

Decarbonizing Transport Sector via Electric 2-Wheelers Taxi in Thailand: Mainstreaming, Scaling and Replicating Electric Motorcycle Taxi

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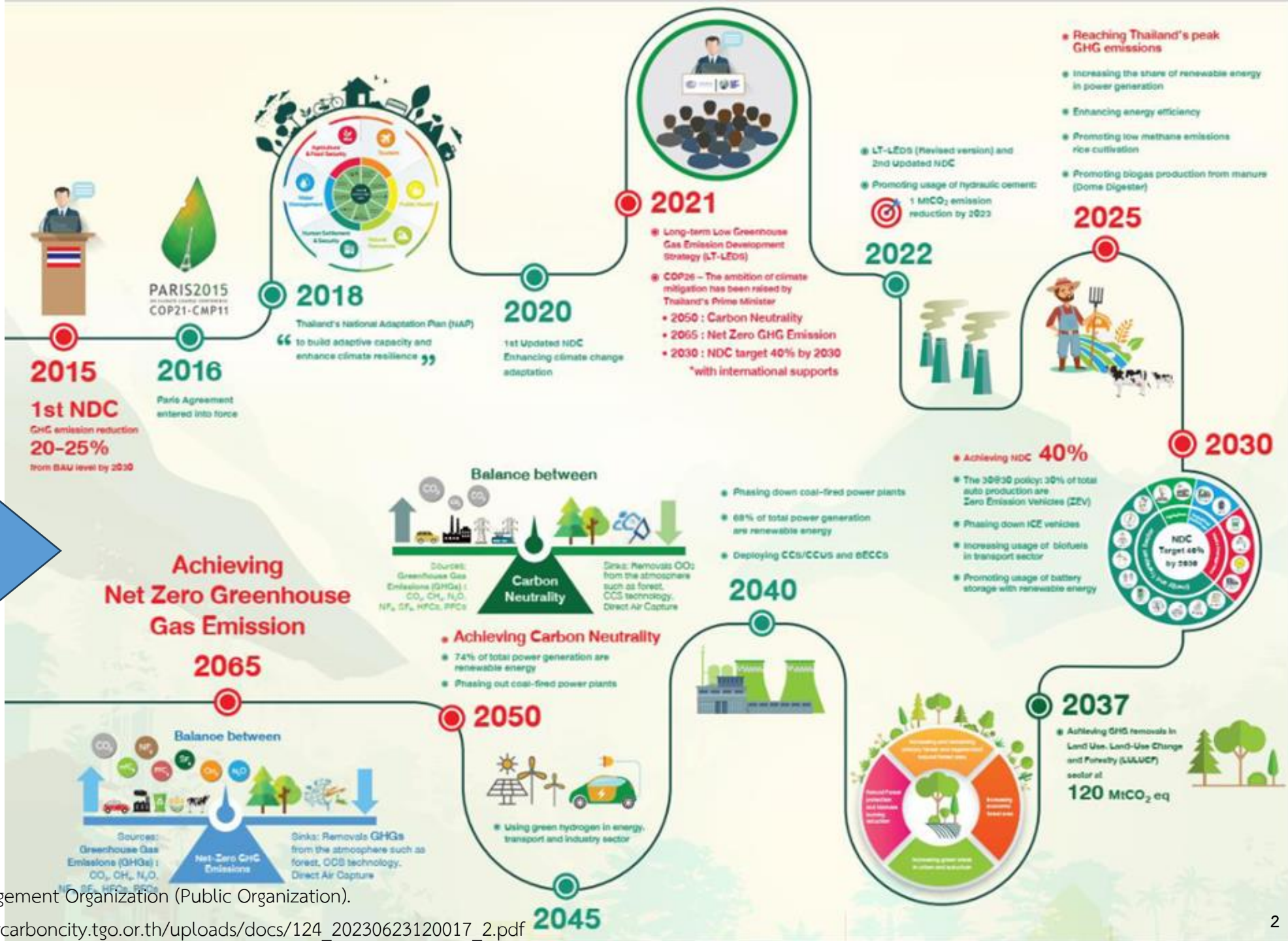
Paving the Path: Decarbonising Transport in India and the Region

A Decarbonising Transport in Emerging Economies (DTEE) and NDC Transport Initiative for Asia (NDC-TIA) event

28 – 29 March 2024

Viceroy Hall, The Claridges, New Delhi

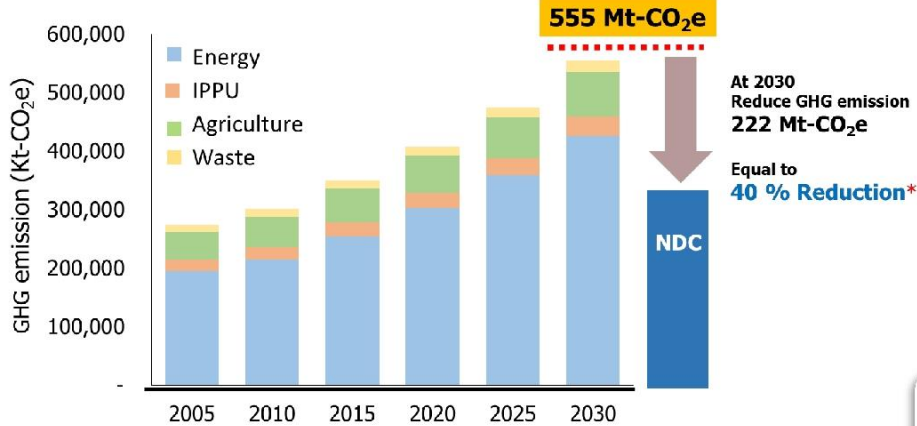
Thailand's Net Zero Roadmap 2065



Reference : Thailand Greenhouse Gas Management Organization (Public Organization).

Report action on climate change, http://lowcarboncity.tgo.or.th/uploads/docs/124_20230623120017_2.pdf

Thailand's Nationally Determined Contribution (NDC)



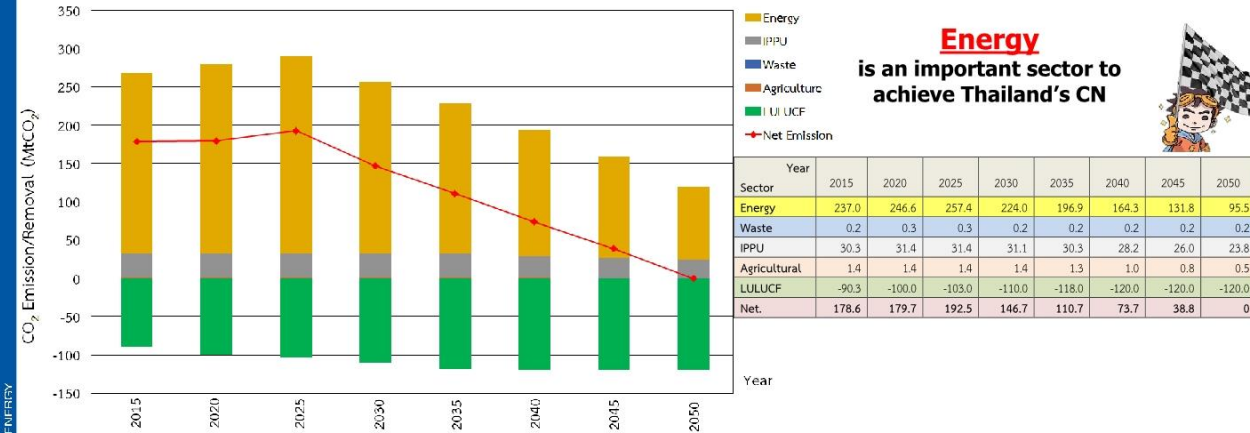
Action Plan for NDC (Potential)

- Energy + Transport: 216 MtCO₂eq
- Agriculture: 2.6 MtCO₂eq
- IPPU: 1.1 MtCO₂eq
- Waste: 2.6 MtCO₂eq

Carbon Sink by 2037: -120 MtCO₂eq

Remark : with international support

CO₂ emission scenarios to achieve CN 2050*



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

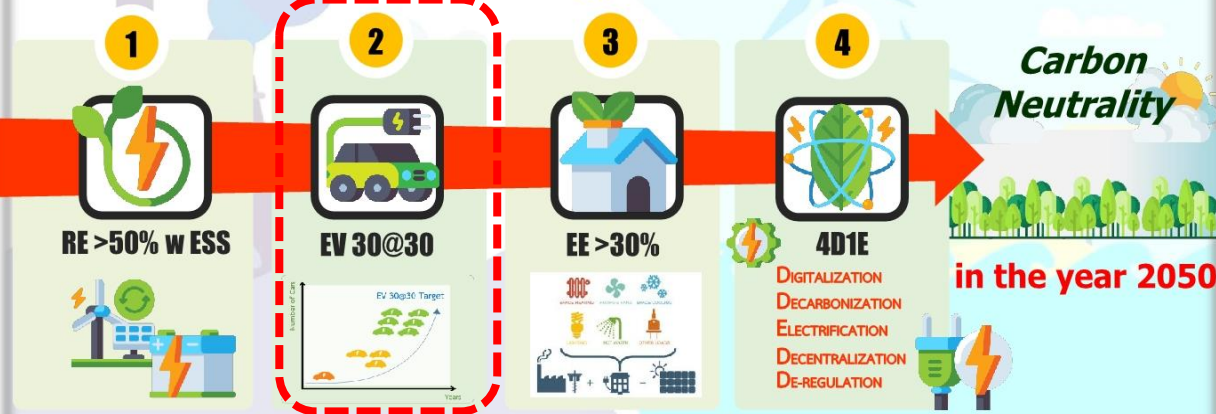
National Energy Plan

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



EV 30@30

ยานยนต์ไฟฟ้า (EV) ของประเทศไทย ตามนโยบาย 30@30

เป้าหมายการผลิตยานยนต์ไฟฟ้า

- รถยนต์ส่วนบุคคล: 675,000 คัน
- รถโดยสารสาธารณะ: 24,000 คัน
- รถจักรยานยนต์ไฟฟ้า: 650,000 คัน
- รถโดยสารสาธารณะ: 33,000 คัน

การส่งเสริมสถานีอัดประจุยานยนต์ไฟฟ้า

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

เป้าหมายการผลิตยานยนต์ไฟฟ้า

การส่งเสริมยานยนต์ไฟฟ้า

การพัฒนาโครงสร้างพื้นฐานรองรับยานยนต์ไฟฟ้า

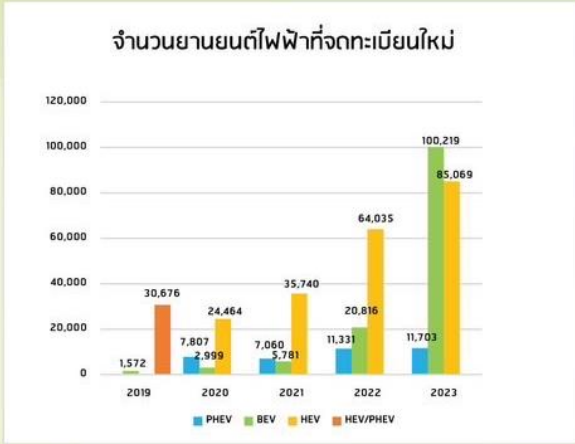
EV 30@30 policy aim to produce zero-emission vehicles 30% by 2030.

A Driving Force for National Science and Technology Capability

Thailand's Electric Vehicle Status in 2023

New Number of xEV Registration Between 2019-2023

จำนวนยานยนต์ไฟฟ้าที่จดทะเบียนใหม่ ระหว่างปี 2562-2566



New Number of xEV Registration in 2023

จำนวนยานยนต์ไฟฟ้าที่จดทะเบียนใหม่ 1 มกราคม - 31 ธันวาคม 2023



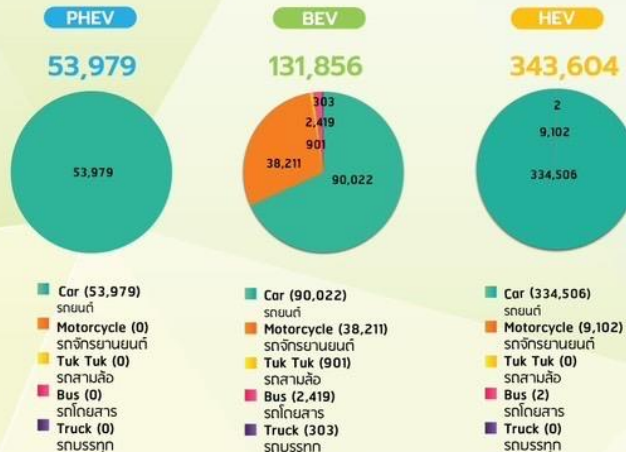
Accumulated Number of xEV Registration Between 2019-2023

จำนวนยานยนต์ไฟฟ้าสะสม ระหว่างปี 2562-2566



Accumulated Number of xEV Registration in 2023

จำนวนยานยนต์ไฟฟ้าสะสม As of 31 December 2023



ยอดจดทะเบียน รถไฟฟ้า 100% ปี 2023 / 2566 รวม 76,314 คัน
www.autolifethailand.tv

อันดับ 1 RANK BYD Atto 3 19,214 คัน

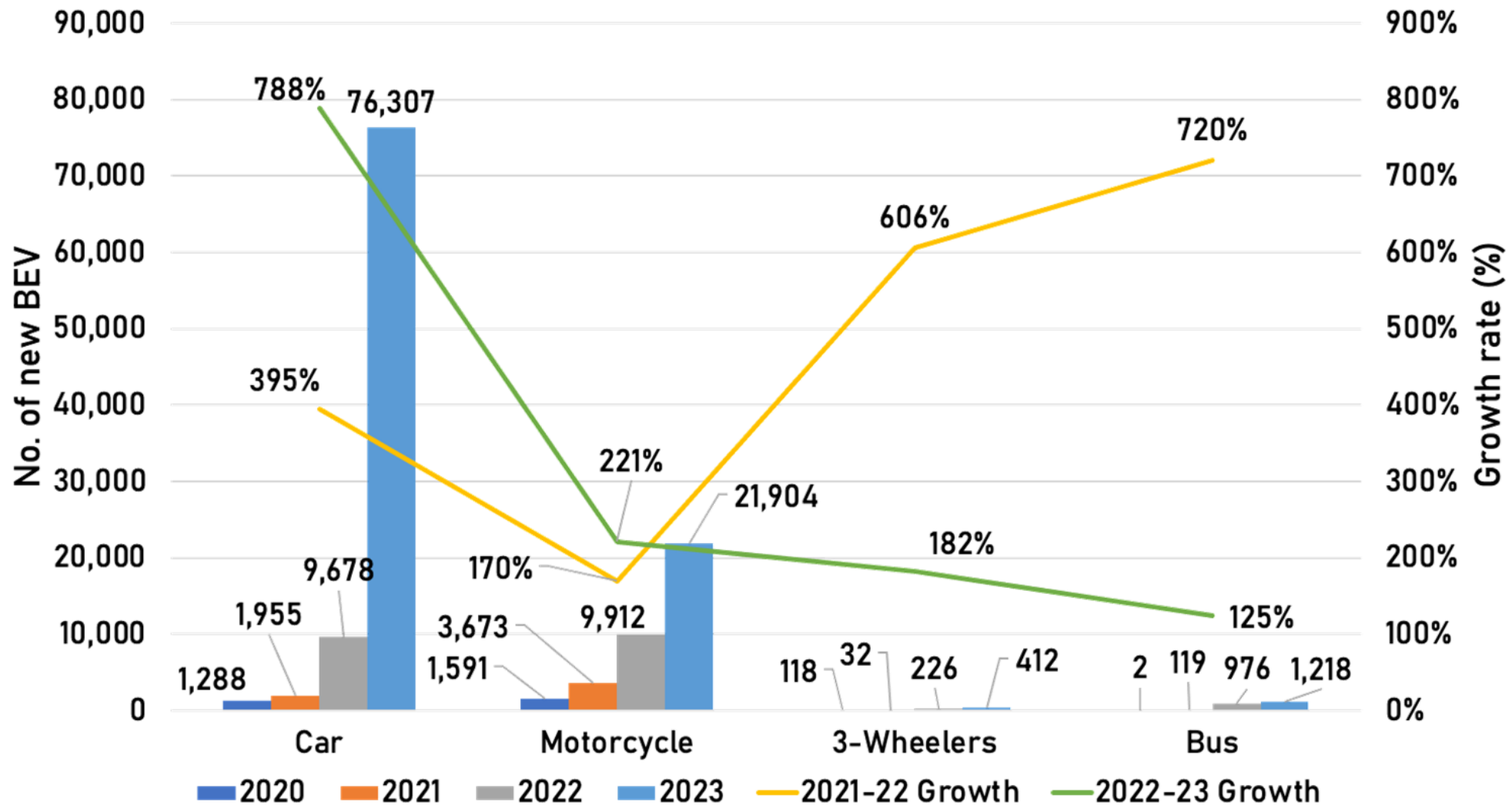
Model	Count
NETA V	12,777 คัน
BYD Dolphin	9,410 คัน
ORA Good Cat	6,712 คัน
Tesla Model Y	5,881 คัน
MG 4 Electric	4,833 คัน
MG EP+	4,475 คัน
Tesla Model 3	2,324 คัน
BYD Seal	1,810 คัน
MG ZS EV	1,753 คัน

ยอดจดทะเบียนรถไฟฟ้า 100% ในไทย ปี 2023 ยอดจดทะเบียนรถไฟฟ้า 100% รวม 76,314 คัน คิดเป็น 12.02% ของรถ สบ.1 ทั้งหมด 634,948 คัน ปี 2023 : 76,314 คัน เพิ่มขึ้น 66,585 คัน +684.4%

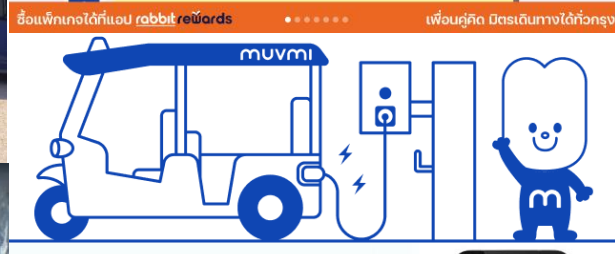
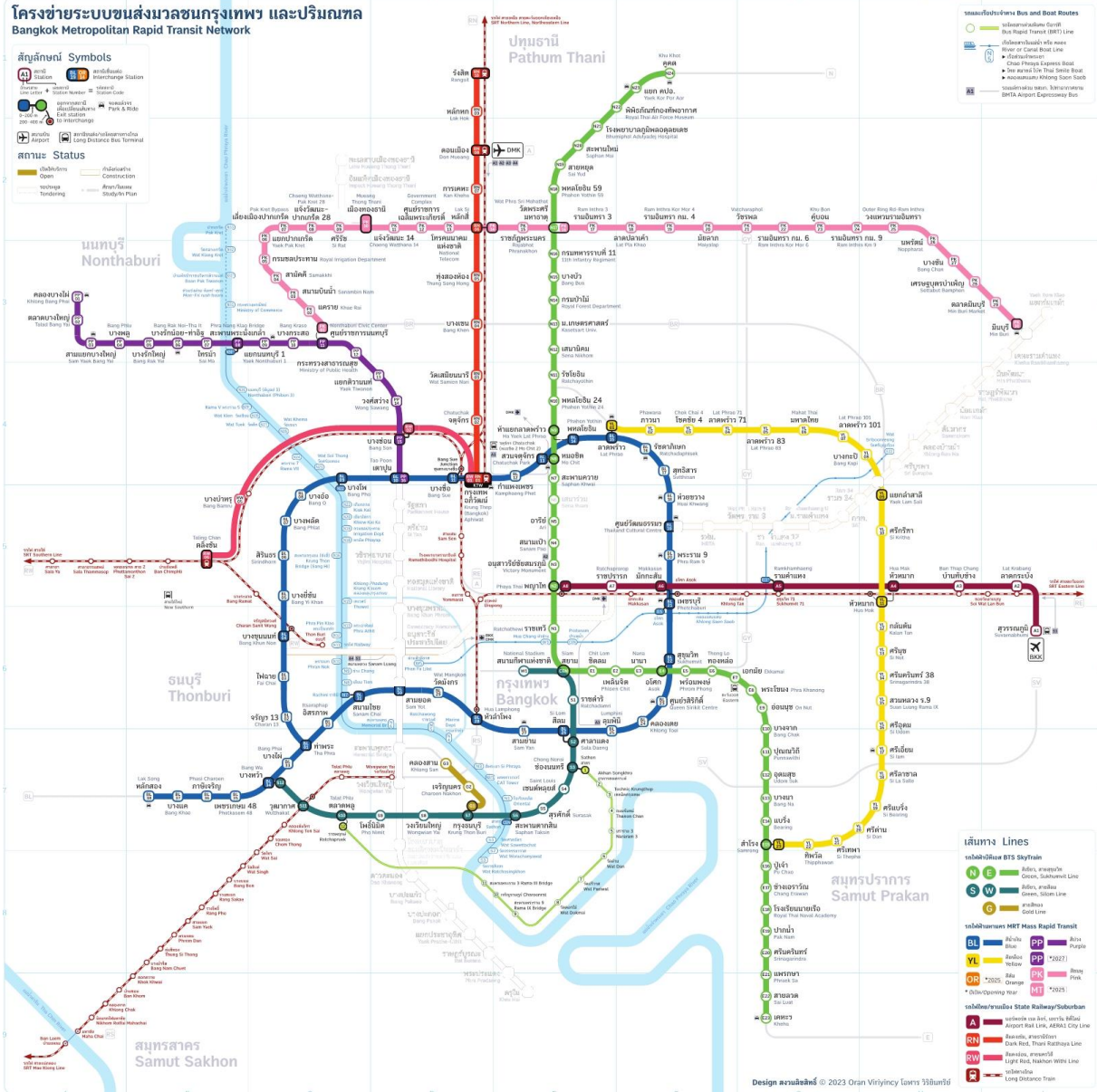
- EV registrations in Thailand between 2019-2023 increase thanks to EV 3.0 and EV 3.5 measures.
- The share of EV registrations for passenger car push to 12% in 2023.

BEV Registration Statistics

Increasing new BEV registration



e-Urban Transport Connectivity





Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

based on a decision of
the German Bundestag



Mainstreaming & Scaling Up of Electric 2-Wheelers in Thailand (2020-2023)

Bangkruai/Nonthaburi – Bangphlat/Bangkok Implementation



Project implementation areas

50 Electric motorcycles were analyzed in this study

Model	EGAT-ENGY (TAILG-Dragon)
Motor power	3 kW (rated)
Top speed	80 km/hr
Gross load	150 kg
Dust 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)



Hand-over Ceremony of 50 Electric Motorcycles



23 June 2023
at EGAT Learning Center,
Headquarters



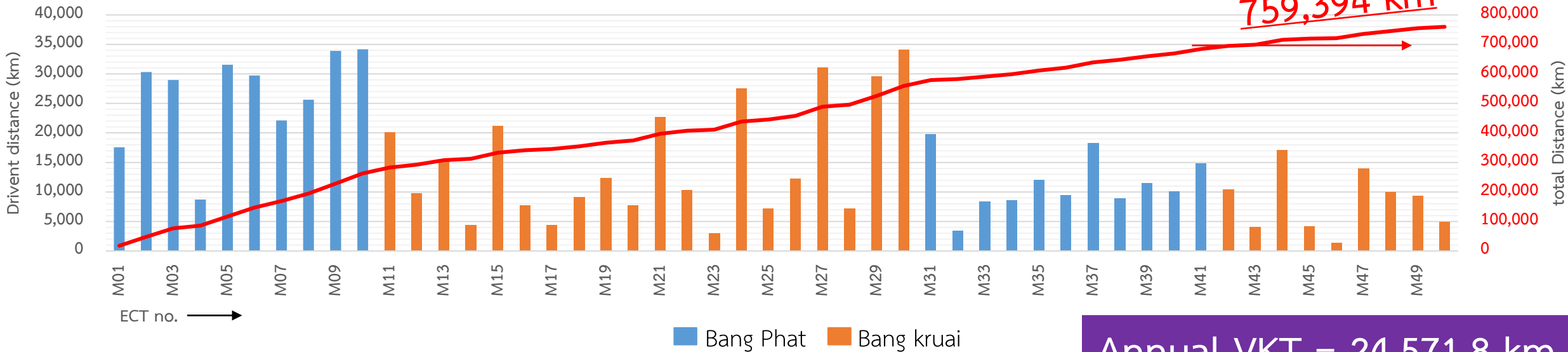
On-site activity: Data collection with Taxi-riders

Up to 10 months usage



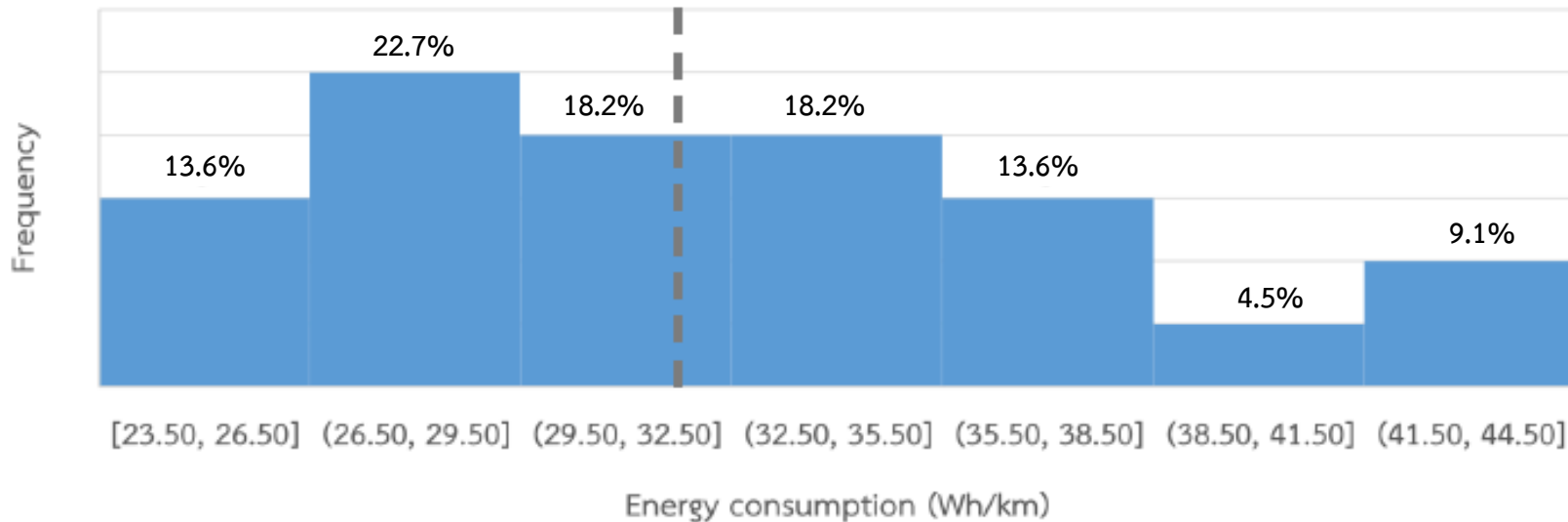
Distance (Bang Kruai & Bang Phat)

Total driven distance in the project
759,394 km



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

Energy consumption



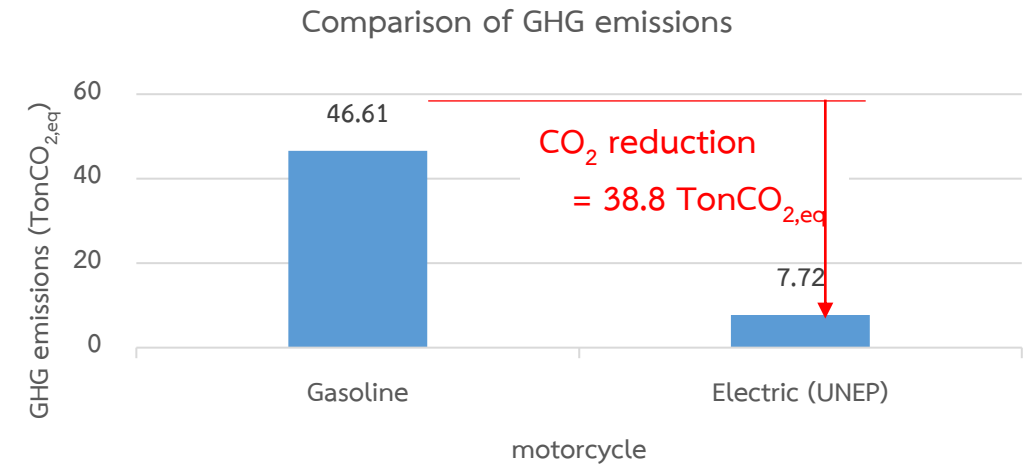
Energy consumption =
32.24 Wh/km

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	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 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)



Replication Battery-Swapping Electric Motorcycle Taxis in Samyan District of Bangkok (2023-2024)

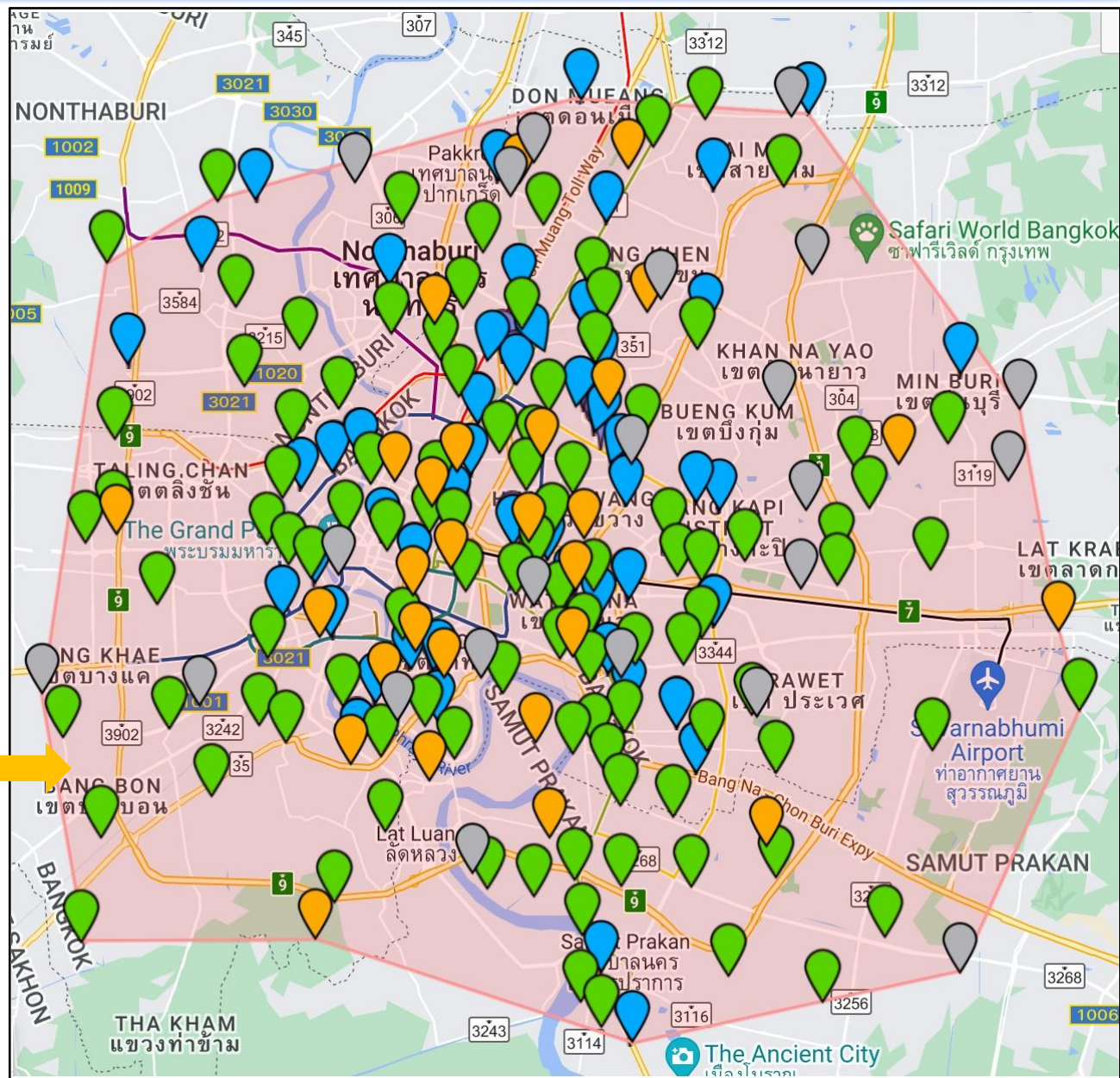
Bangkok city center (Swapping business model)



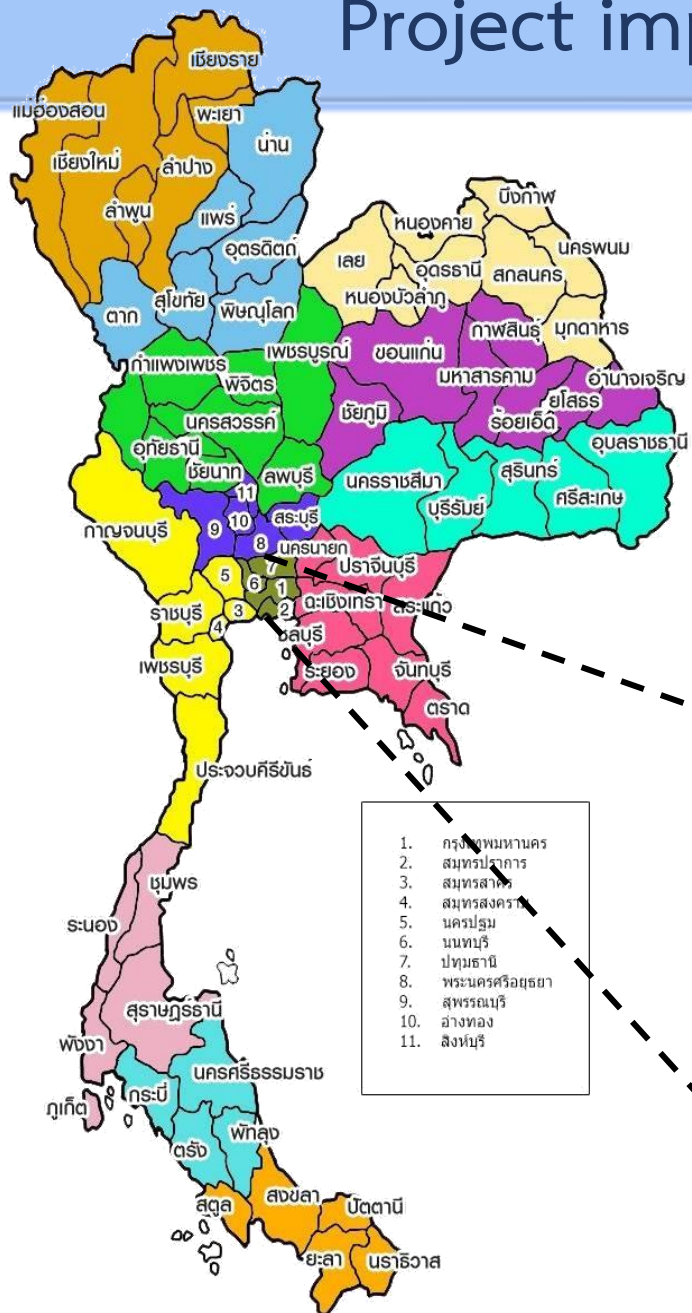
Battery Swapping Service for e2w for both delivery riders and motorcycle taxi

- Swap & Go  32 station
- Winnonie  105 station
- HSEM  53 station
- Storm  23 station

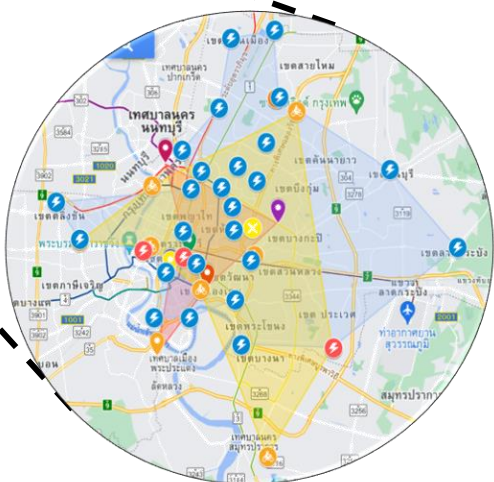
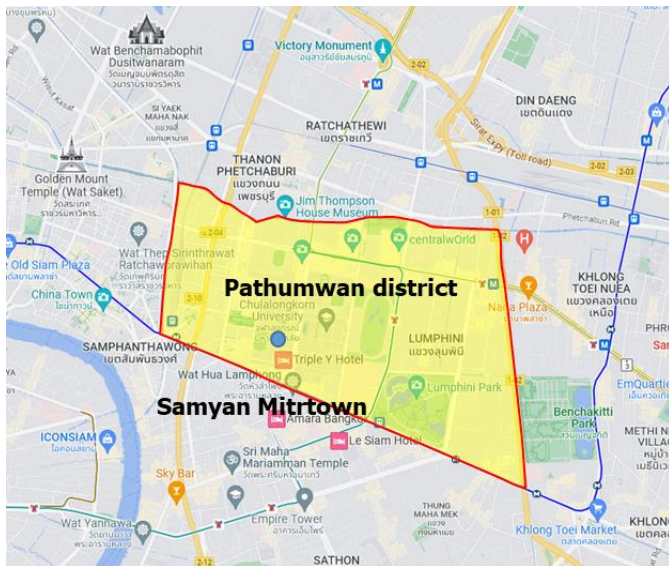
Available Battery Swapping Station



Project implementation area



1. กรุงเทพมหานคร
2. สมุทรปราการ
3. สมุทรสาคร
4. สมุทรสงคราม
5. นครปฐม
6. นนทบุรี
7. ปทุมธานี
8. พระนครศรีอยุธยา
9. สุพรรณบุรี
10. อ่างทอง
11. สิงห์บุรี



Road-side dedicated station



Located inside PTT fuel station

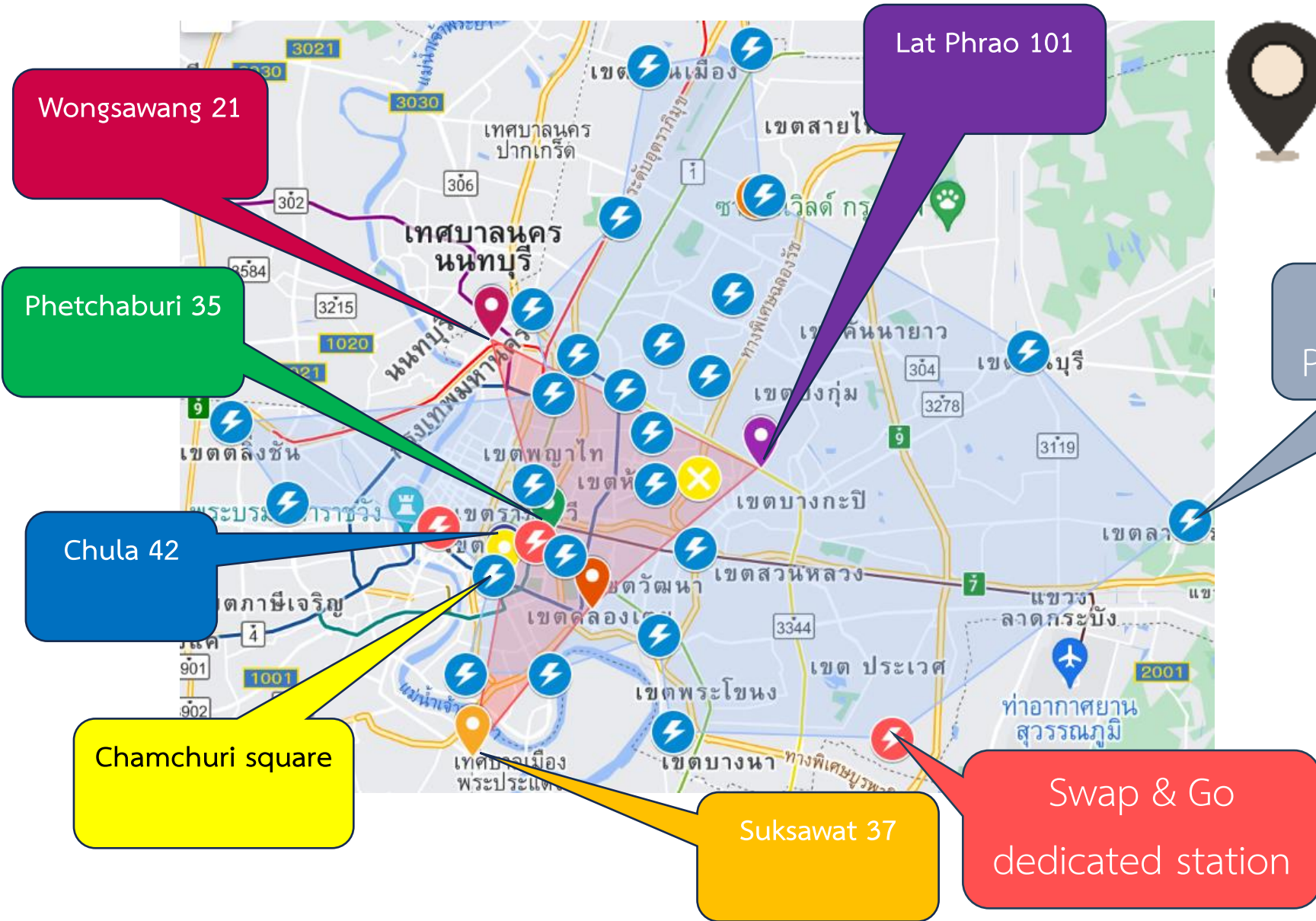
- Swap & Go dedicated station
- Swap & Go (services only for Lazada staff)
- Swap & Go in PTT Fuel Station
- Swap & Go in PTT Fuel Station (Temporarily closed)
- Service station
- Parking points of public motorcycle riders who participate in the project

Battery swapping station

Bangkok Metropolitan Area (Pathumwan District)

Reference :Thailand map. www.pinterest.com

Project implementation area



Parking points of public motorcycle riders who participate in the project

Swap & Go in PTT Fuel Station

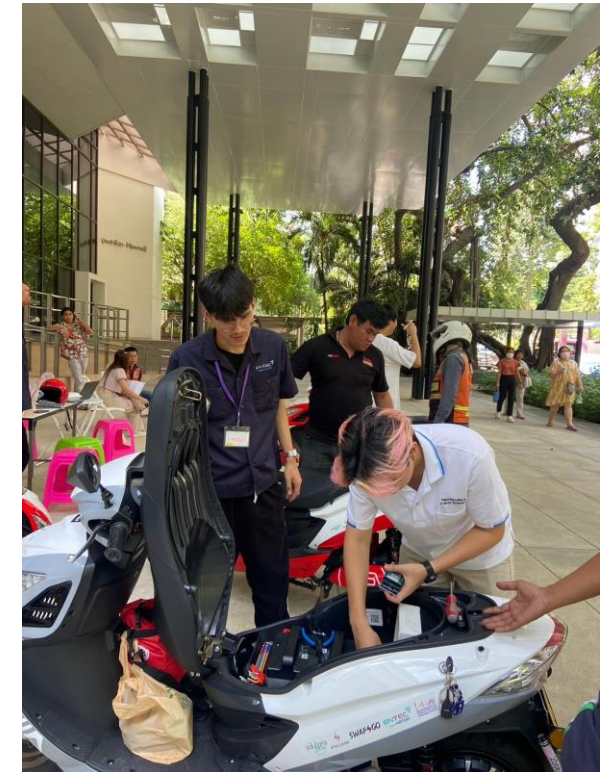


Swap & Go dedicated station

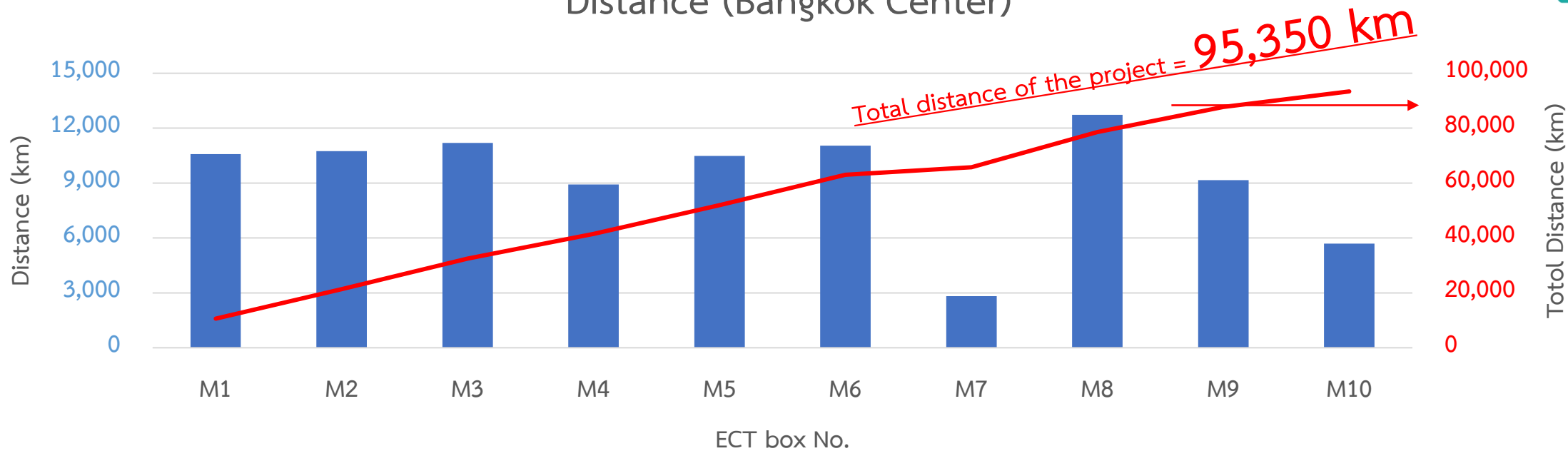
Kick-off Event for E2W Toward Sustainable Society



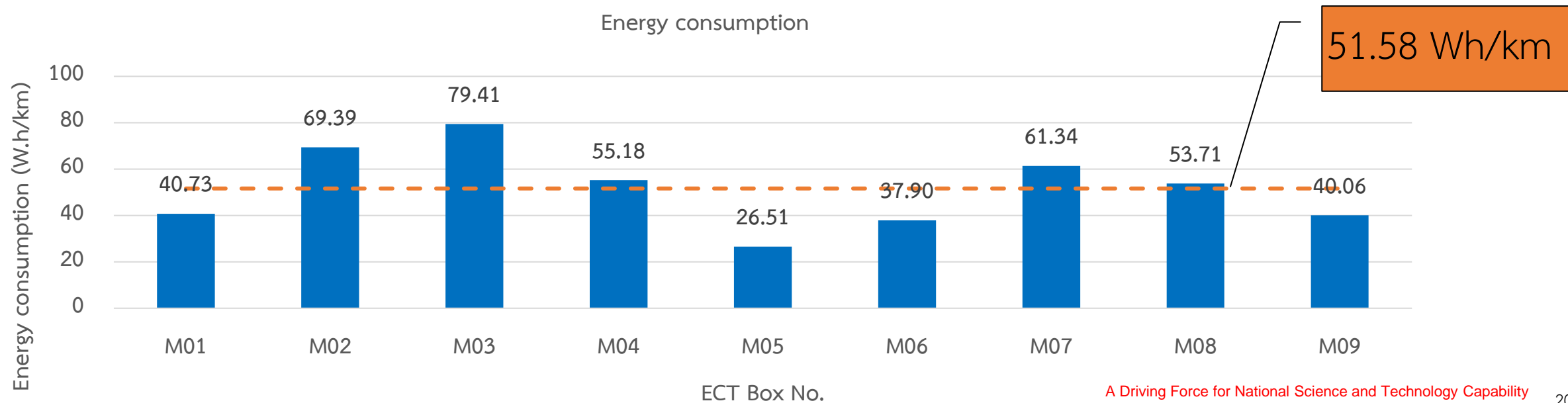
On-site activity: Data collection and opinion gathering



Distance (Bangkok Center)



Energy consumption

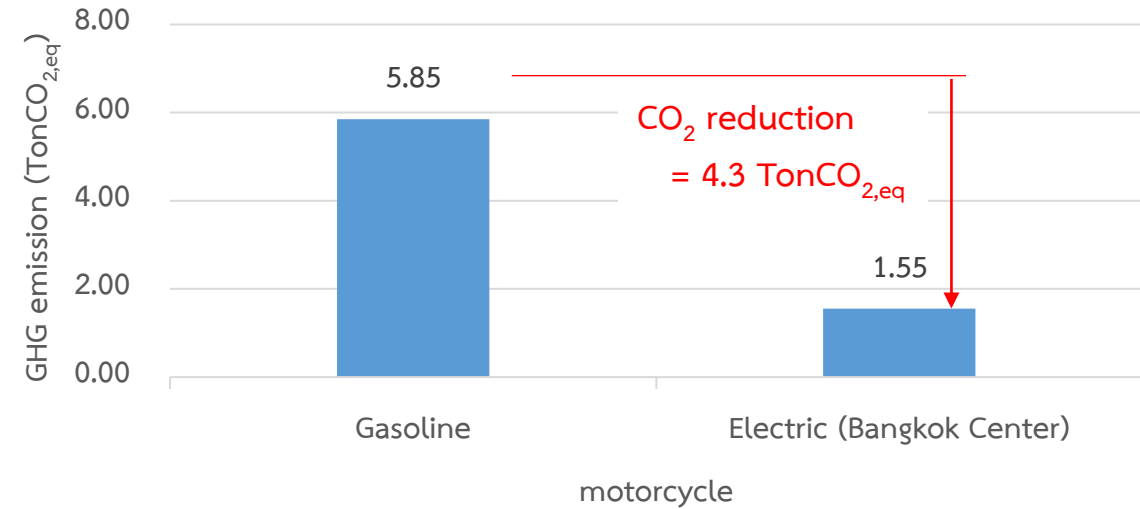


GHG Reduction in the Project

Total distance of the project		95,350	km
Fuel consumption A	Gasoline	2.35	Liter/100km
	Electric	51.58	Wh/km
Energy Consumption	Electric	0.589	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 $C = A^{(energy/km)} \times B^{(Emission\ factor)}$	Gasoline	61.38	gCO ₂ /km
	Electric	16.25	gCO ₂ /km

Total CO₂ = Per km CO₂ x Total km
C **95,350**

Comparison of GHG emissions



Reduction of GHG emissions =
4.30 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)

Concluding Remarks

- With strong promotion on electric mobility in Thailand, electric 2-wheelers are low-hanging fruit to
 - Decarbonize transport sector
 - 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



Electric Two and Three Wheelers
Global Emerging Market Overview