ASIA AND THE PACIFIC TRANSPORT FORUM 2024
14 - 17 MAY 2024 | ADB HEADQUARTERS, MANILA PHILIPPINES

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

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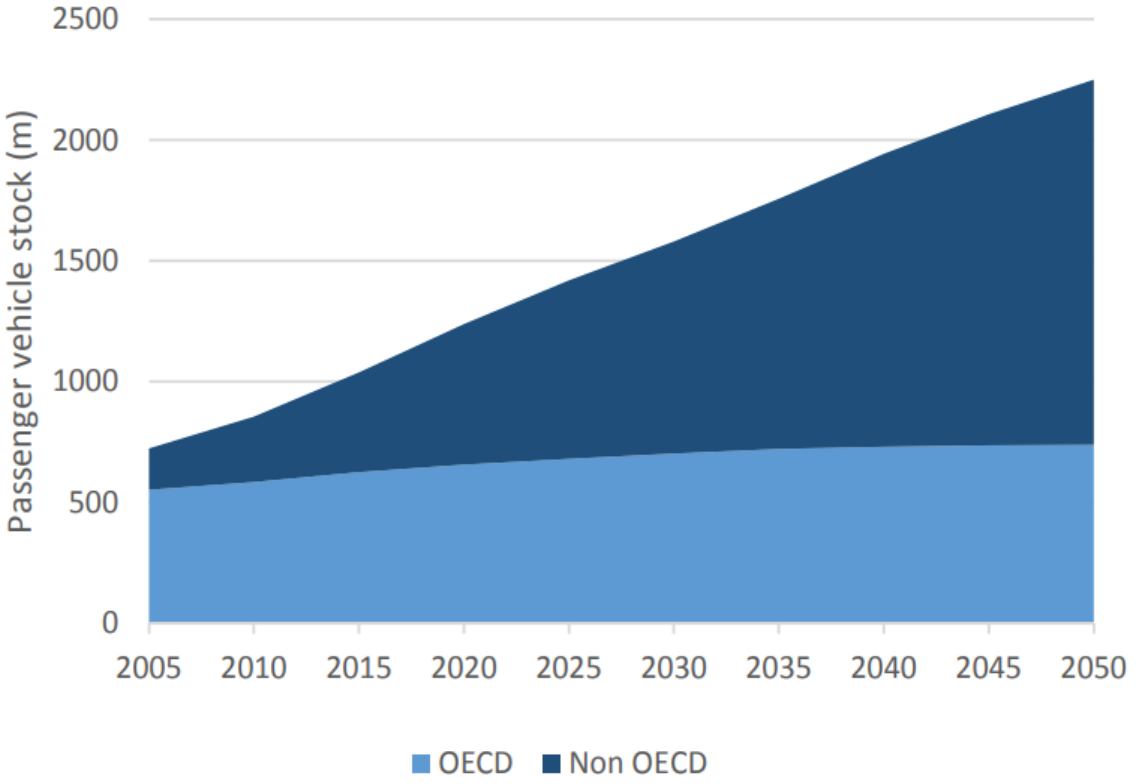
T.8 Ramping Up Electrification of Transport
Training Session of the E-Mobility Platform for Asia and the Pacific

Friday 17 May 2024 (9-12:30) @Auditorum 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**

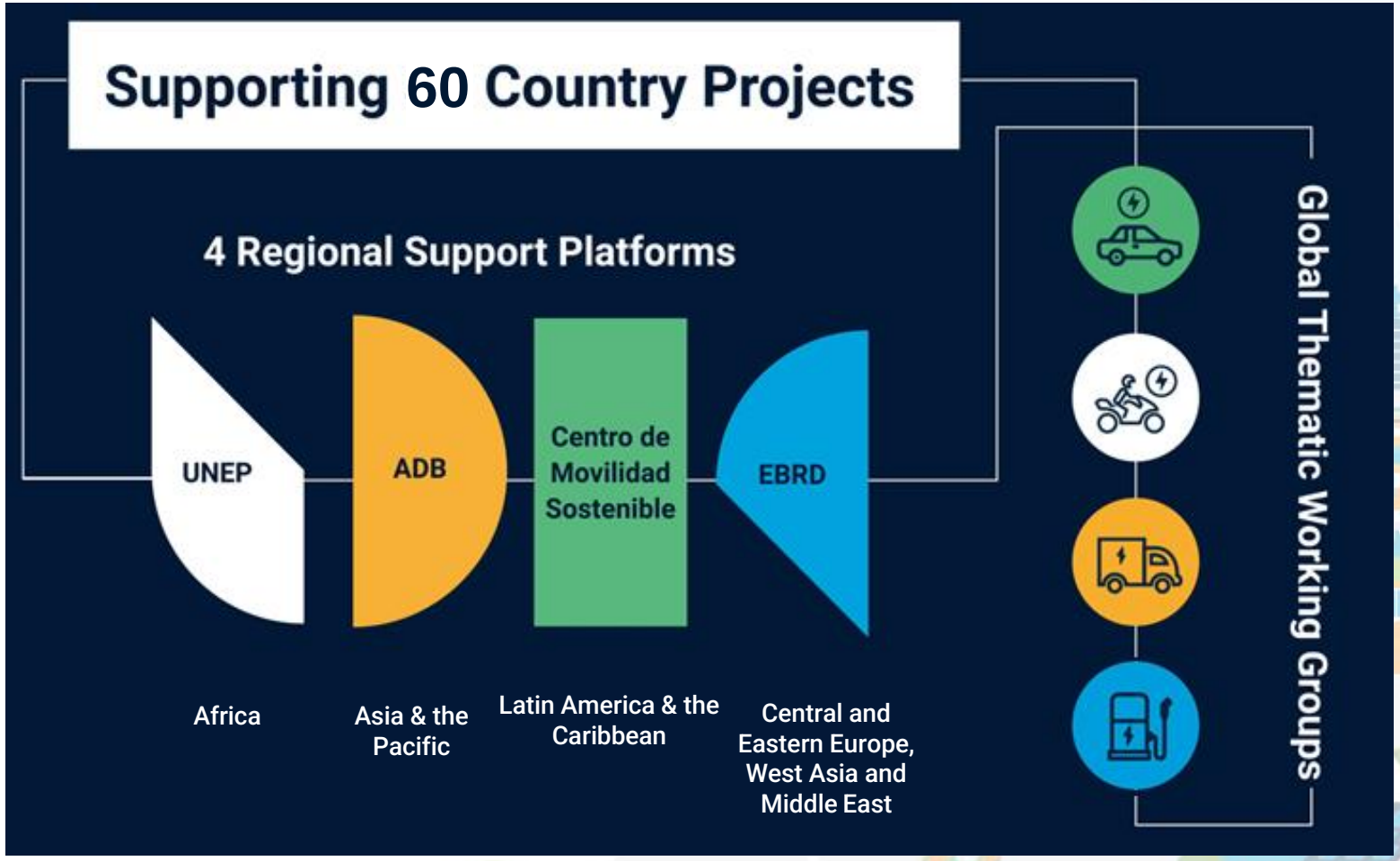
- Close to break-even with conventional cars
- Technically mature
- Highest mitigation potential of global transport energy use and emissions

**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+ |




- 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

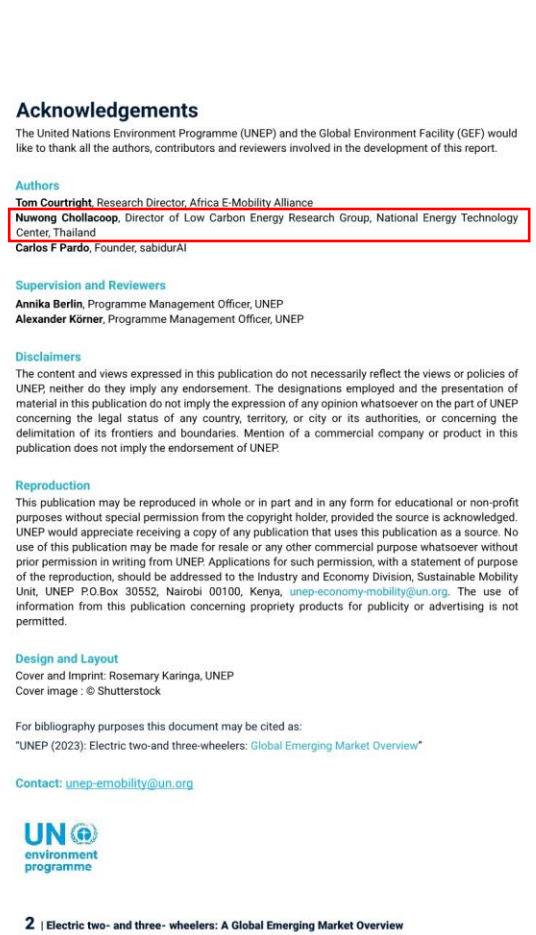
# UNEP Recent Report on e2&3w Global Emerging Market

**Electric Two and Three Wheelers**

Global Emerging Market Overview

UNEP Global Electric Mobility Programme

gef global environment facility INVESTING IN OUR PLANET



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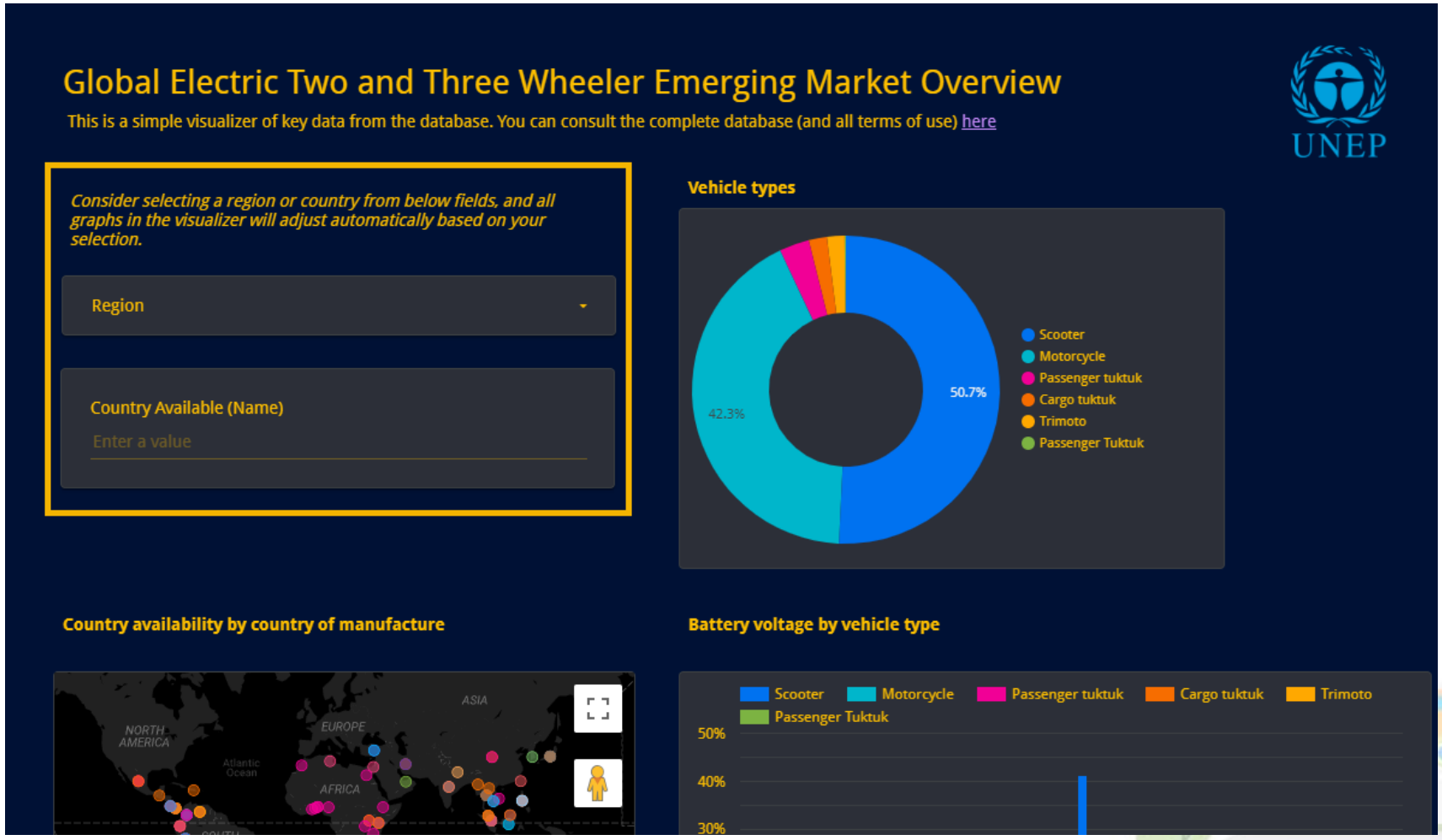
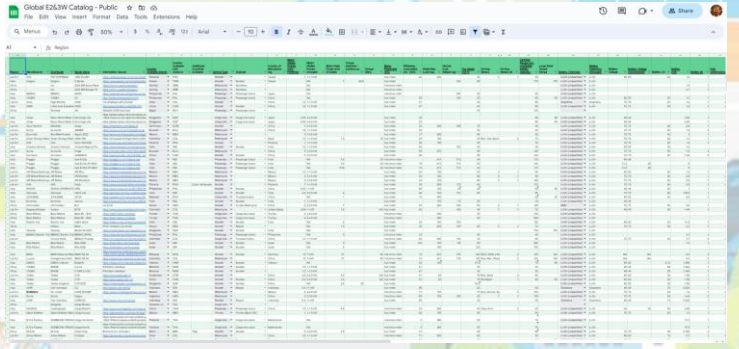
- An estimated 570 million 2&3W today globally (490 million in Asia), providing transport at lower cost
- 2&3W are low-hanging fruit for electrification, and are the farthest EV segment ahead
- Need for further support to accelerate the transition, including import tax reductions or industrial incentives

https://www.unep.org/resources/report/global-emerging-market-overview-electric-two-and-three-wheelers

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




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



https://bit.ly/unep-e23w-visualizer

https://bit.ly/unep-e23w-database

# 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-on

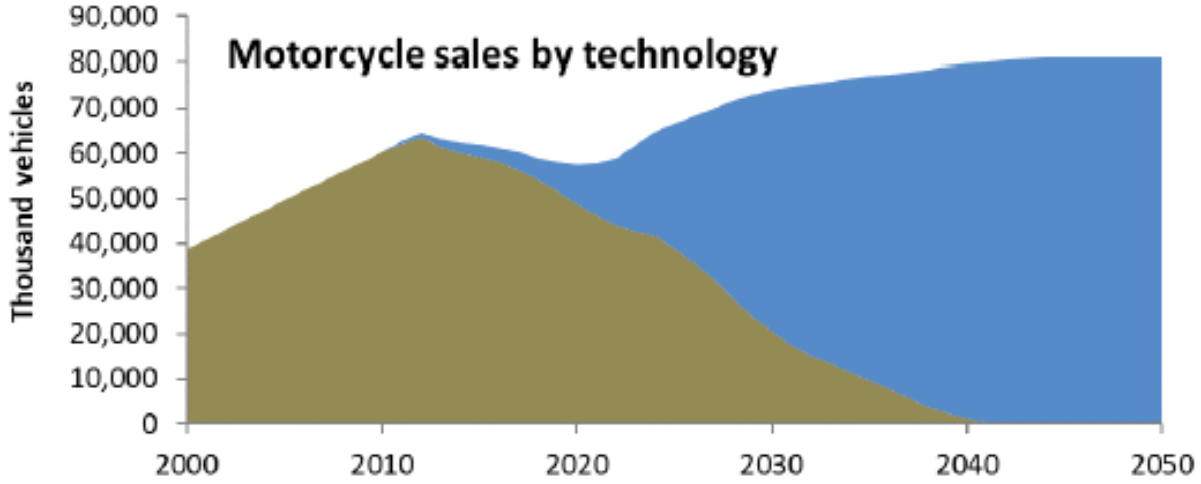
## Industry Structure

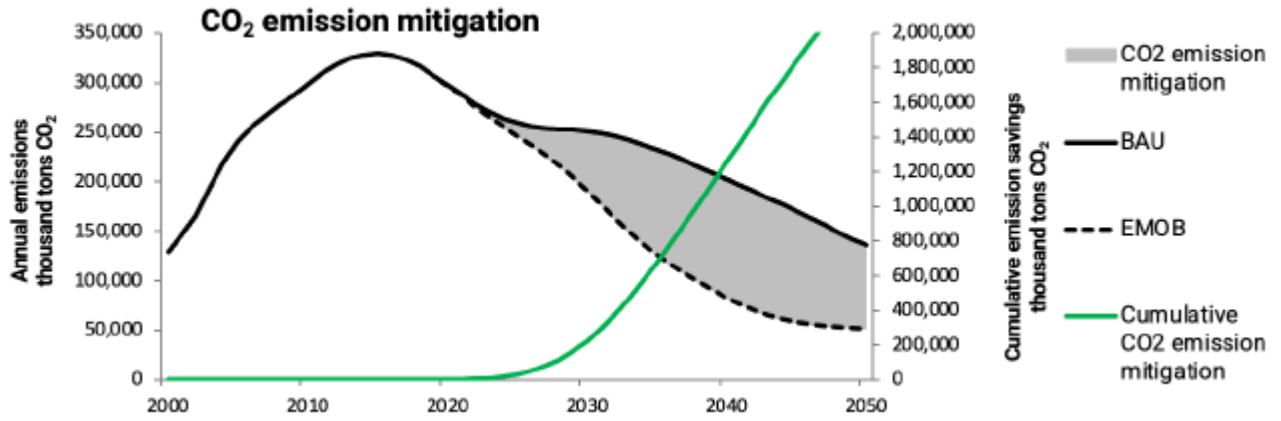
- Mainly dominated by Chinese brands (imported or joint-ventured) with some emerging local companies like VinFast
- Rising market for India (e3w) and Vietnam (e2w) with e2w taxi/delivery in Indonesia & Thailand
- Mostly manufactured in the region for self usage and export to others (esp. Africa)

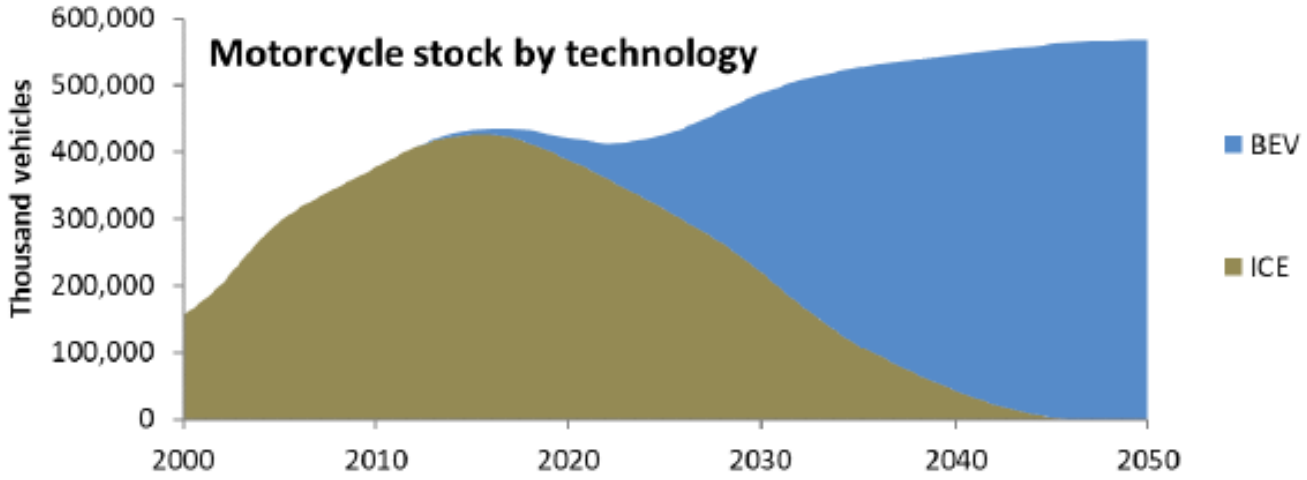
## Key Challenges

- 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)

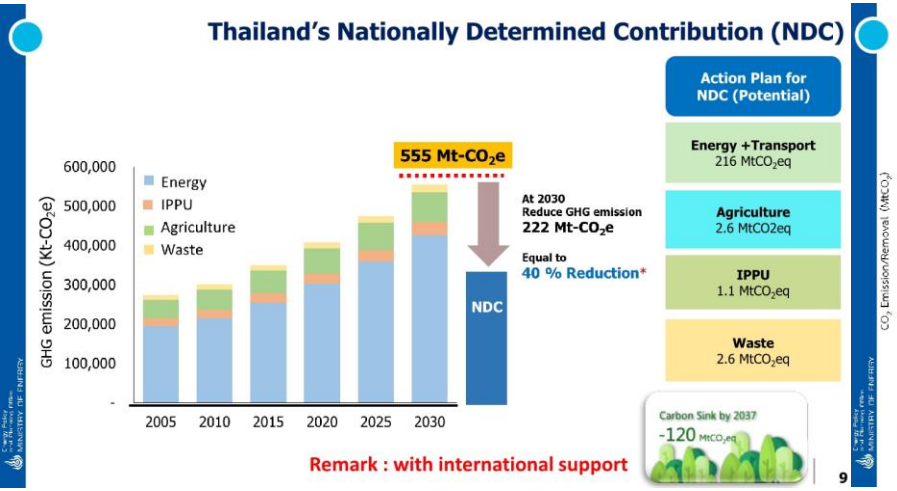


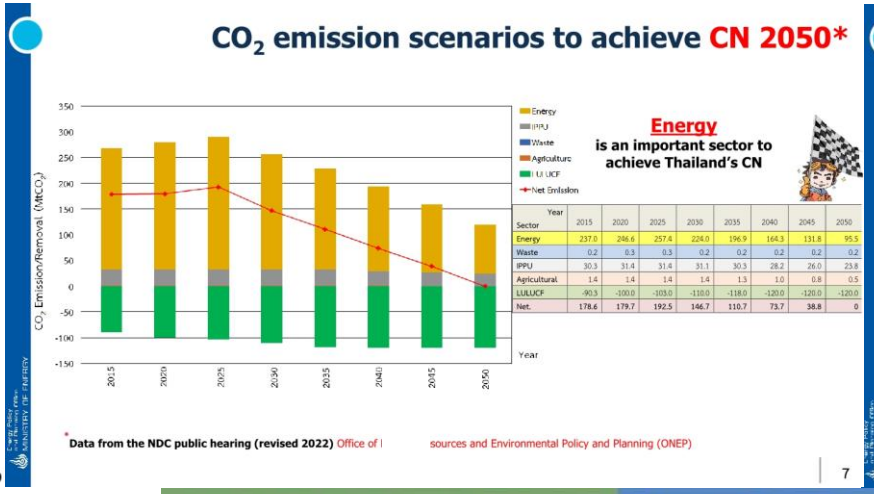



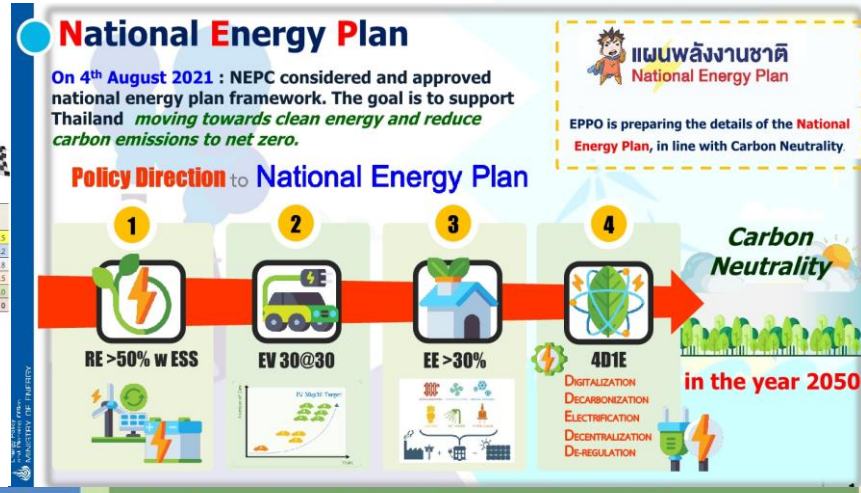




- 2&3w expected to level off with continued economic growth
- China, India, Indonesia, Thailand and Vietnam market leaders
- India growing usage on e3w delivery with strong govt support
- Indonesia accelerating with subsidies and local manufacturing

# E-mobility in Thailand

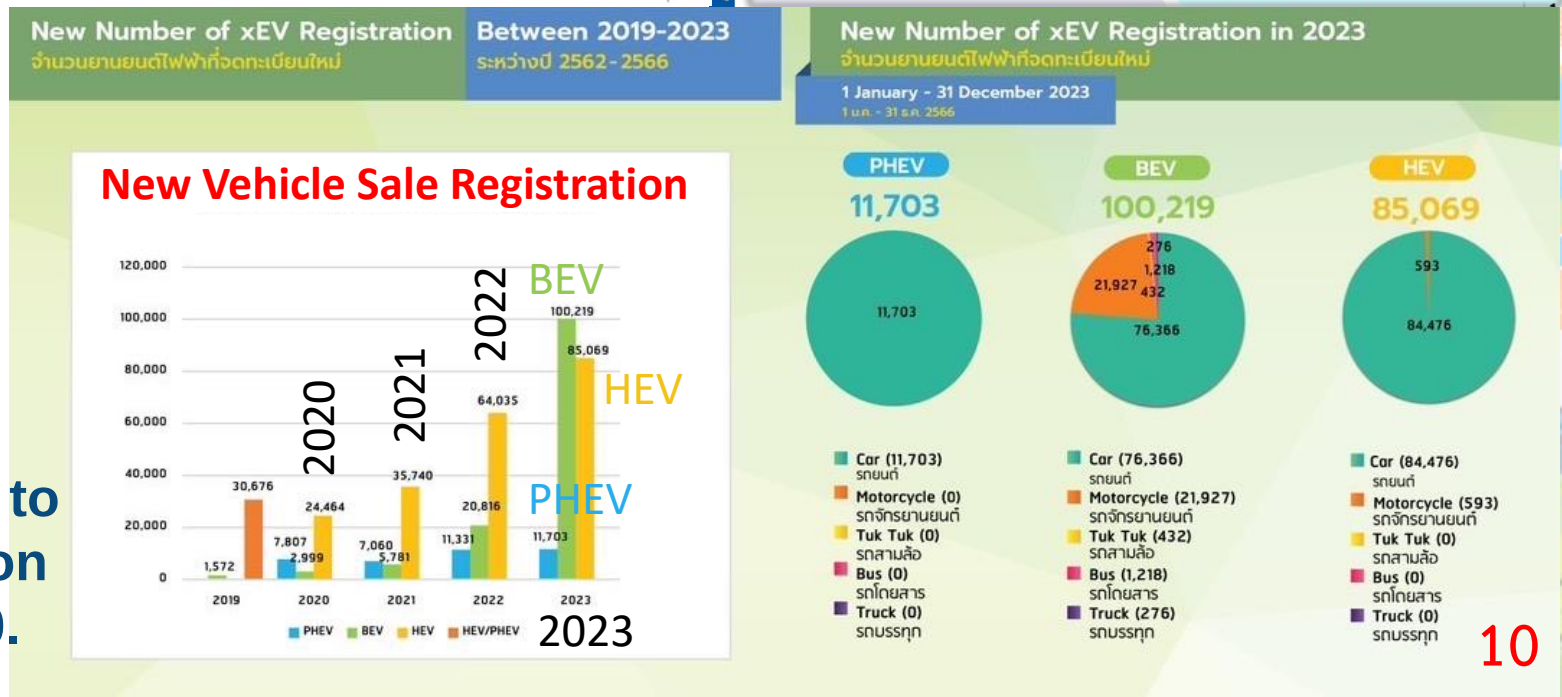


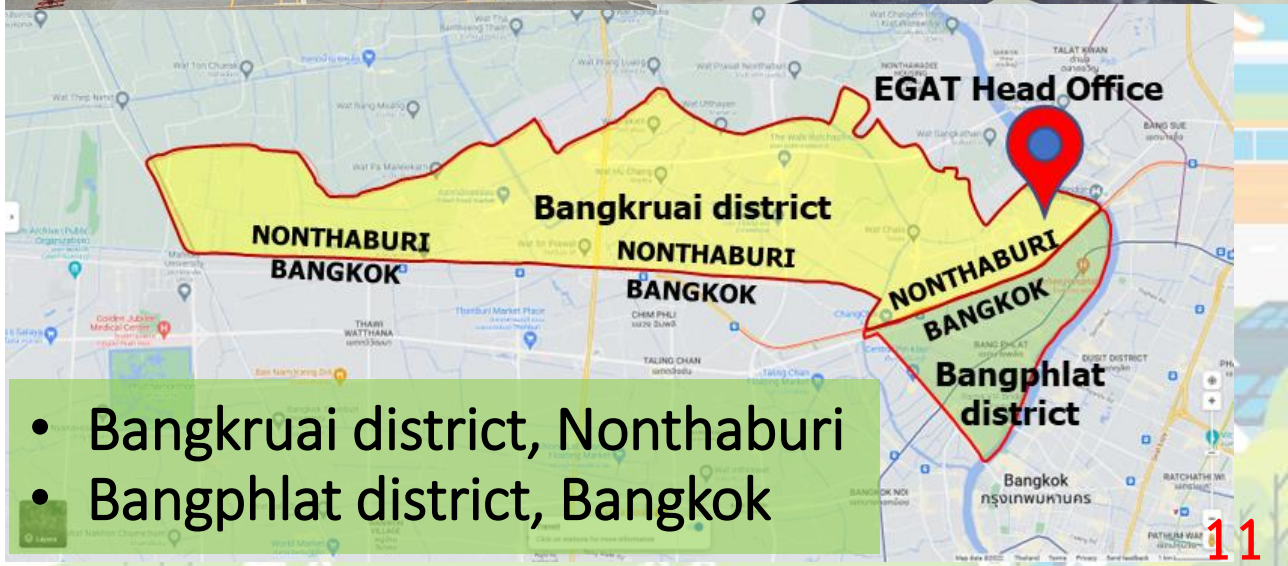



**EV 30@30 policy aim to produce zero-emission vehicles 30% by 2030.**



# 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) |

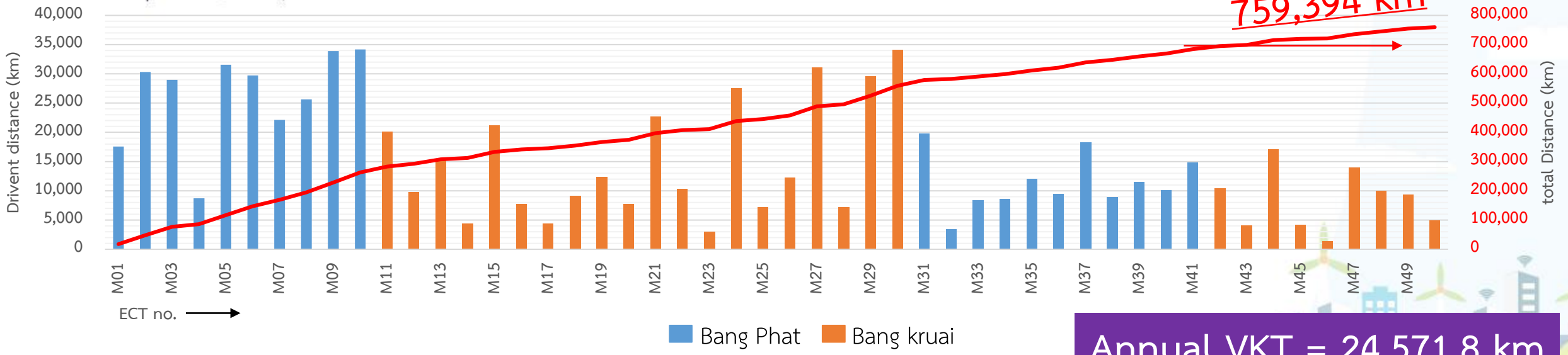




- Bangkruai district, Nonthaburi
- Bangphlat district, Bangkok

## Distance (Bang Kruai & Bang Phat)

Total driven distance in the project

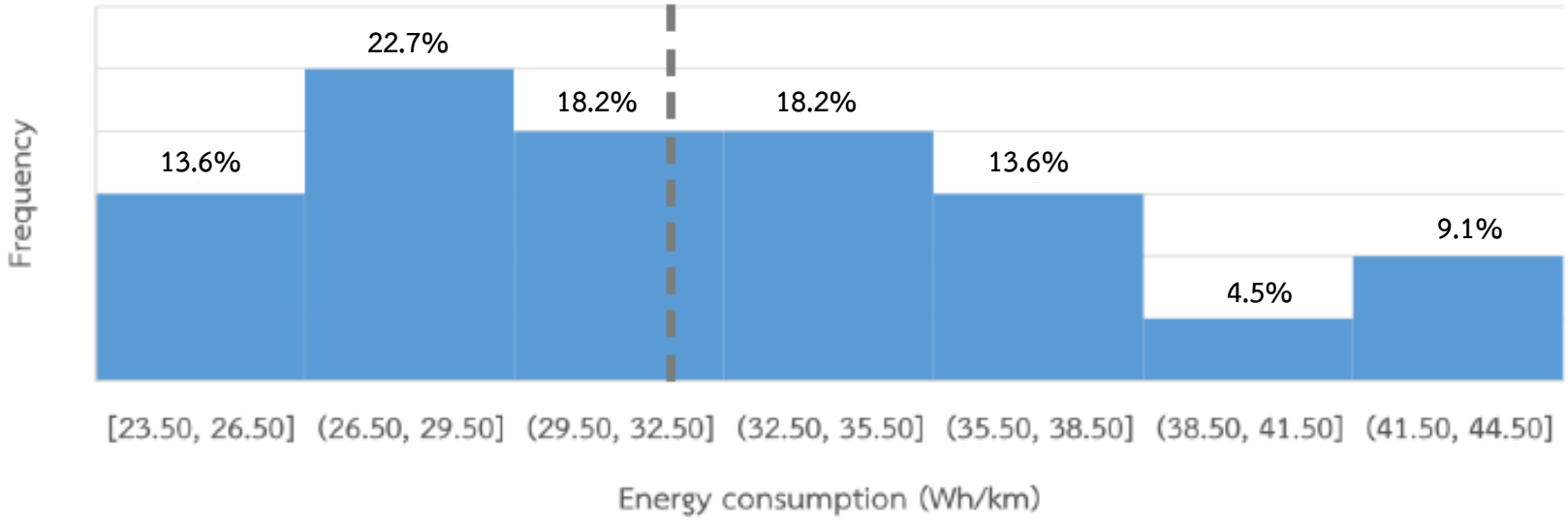
**759,394 km**




**Annual VKT = 24,571.8 km**

**Daily VKT = 67.32 km**

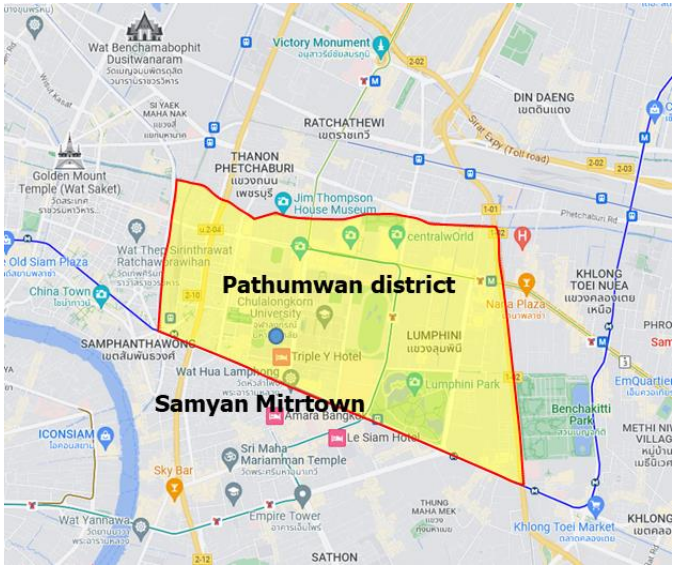
## Energy consumption




Energy consumption = **32.24** Wh/km

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

# 2 Demo Projects on e2w Taxi in Thailand



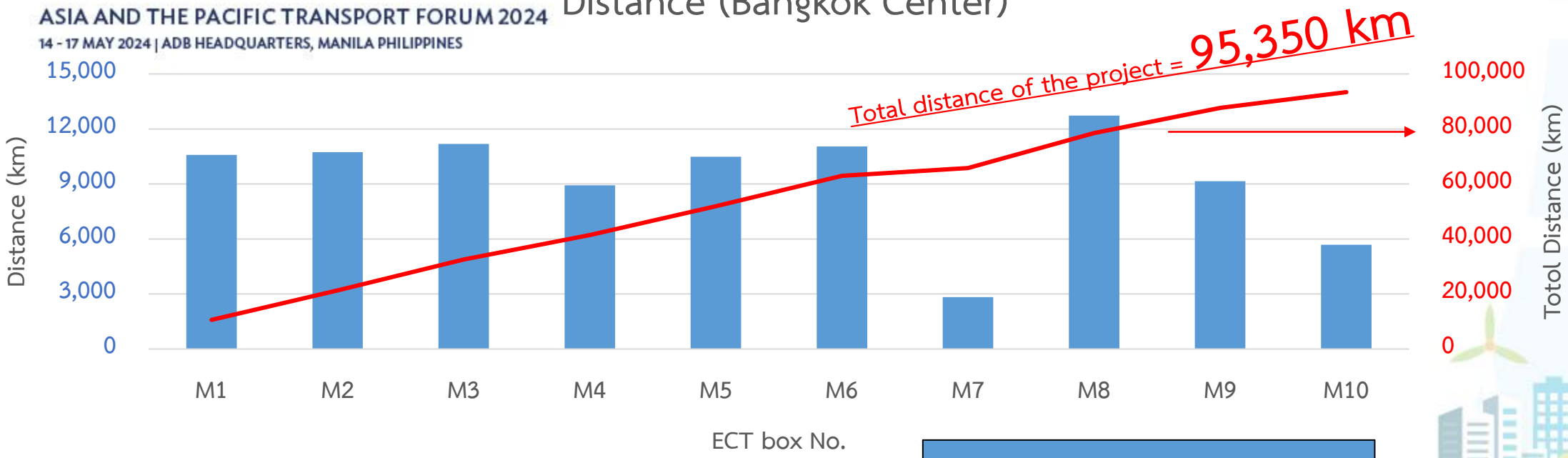


Located inside PTT fuel station



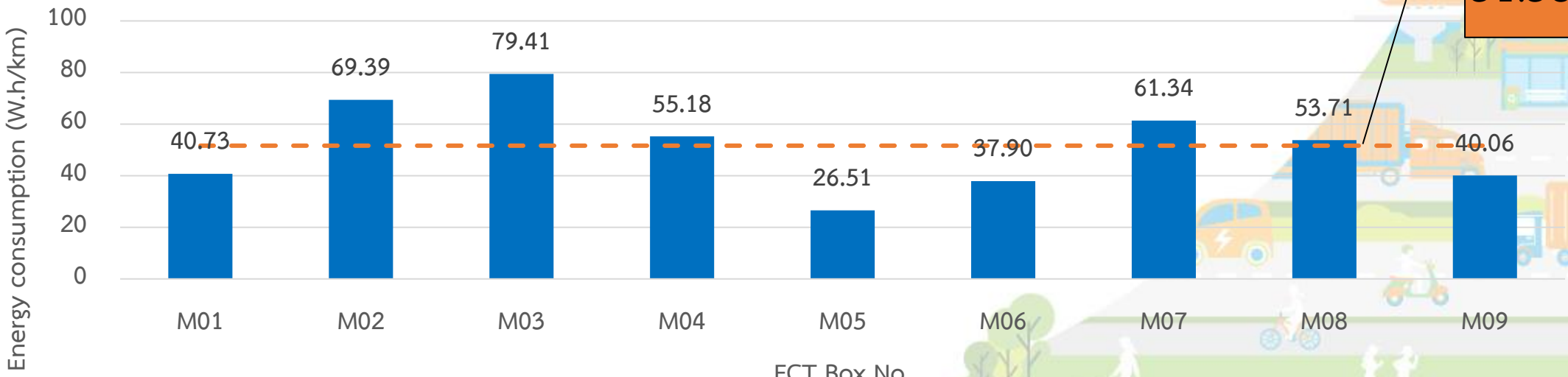
Swapping stations


# Distance (Bangkok Center)




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

## Energy consumption



# Concluding Remarks

- Asia, in particular ASEAN coutries 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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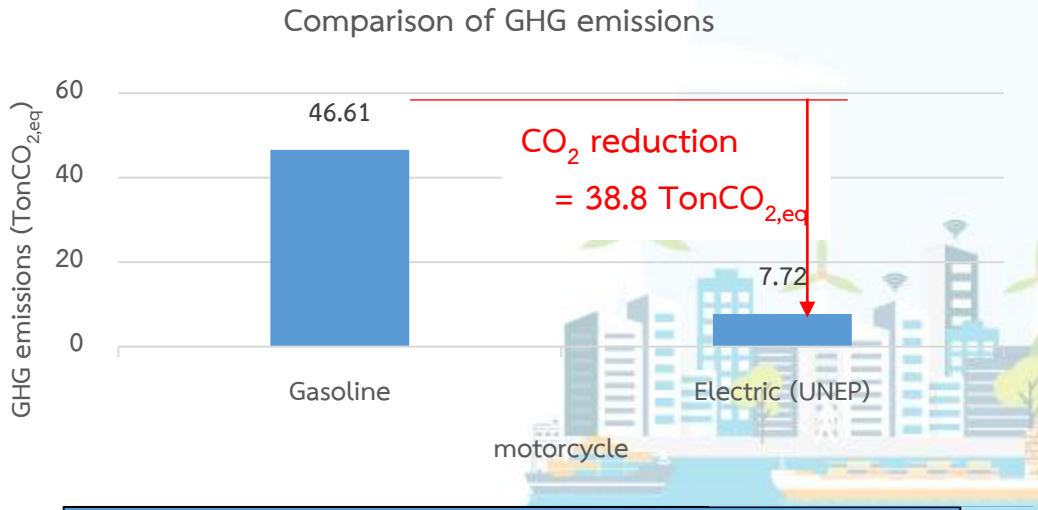
# GHG Reduction in the Project

| | | | |
|---|---|---|---|
| Total distance covered in the project | | 759,354 | km |
| Fuel consumption (A) | Gasoline | 2.35 | Liter/100km |
| Energy Consumption | Electric | 32.41 | Wh/km |
| | Electric | 0.371 | $Liter_{gasoline\ equivalent}$/100km |
| 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 $CO_2$ <br> $C = A^{(energy/km)} \times B^{(Emission\ factor)}$ | Gasoline | 61.38 | $gCO_2/km$ |
| | Electric | 10.16 | $gCO_2/km$ |

Total $CO_2$ = Per km $CO_2$ x Total km

C 759,354




**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 $TonCO^2/MWh$ (EPPO, 2000)

-gasoline WTT $CO_2$ = 0.402 $kgCO_2/L$ (National LCI database)

-gasoline TTW $CO_2$ = 69.30 $TonCO_2/TJ$ (DMF, 2022)