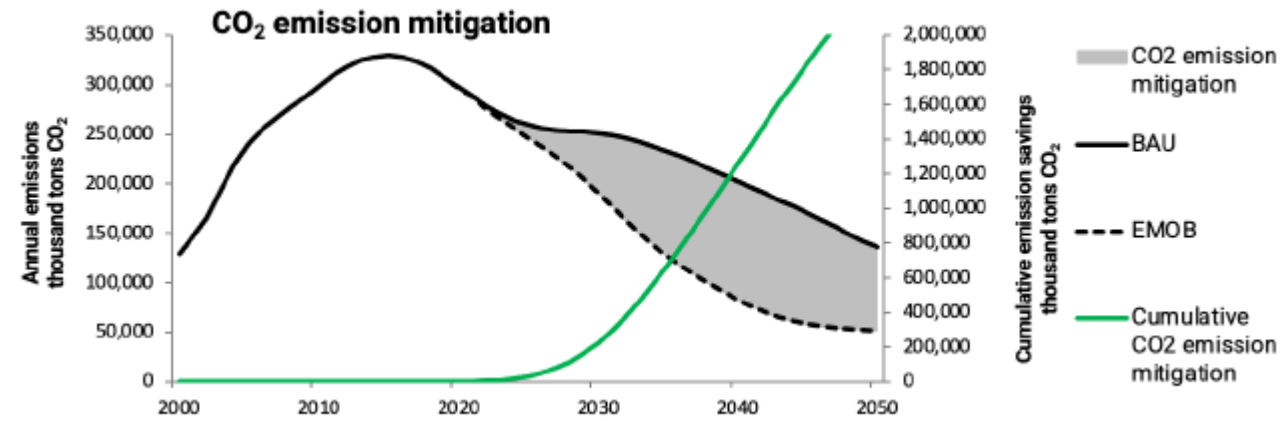
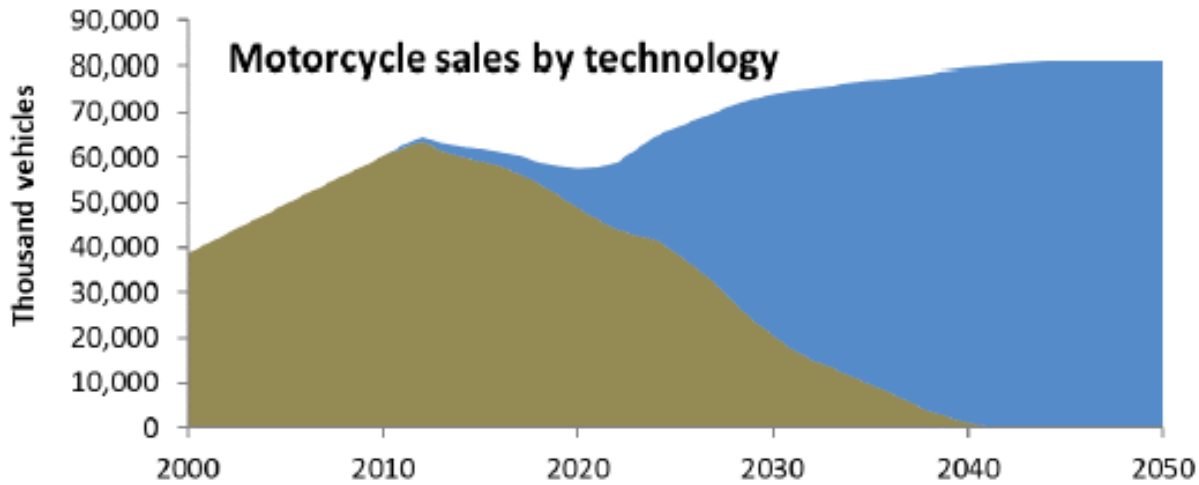
Industry Structure

- Mainly dominated by Chinese brands (imported or joint-ventured) with some emerging local companies like VinFast
- Rising market for India (e3w) and Vietnam (e2w) with e2w taxi/delivery in Indonesia & Thailand
- Mostly manufactured in the region for self usage and export to others (esp. Africa)

Key Challenges

- Harmonized standards for lower expansion cost and faster development
- Increase of swapping/charging infrastructures to catch up increase of e2&3w usages including cross-border charging compatibility
- Proper handling of used batteries
- Regulatory improvements for those not yet using e2&3w

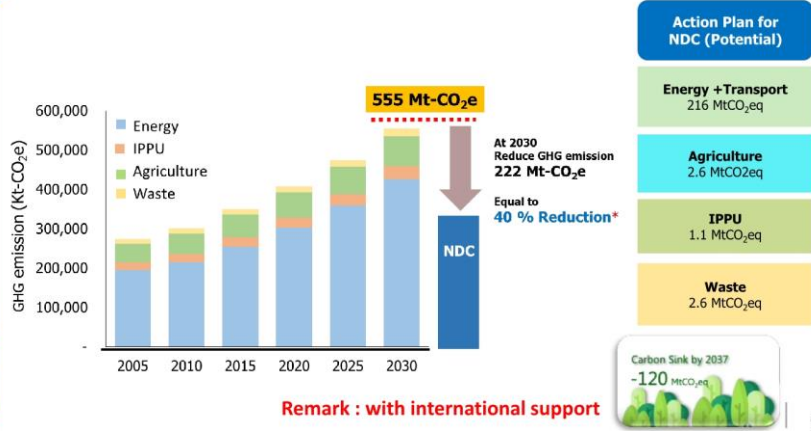
E-mobility Scenario (100% electric in 2040)



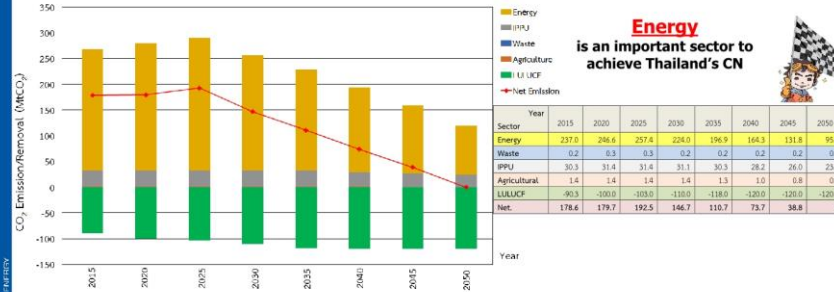
- 2&3w expected to level off with continued economic growth
- China, India, Indonesia, Thailand and Vietnam market leaders
- India growing usage on e3w delivery with strong govt support
- Indonesia accelerating with subsidies and local manufacturing

E-mobility in Thailand

Thailand's Nationally Determined Contribution (NDC)



CO₂ emission scenarios to achieve CN 2050*



* Data from the NDC public hearing (revised 2022) Office of sources and Environmental Policy and Planning (ONEP)

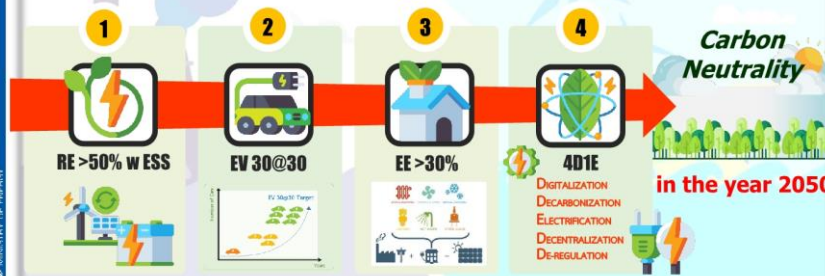
National Energy Plan

On 4th August 2021 : NEPC considered and approved national energy plan framework. The goal is to support Thailand moving towards clean energy and reduce carbon emissions to net zero.



EPPO is preparing the details of the National Energy Plan, in line with Carbon Neutrality.

Policy Direction to National Energy Plan



แนวทางการส่งเสริมยานยนต์ไฟฟ้า (EV) ของประเทศไทย ตามนโยบาย 30@30

ตั้งเป้าหมาย ZEV (Zero Emission Vehicle) รถยนต์ปล่อยมลพิษเป็นศูนย์ 100% ของการผลิตยานยนต์ทั้งหมดในปี ค.ศ. 2030

เป้าหมายการผลิตยานยนต์ไฟฟ้า

- รถยนต์ส่วนบุคคล: 675,000 คัน
- รถโดยสารสาธารณะ: 725,000 คัน
- รถจักรยานยนต์ไฟฟ้า: 34,000 คัน
- รถโดยสารสาธารณะไฟฟ้า: 650,000 คัน
- รถโดยสารสาธารณะ: 440,000 คัน
- รถโดยสารสาธารณะไฟฟ้า: 33,000 คัน

การส่งเสริมสถานีอัดประจุยานยนต์ไฟฟ้า

- แบบ Fast charge: 12,000 หัวจ่าย
- สถานีเปลี่ยนแบตเตอรี่สำหรับรถจักรยานยนต์ไฟฟ้า: 1,450 สถานี

มาตรการส่งเสริม ZEV

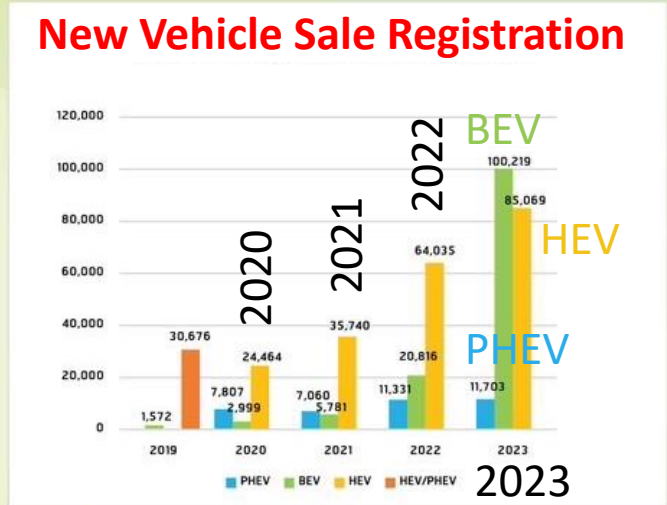
- การส่งเสริมการขายรถจักรยานยนต์ไฟฟ้า
- การส่งเสริมการขายรถจักรยานยนต์ไฟฟ้า
- การส่งเสริมการขายรถจักรยานยนต์ไฟฟ้า

เป้าหมายการส่งมอบ

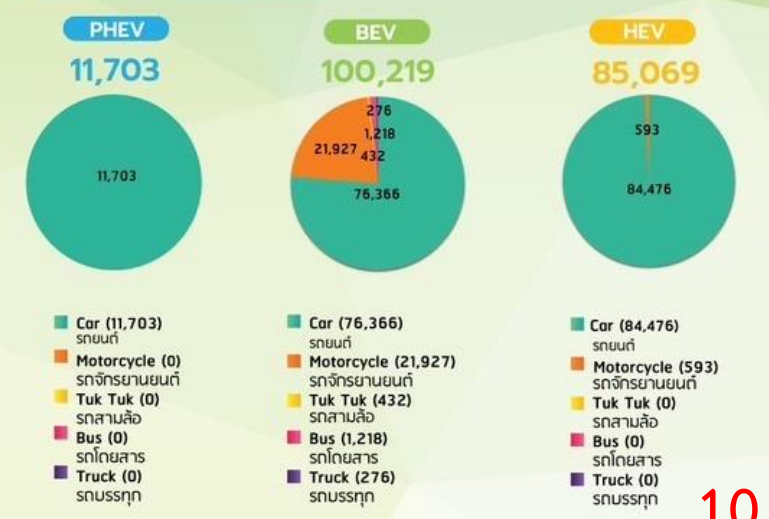
Electric motorcycle 650,000

EV 30@30 policy aim to produce zero-emission vehicles 30% by 2030.

New Number of xEV Registration Between 2019-2023 จำนวนยานยนต์ไฟฟ้าที่จดทะเบียนใหม่ ระหว่างปี 2562 - 2566



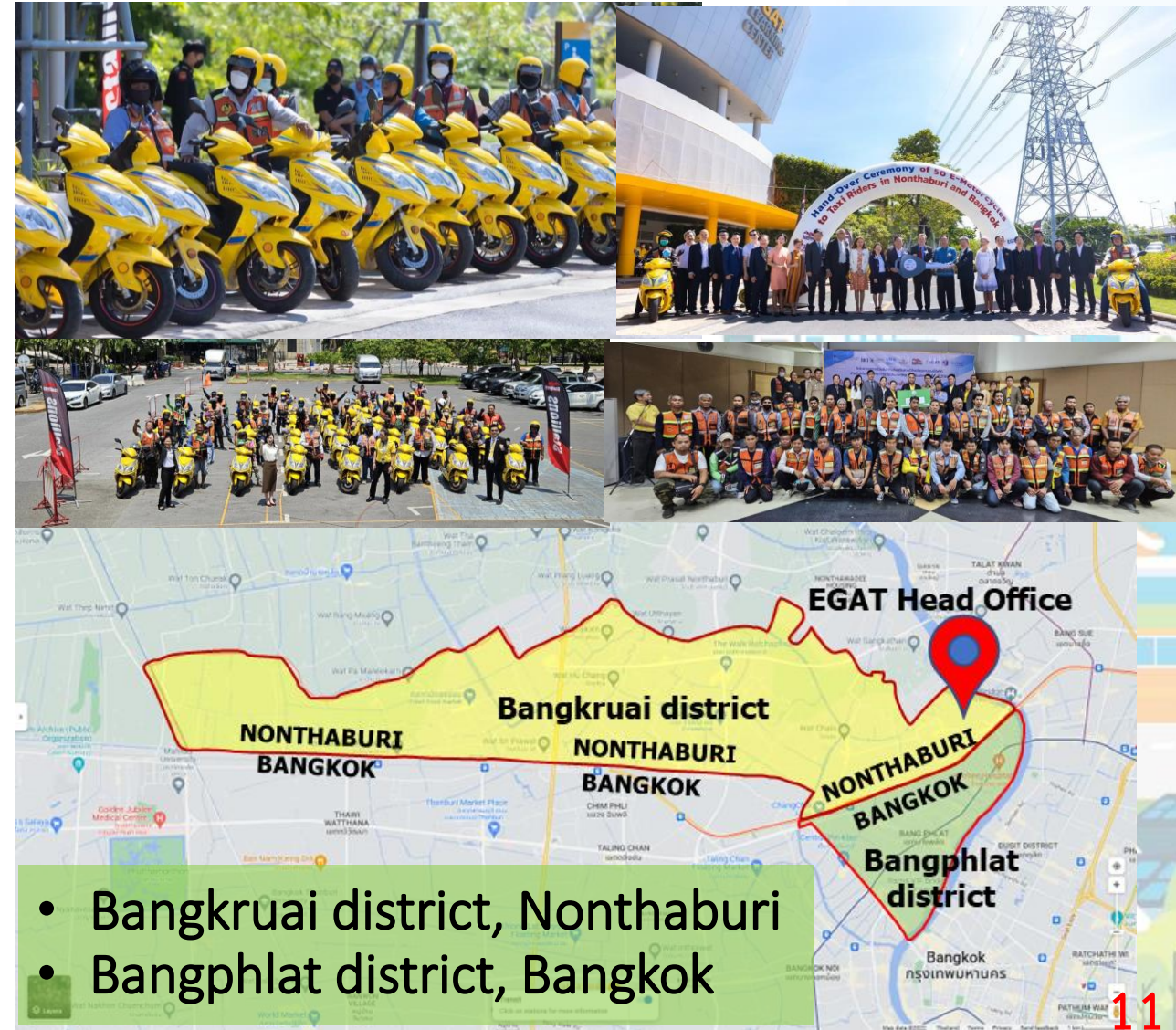
New Number of xEV Registration in 2023 จำนวนยานยนต์ไฟฟ้าที่จดทะเบียนใหม่ 1 January - 31 December 2023 1 ม.ค. - 31 ธ.ค. 2566



2 Demo Projects on e2w Taxi in Thailand

50 Electric motorcycles were analyzed in this

Model	EGAT-ENGY (TAILG-Dragon)
Motor power	3 kW (rated)
Top speed	80 km/hr
Gross load	150 kg
Water resistance	IP67
Battery specification	
Type	Lithium-ion (NMC)
Capacity	3.6 kWh (1.8 kWh x 2)
Voltage	72V
Weight	9.8 kg/pack (x 2 packs)

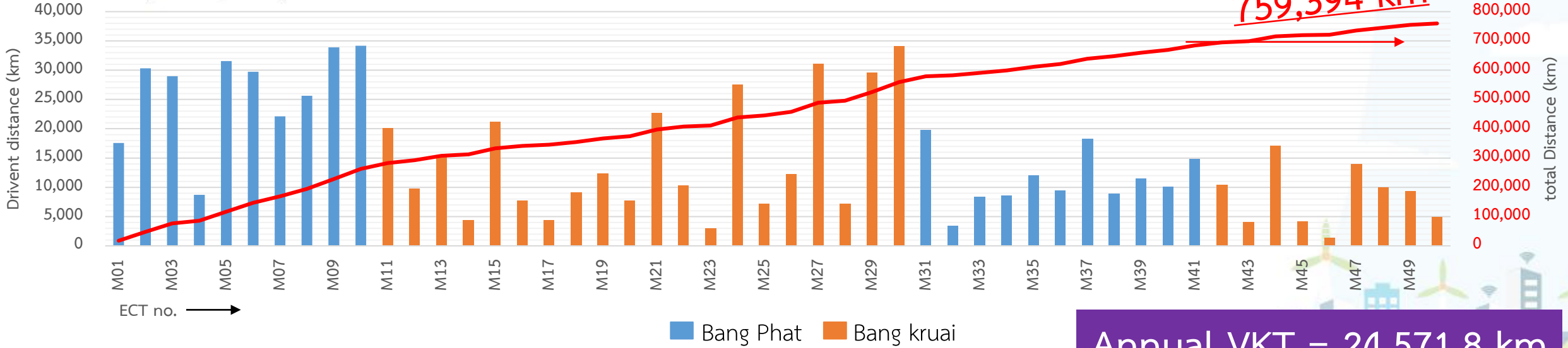


- Bangkruai district, Nonthaburi
- Bangphlat district, Bangkok

Distance (Bang Kruai & Bang Phat)

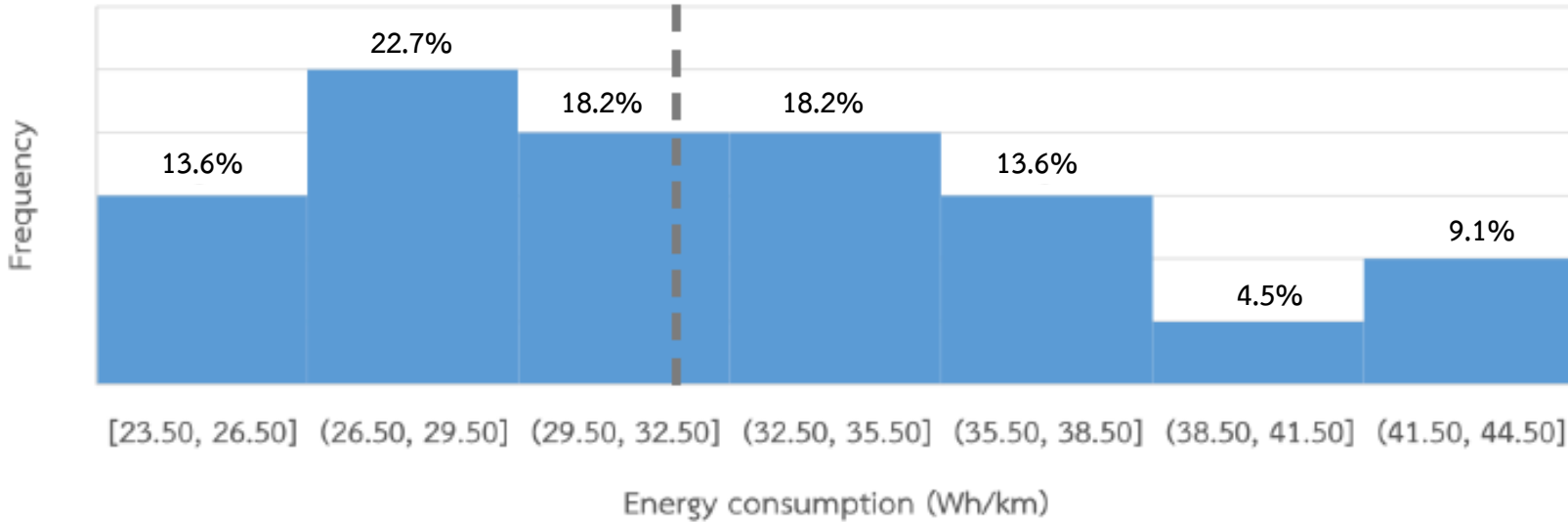
Total driven distance in the project

759,394 km



Annual VKT = 24,571.8 km
Daily VKT = 67.32 km

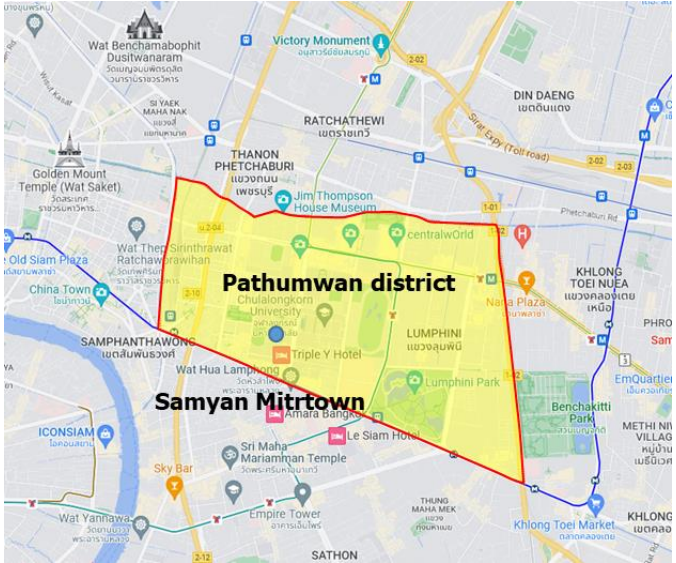
Energy consumption



Energy consumption = **32.24 Wh/km**

Reduction of GHG emissions = **38.8 TonCO_{2,eq}**

2 Demo Projects on e2w Taxi in Thailand



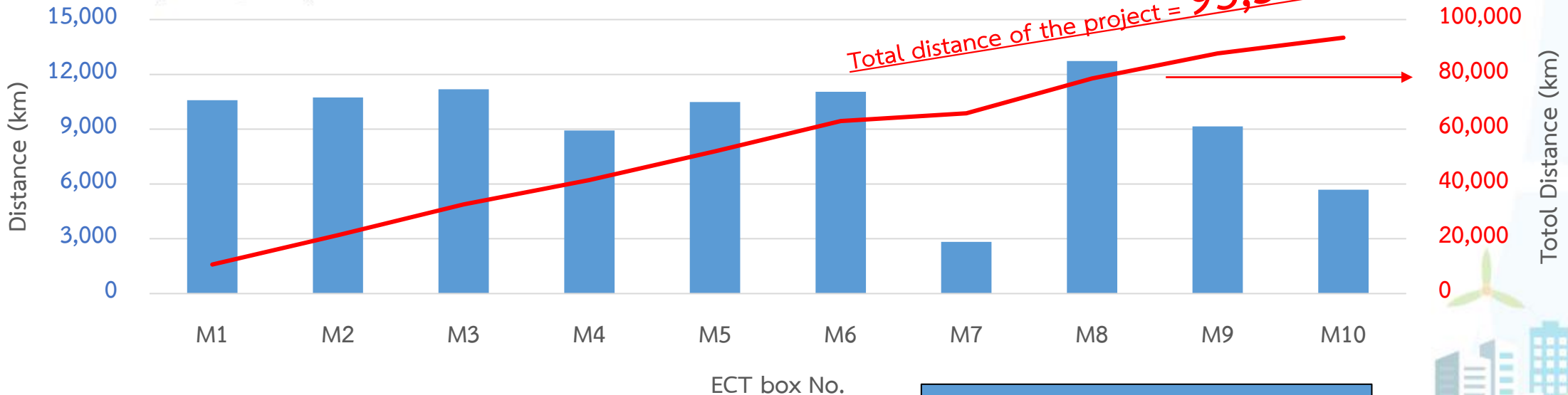
Located inside PTT fuel station



Swapping stations



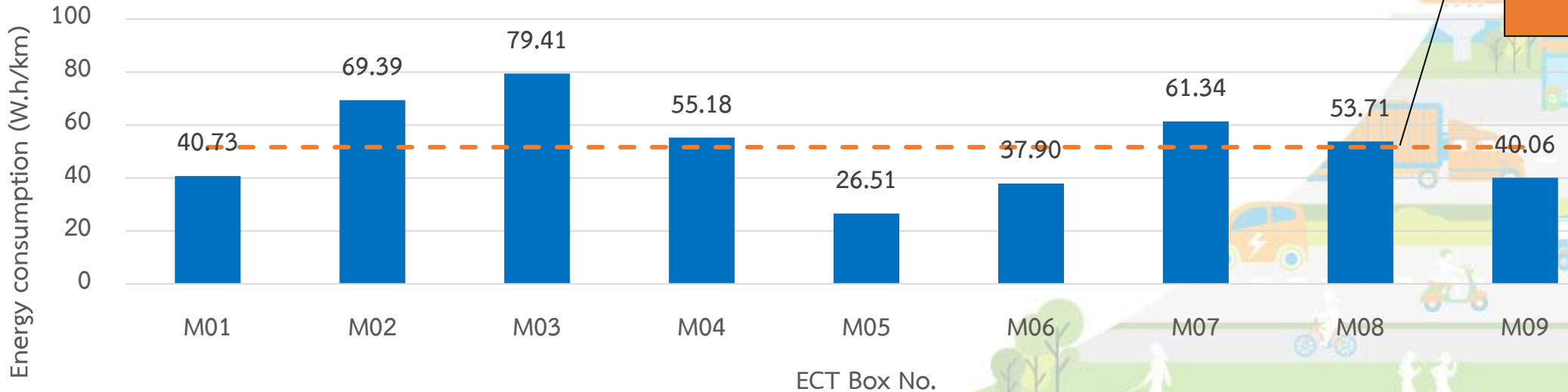
Distance (Bangkok Center)



Total distance of the project = **95,350 km**

Reduction of GHG emissions = **4.30** TonCO_{2,eq}

51.58 Wh/km



Concluding Remarks

- Asia, in particular ASEAN countries like Indonesia, Vietnam and Thailand, has great potentials for transport decarbonization by e2&w
- With strong promotion on electric mobility in ASEAN, e2w is low-hanging fruit to
 - decarbonize transport sector for both passenger and goods delivery
 - enhance low-carbon backbone transport with 1st and last mile connectivity through electric motorcycle taxi
- Lesson learned from Thailand can be shared to other countries for global promotion of electric 2-wheelers

THANK YOU!

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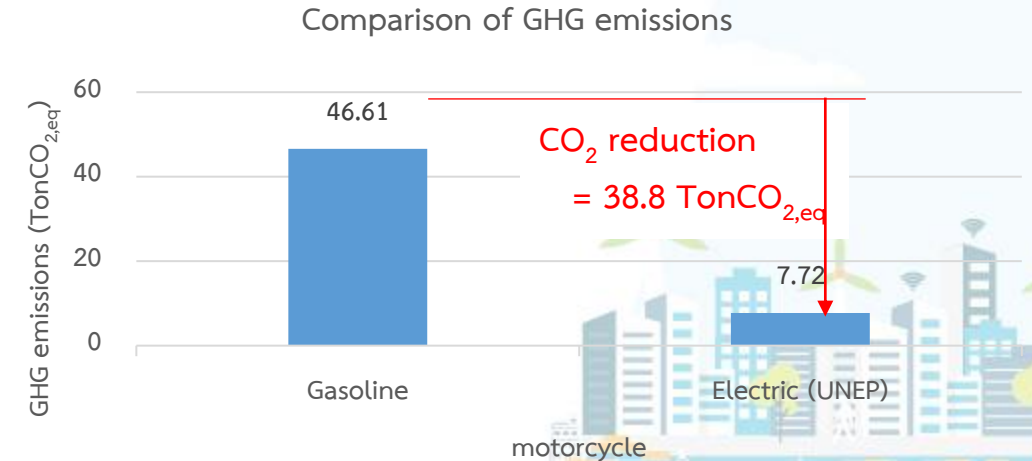


GHG Reduction in the Project

$$\text{Total CO}_2 = \text{Per km CO}_2 \times \text{Total km}$$

C **759,354**

Total distance covered in the project		759,354	km
Fuel consumption A	Gasoline	2.35	Liter/100km
	Electric	32.41	Wh/km
Energy Consumption	Electric	0.371	Liter gasoline equivalent /100km
	Electric	31.48	MJ/L
Gasoline heating value		31.48	MJ/L
Emission factor B	Gasoline (WTW)	82.08	TonCO ₂ /TJ
	Gasoline (WTT)	12.78	TonCO ₂ /TJ
	Gasoline (TTW)	69.30	TonCO ₂ /TJ
	Grid electricity (WTT)	0.315	TonCO ₂ /MWh
Per km CO ₂ C = A^(energy/km) × B^(Emission factor)	Gasoline	61.38	gCO ₂ /km
	Electric	10.16	gCO ₂ /km



Reduction of GHG emissions = **38.8 TonCO_{2,eq}**

Assumption:

- ave fuel consumption of ICE 2w taxi ~ 2.35 L/100km (EPPO, 2019)
- heating value of gasoline ~ 31.48 MJ/L (DEDE, 2021)
- grid emission factor – 0.315 TonCO₂/MWh (EPPO, 2000)

- gasoline WTT CO₂ = 0.402 kgCO₂/L (National LCI database)
- gasoline TTW CO₂ = 69.30 TonCO₂/TJ (DMF, 2022)