

Nghiên cứu điển hình:

# Vai trò của Chính phủ đối với Phát triển Sạc EV

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Ủy ban Sáng lập &

Hiện tại Nuwong Chollacoop, Hiệp hội Xe điện Thái Lan (EVAT)

Giám đốc Nhóm Nghiên cứu Năng lượng Carbon thấp, Trung tâm Công nghệ Năng lượng Quốc gia (ENTECH) [nuwong.cho@entec.or.th](mailto:nuwong.cho@entec.or.th)

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Tập huấn luyện quốc gia về di động điện tử  
29-30 tháng 11 năm 2022

# nội dung

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- Về ENTEC/EVAT
- Trạng thái xEV SEA và Thái Lan bao gồm các trạm sạc EV
- Triển vọng và Cơ hội cho EV



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# Trung tâm Công nghệ Năng lượng Quốc gia (ENTEC)

Thành viên mới của NSTDA

Trung tâm Công nghệ Năng lượng Quốc gia (ENTEC) chính thức được thành lập vào ngày 9 tháng 6 năm 2020 khi được Nội các Thái Lan phê duyệt.

Nó trở thành trung tâm quốc gia thứ năm trực thuộc Cơ quan Phát triển Khoa học và Công nghệ Quốc gia (NSTDA).





# Trung tâm Công nghệ Năng lượng Quốc gia (ENTEC)

Tầm nhìn và Sứ mệnh



chiến lược

Tiến hành nghiên cứu, sáng tạo và lĩnh hội tri thức  
trong việc hỗ trợ

Thái Lan Kế hoạch tổng thể năng lượng tích hợp (TIEB)

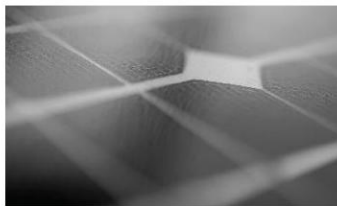
Tạo và chuyển giao bí quyết công nghệ năng lượng  
chất lượng cao cho các bên liên quan để  
tạo ra tác động

Hợp tác với cả đối tác nhà nước và tư nhân về  
công nghệ năng lượng. R&D

Tích hợp các tài nguyên chính để tránh dư thừa và mang lại  
hiệu quả cao

# Trung tâm Công nghệ Năng Lượng Quốc gia (ENTEC)

Nghiên cứu và phát triển



Solar (PV, Thermal), Bioenergy, Wind, Artificial photosynthesis, perovskite solar cell, Hybrid tandem PV, Digital PV

Renewable Energy



High energy density & low cost battery (Li-ion and beyond) Supercap. H2 storage/fuel cell

Energy Storage



Oil, Natural Gas, Coal

Conventional Energy



RE integration Distributed energy system, Flexible grid, Smart/Microgrid Blockchain, IoT

System Integration & Energy Management



Thermal, Electrical Zero energy bldg./ factory [Transport | Power | Industry | Household | Agriculture]

Energy Efficiency



Energy Policy/Resilience



# EVAT - Hiệp hội xe điện Thái Lan

Thành lập: Tháng 11  
 Mục tiêu: năm 2015 Thúc đẩy việc sử dụng xe điện ở Thái Lan • Giảm ô nhiễm không khí • Cải thiện hiệu quả sử dụng năng lượng trong lĩnh vực Giao thông  
 hỗ trợ: vận tải Sản xuất công nghiệp, R&D về công nghệ xe điện

รายนามคณะกรรมการสมาคมยานยนต์ไฟฟ้าไทย (2565 - 2567)  
EVAT Committee (2022 - 2024)



**ประธาน | Advisors**

ดร.อภิชาติ อุทิตินันท์  
Mr. Abhisit Uthitinan  
President

**รองประธาน | Vice President**

ดร.สุวิทย์ วัฒนวิเศษ  
Dr. Suwit Wattanasri  
Vice President

**ที่ปรึกษา | Advisors**

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EVAT Committee (2022 - 2024)



**ฝ่ายอุตสาหกรรม | Industry**

**WG1**  
สังเคราะห์และ  
นโยบายอุตสาหกรรม

WG1 Working Group on  
Production Data and  
Industrial Policy

**WG2**  
สังเคราะห์และ  
กฎระเบียบมาตรฐาน

WG2 Working Group on  
Regulations and Standards

**ฝ่ายวิชาการ | Academics**

**ฝ่ายสนับสนุนการวิจัย | Research**

**ฝ่ายส่งเสริมการใช้ | Promotion of EV Usage**

**WG3**  
สังเคราะห์และ  
นโยบายส่งเสริมการใช้

WG3 Working Group on  
User Data and  
Promotion Policy

**WG4**  
บริหารสัมพันธ์  
สาธารณะ

WG4 Working Group on  
Public Relations and  
Promotion Campaign





# Tư cách thành viên EVAT

thành viên công ty

233  
Các thành viên

Thành viên cá nhân

109  
Các thành viên







# nội dung

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- Triển vọng và Cơ hội cho EV





# Sản xuất ô tô & Đăng ký BEV ở Đông Nam Á



Thailand



Indonesia



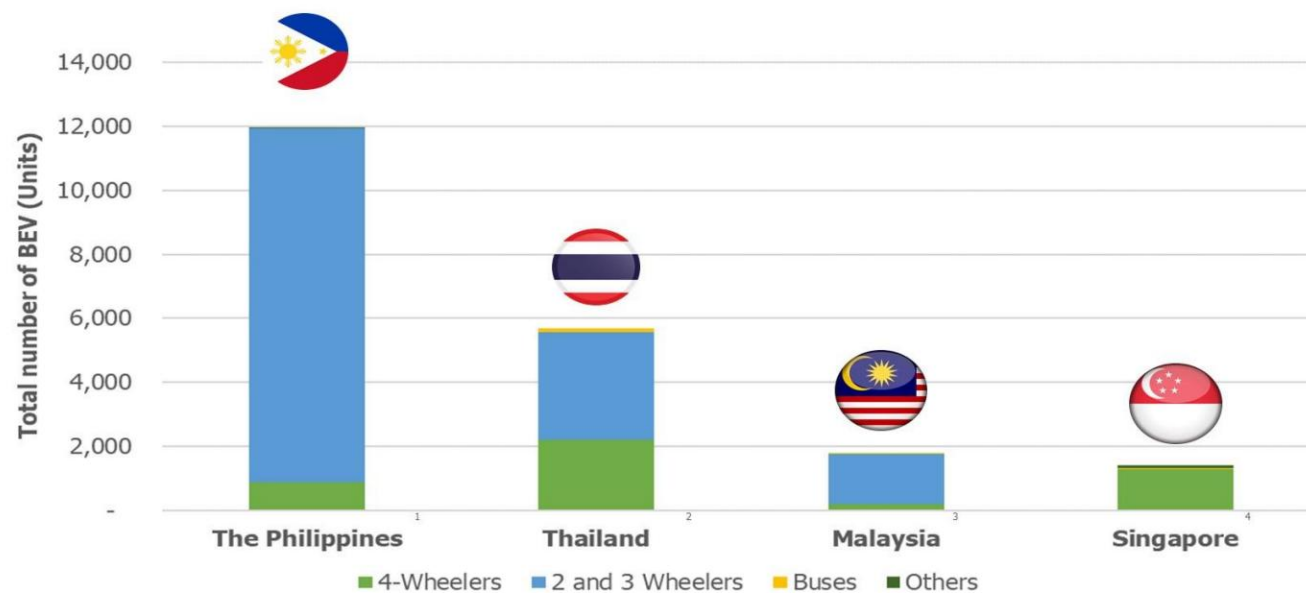
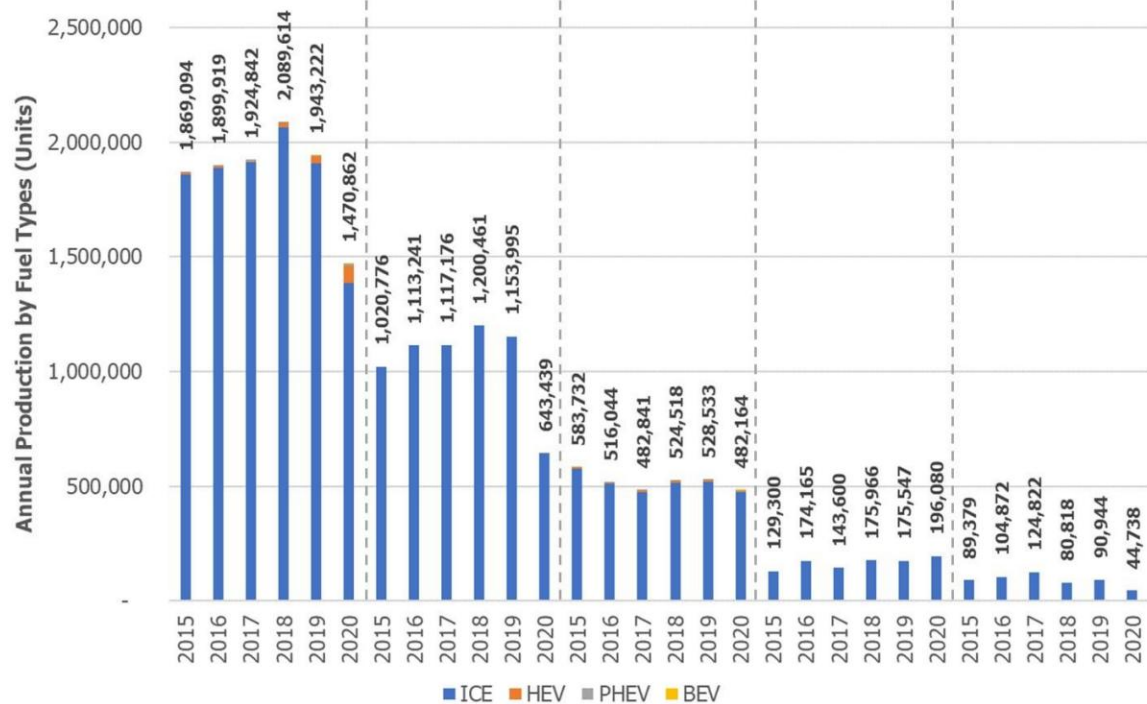
Malaysia



Vietnam



The Philippines



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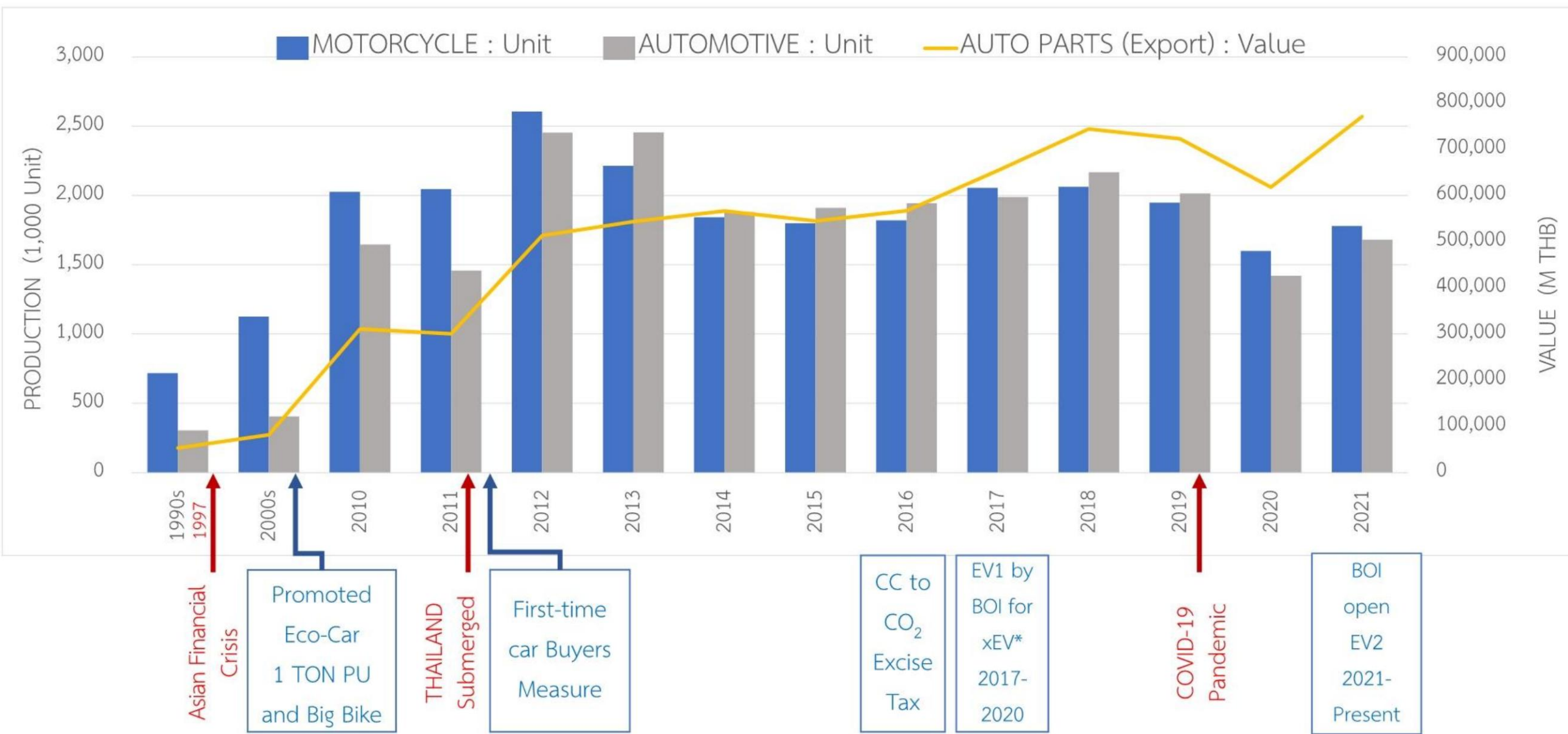
<sup>1</sup> Land Transportation Office, as of 2019

<sup>2</sup> Department of Land Transport, as of December 2020

<sup>3</sup> Electric Vehicle Association of Malaysia (EVAM), as of May 2019

<sup>4</sup> Vehicle Population by Type of fuel used, as of June 2020

# Story of Thailand Automotive Policies



Remark : xEV = Hybrid Electric Vehicle (HEV), Plug-in Hybrid Electric Vehicle (PHEV) and Battery Electric Vehicle (BEV)



# National Electric Vehicle Committee (Board EV)



1. In 2020 PM. assign National EV Policy Committee. Deputy-PM., Mr. Supattanapong Punmeechaow as chairman that had arranged total 5 meeting since 2021. The EV committee had setting vision, target, Strategies and Measures as well as assigned 4 Sub-EV committees to implement policy.

## 2. ZEV target in 2025-2030

Target	Type	(unit/year)	
		2025	2030
Production	Car/Pick-up	225,000 (10%)	725,000 (30%)
	Motorcycle	360,000 (20%)	675,000 (30%)
	Bus/Truck	18,000 (33%)	34,000 (47%)
Infrastructure	Two-Wheel Charging Station	1,600	8,000
	Four-Wheel Fast Charging	2,200-4,000	12,000
	Battery for BEV production	20 GWh	56 GWh

## 4. Measures for development of EV

**Supply side** : BOI Investment privilege EV2 and Free Zone privilege

**Infrastructure** : Promote & Facilitate Charging Station

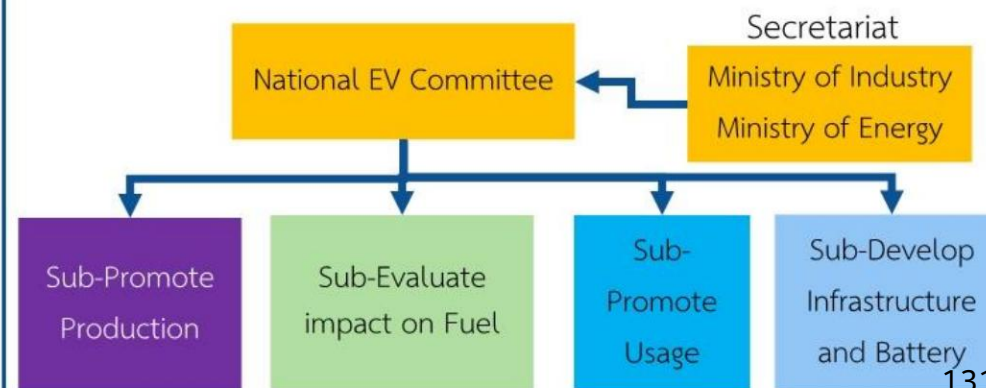
**Demand side** : Tax and Non-Tax Intensive, EV3 package

**Infrastructure** : HRD for next generation Vehicle

**Infrastructure** : Reuse & Recycle Battery

**Infrastructure** : Standardization EV charging and Parts, Testing Center

## 3. Sub-EV committee



- Target

Year	Car/Pickup 		Motorcycle  Motorcycle taxi			
	Cumulative usage (Million Cars)	Target of Fast Charge	Cumulative usage (Million Cars)	Total target Station	Cumulative usage (Thousand Cars)	Total target Station
2025	0.4	2,200** - 4,400*	0.6	1,600	12	260
2030	2.0	12,000**	3.2	8,000	65	1,450

- Measures

- electricity fee promotion for public charging station : 2.63 baht/kW-h (from 4.60 baht/kW-h)
- Administrative services support for household uses (80% of all usages) :
  - Time of Use Tariff (TOU) meter
  - Wall box installation



# Infrastructure : Testing Drive



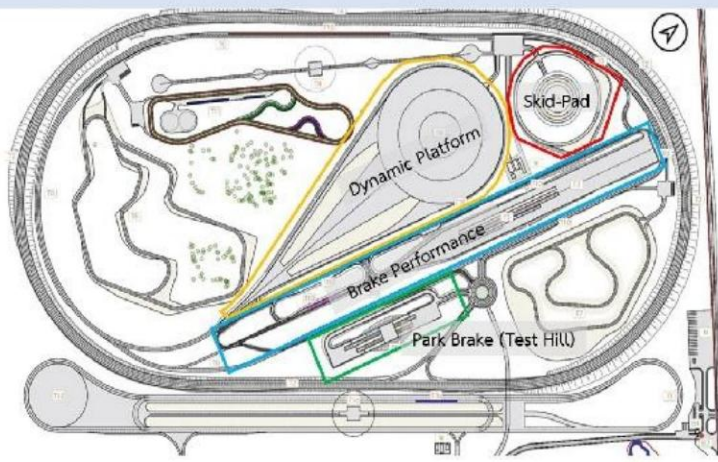
UNR 117



## ATTRIC

ศูนย์ทดสอบยานยนต์และยางล้อแห่งชาติ  
Automotive and Tyre Testing, Research and Innovation Center

First in ASEAN



Brake Performance



Park Brake (Test Hill)



Dynamic Platform



**\*\*\* Open Now\*\*\***

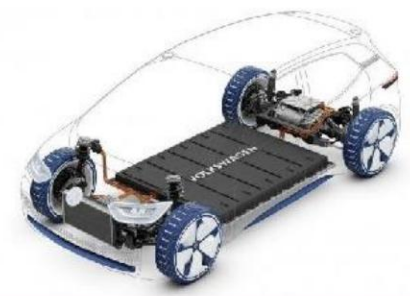
Testing Tyre  
(UN R117)



# Infrastructure : Battery Testing Center




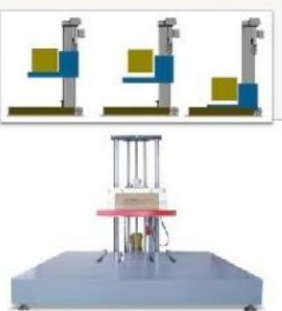
**TISI** | **ATTRIC**  
ศูนย์ทดสอบยานยนต์และยางล้อแห่งชาติ  
Automotive and Tyre Testing, Research and Innovation Center



UN R100

Testing Battery UNR 100 & UNR 136

UN R136

Drop test

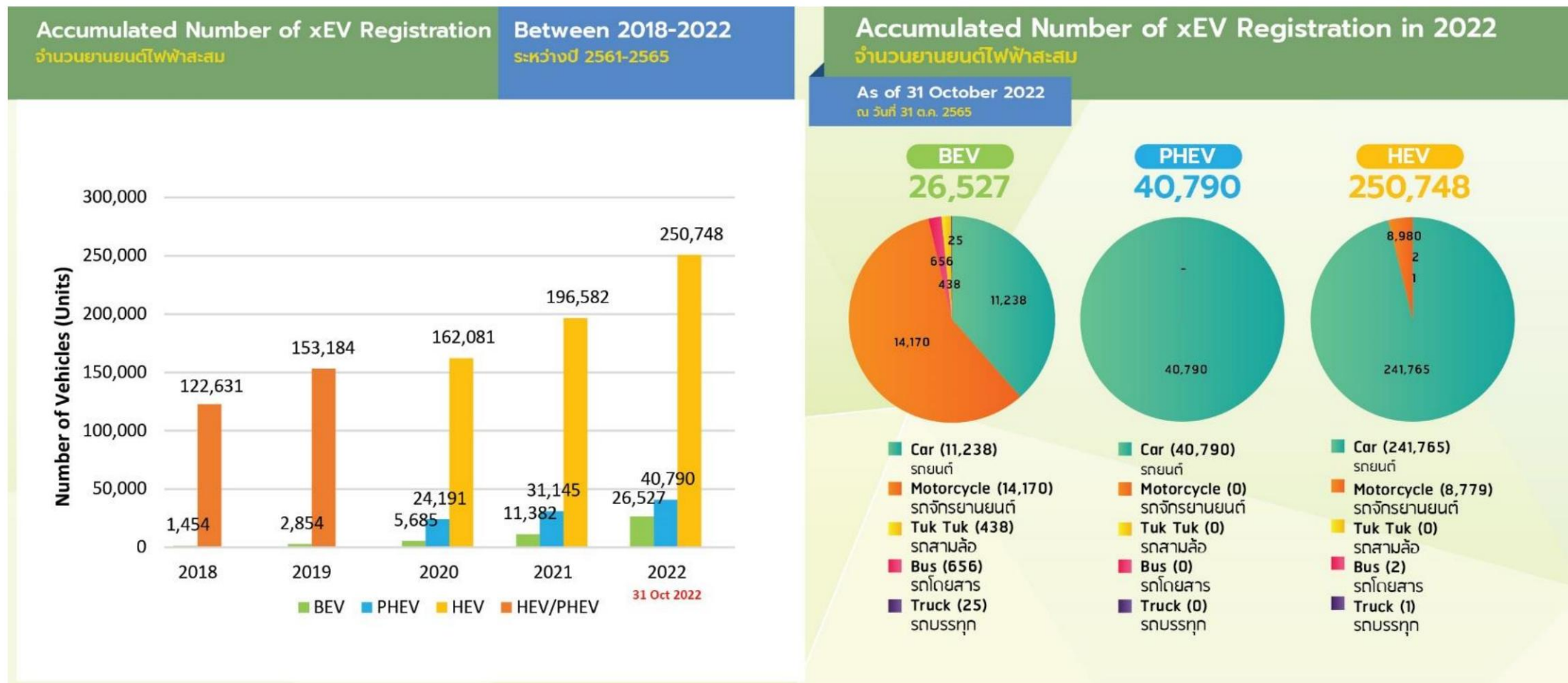



Mechanical shock test

Water resistance test

 <b>Vibration</b> การสั่นสะเทือน	 <b>Thermal shock and cycling</b> การทนอุณหภูมิ	 <b>Mechanical shock</b> การเปลี่ยนแปลงความแรงฉับพลัน
 <b>Mechanical integrity</b> ความแข็งแรงของโครงสร้างชุดแบตเตอรี่	 <b>Fire resistance</b> การทนไฟ	 <b>External short circuit protection</b> การลัดวงจร
 <b>Overcharge protection</b> ระบบป้องกันการชาร์จเกิน	 <b>Over-discharge protection</b> ระบบป้องกันดิสชาร์จเกิน	 <b>Over temperature protection</b> ระบบป้องกันอุณหภูมิเกิน

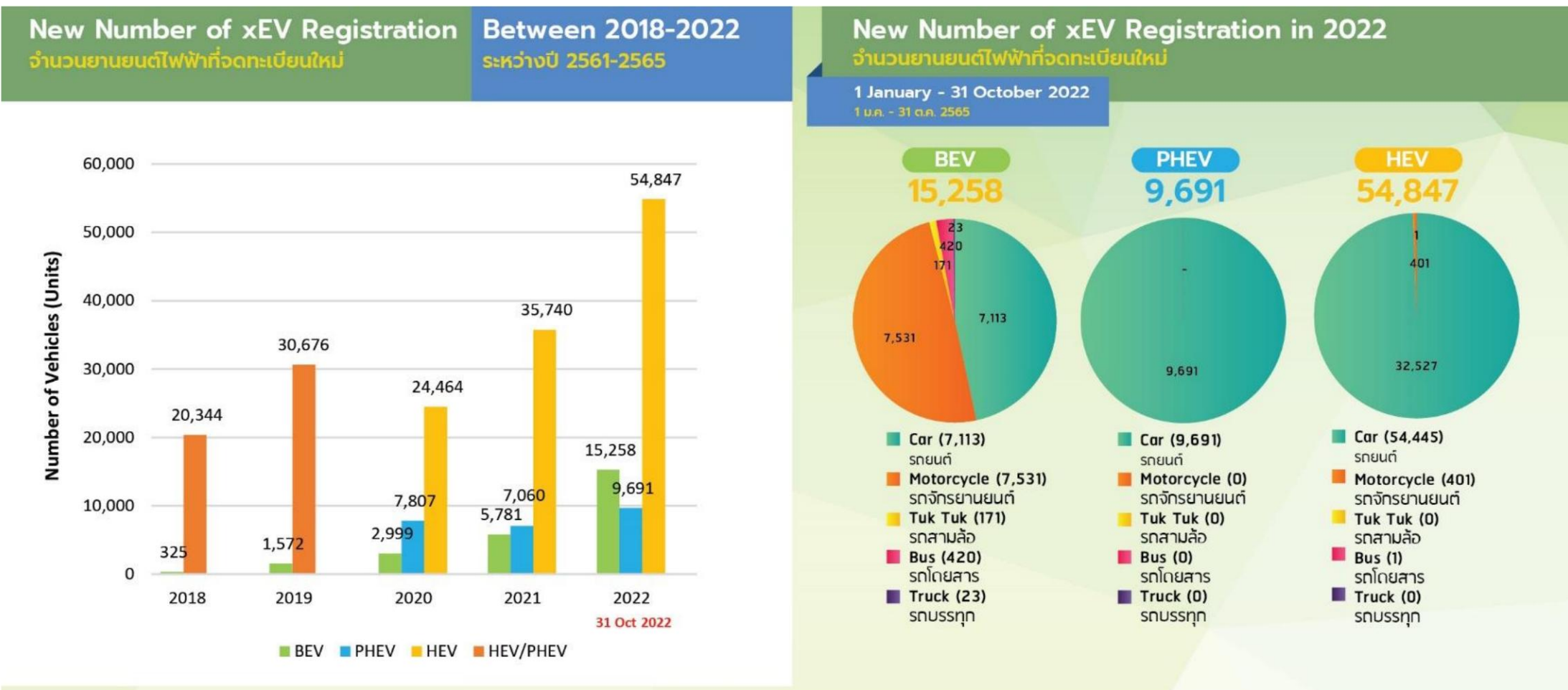
# Tình trạng đăng ký tích lũy xEV tại Thái Lan



Nguồn: Hiệp hội xe điện Thái Lan




































# Tình trạng đăng ký hàng năm của xEV tại Thái Lan



Nguồn: Hiệp hội xe điện Thái Lan


































# Các mẫu BEV hiện tại ở Thái Lan.

BEV  
2022

	 Audi										
	e-tron 55 quattro	BMW i3s	BMW iX	BMW iX3	BMW i4	e6	M3, T3	ONE	ORA Good Cat	KONA Electric	IONIQ Electric
ประเภทหัวชาร์จ Socket Type	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2	AC Type 2	AC Type 2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2
ระยะทางวิ่งสูงสุด EV Range (km)	417	280	630	460	590	400	300	160	400 [TECH] 400 [PRO] 500 [ULTRA]	312 [SE] 482 [SEL]	280
ขนาดแบตเตอรี่ Battery Size (KWh)	95	33	111.5	80	83.9	80	50.3	11.8	47.8 [TECH] 47.8 [PRO] 63.1 [ULTRA]	39.2 [SE] 64 [SEL]	28
ประเทศที่ผลิต Country of Origin											
ภาษีนำเข้า Import Tax	80%	80%	80%	0%	80%	0%	0%	-	0%	40%	40%
ภาษีสรรพสามิต Excise Tax	8%	8%	8%	8%	8%	8%	8%	0%	8%	8%	8%
ราคาขาย Retail Price (Baht)	5,099,000	2,230,000	5,999,000	3,399,000	4,499,000	1,400,000	1,089,000 [M3] 1,059,000 [T3] 5Seat 999,000 [T3] 2Seat	664,000	989,000 [TECH] 1,059,000 [PRO] 1,199,000 [ULTRA]	1,849,000 [SE] 2,259,000 [SEL]	1,749,000
ข้อมูลเพิ่มเติม More info											

# Các mẫu BEV hiện tại ở Thái Lan.

BEV  
2022

											
	I-PACE	All-New Soul EV	UX 300e	EP Wagon EV	ZS EV	MINI Cooper SE	LEAF	TAYCAN	TTE 500	Model 3	XC40 Recharge
ประเภทหัวชาร์จ Socket Type	AC Type 2 & CCS2	AC Type 1 & CCS1	AC Type 2 & DC CHAdeMO	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 1 & DC CHAdeMO	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2
ระยะทางวิ่งสูงสุด EV Range (km)	470	452	360	380	337	217	311	407 [4S] 447 [Turbo] 412 [Turbo S]	100	386	418
ขนาดแบตเตอรี่ Battery Size (KWh)	90	64	54	50.3	44.5	32.6	40	79 [4S] 93 [Turbo&Turbo S]	11	62	78
ประเทศที่ผลิต Country of Origin											
ภาษีนำเข้า Import Tax	80%	40%	20%	0%	0%	80%	20%	80%	-	80%	0%
ภาษีสรรพสามิต Excise Tax	8%	8%	8%	8%	8%	8%	8%	8%	0%	8%	8%
ราคาขาย Retail Price (Baht)	5,499,000 [S] 6,299,000 [SE] 6,999,000 [HSE]	2,387,000	3,490,000	988,000	1,190,000	2,290,000	1,490,000	7,100,000 [4S] 9,900,000 [Turbo] 11,700,000 [Turbo S]	438,000	2,990,000	2,590,000
ข้อมูลเพิ่มเติม More Info											



**PHEV**  
Plug-in Hybrid Electric Vehicle  
รถยนต์ไฟฟ้าปลั๊กอินไฮบริด PHEV



	C 300 e Average, AMG Sport, AMG Dynamic	E 300 e Average, AMG Dynamic	GLC 300 e 4MATIC, Dynamic, AMG, AMG Coupe	GLE 350 e 4MATIC
EV RANGE (KM) สามารถวิ่งด้วย แบตเตอรี่ได้ (กม.)	54 - 59	51 - 58	47 - 51	101 - 105
BATTERY CAPACITY (kWh) ความจุของแบตเตอรี่	13.0	17.4	13.0	31.2
DRIVE SYSTEM ระบบขับเคลื่อน	Rear engine, 4 cylinders with turbocharger and intercooler			
MAX. E-MOTOR OUTPUT (kW) กำลังสูงสุดของมอเตอร์ไฟฟ้า (กิโลวัตต์)	90	99	90	120
ENGINE SIZE (CC) ขนาดเครื่องยนต์ (ซีซี)	1,991	1,991	1,991	1,991
MAXIMUM SPEED (km/h) ความเร็วสูงสุด (กม./ชม.)	230	250	232	210
FUEL CONSUMPTION (L/100KM) การใช้เชื้อเพลิงต่อระยะทาง 100 กม. (รวม E-mode และโหมดขับขี่ด้วยมอเตอร์ไฟฟ้า)	2.2	2.6	2.5	1.1
CO2 EMISSION (g/km) อัตราการปล่อย CO2 (กรัม/กม.)	45	64	47	22
STARTING PRICE (฿BART) ราคาขายเริ่มต้น (บาท)	Average 2,599,200 AMG Sport 2,735,000 AMG Dynamic 2,599,200	Average 3,192,000 AMG Dynamic 3,172,000	Dynamic 3,199,200 Coupe Dynamic 4,084,000	1,689,000
MORE INFO. ดูข้อมูลเพิ่มเติม				

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ELECTRIC VEHICLE GUIDEBOOK

	Range Rover Velar PHEV SE Dynamic SE-DYNAMIC SE	Range Rover Sport HSE LUX.	Range Rover PHEV Autobiography Plus LWB	HS PHEV	Outlander PHEV GT-ST PREMIUM
EV RANGE (KM) สามารถวิ่งด้วย แบตเตอรี่ได้ (กม.)	41	41	41	67	59
BATTERY CAPACITY (kWh) ความจุของแบตเตอรี่	13.68	15.10	13.80	16.2	13.8
DRIVE SYSTEM ระบบขับเคลื่อน	2.0 Litre Turbo Charge Power F. EV AND		2.0L 4-Cyl Turbo 220		
MAX. E-MOTOR OUTPUT (kW) กำลังสูงสุดของมอเตอร์ไฟฟ้า (กิโลวัตต์)	105	105	105	90	90
ENGINE SIZE (CC) ขนาดเครื่องยนต์ (ซีซี)	1,997	1,997	1,997	1,990	2,300
MAXIMUM SPEED (km/h) ความเร็วสูงสุด (กม./ชม.)	209	220	220	190	180
FUEL CONSUMPTION (L/100KM) การใช้เชื้อเพลิงต่อระยะทาง 100 กม. (รวม E-mode และโหมดขับขี่ด้วยมอเตอร์ไฟฟ้า)	2.2	3.1	3.2	2.2	1.9
CO2 EMISSION (g/km) อัตราการปล่อย CO2 (กรัม/กม.)	57	71	75	34	43
STARTING PRICE (฿BART) ราคาขายเริ่มต้น (บาท)	SE 1,800,000 Dynamic SE 2,000,000	SE Plus 1,699,000 Dynamic HSE Plus 1,999,000	9,999,220	1,359,200	GT 1,410,000 GT Premium 1,740,000
MORE INFO. ดูข้อมูลเพิ่มเติม					

BMW

	330e	330e	745Le xDrive	X3 xDrive30e	X5 xDrive45e
EV RANGE (KM) สามารถวิ่งด้วย แบตเตอรี่ได้ (กม.)	39	32	67	47	80
BATTERY CAPACITY (kWh) ความจุของแบตเตอรี่	12	12	12	11	17
DRIVE SYSTEM ระบบขับเคลื่อน	Rear-wheel drive BMW TwinPower Turbo 6-cylinder petrol engine		BMW TwinPower Turbo 6-cylinder petrol engine	BMW TwinPower Turbo 6-cylinder petrol engine	BMW TwinPower Turbo 6-cylinder petrol engine
MAX. E-MOTOR OUTPUT (kW) กำลังสูงสุดของมอเตอร์ไฟฟ้า (กิโลวัตต์)	83	90	83	60	53
ENGINE SIZE (CC) ขนาดเครื่องยนต์ (ซีซี)	1,998	1,998	2,000	1,998	2,998
MAXIMUM SPEED (km/h) ความเร็วสูงสุด (กม./ชม.)	220	220	250	210	220
FUEL CONSUMPTION (L/100KM) การใช้เชื้อเพลิงต่อระยะทาง 100 กม. (รวม E-mode และโหมดขับขี่ด้วยมอเตอร์ไฟฟ้า)	2.1	1.9	3.3	2.6	2.2
CO2 EMISSION (g/km) อัตราการปล่อย CO2 (กรัม/กม.)	46	41	64	54	37
STARTING PRICE (฿BART) ราคาขายเริ่มต้น (บาท)	M Sport 2,700,000 M Performance 3,299,000	Elite 2,890,000 M Sport 3,199,000	M Sport 3,540,000	Elite 3,790,000 M Sport (Top) 3,799,000	M Sport 3,690,000
MORE INFO. ดูข้อมูลเพิ่มเติม					

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LAND ROVER

	Cayenne S Hybrid Coupe, Turbo S, Coupe	Panamera S Hybrid 4.8 Executive, 4 Sport, Turismo, 4S, Turbo S	S60 R-Design Inscription, Expression	S90 RECHARGE TS AND Inscription
EV RANGE (KM) สามารถวิ่งด้วย แบตเตอรี่ได้ (กม.)	41 - 44	40 - 50	40	43
BATTERY CAPACITY (kWh) ความจุของแบตเตอรี่	17.9	17.4	1.6	11.6
DRIVE SYSTEM ระบบขับเคลื่อน	Turbocharged V6 engine with 4-cylinder electric motor (S60 Hybrid).	Turbocharged V6 engine with 4-cylinder electric motor (S60 Hybrid).	4-cylinder turbo engine with 4-cylinder electric motor (S60 Hybrid).	4-cylinder turbo engine with 4-cylinder electric motor (S60 Hybrid).
MAX. E-MOTOR OUTPUT (kW) กำลังสูงสุดของมอเตอร์ไฟฟ้า (กิโลวัตต์)	190	100	65	65
ENGINE SIZE (CC) ขนาดเครื่องยนต์ (ซีซี)	2,995 (E-Hybrid), 3,996 (Turbo S)	2,894 (E-Hybrid), 3,996 (Turbo S)	1,969	1,969
MAXIMUM SPEED (km/h) ความเร็วสูงสุด (กม./ชม.)	230 (E-Hybrid), 250 (Turbo S)	180 (E-Hybrid), 240 (E-Hybrid), 240 (Turbo S)	180	180
FUEL CONSUMPTION (L/100KM) การใช้เชื้อเพลิงต่อระยะทาง 100 กม. (รวม E-mode และโหมดขับขี่ด้วยมอเตอร์ไฟฟ้า)	2.5 - 2.4	3.8 - 5.5	1.8	1.8
CO2 EMISSION (g/km) อัตราการปล่อย CO2 (กรัม/กม.)	17 - 16 (E-Hybrid), 81 (Turbo S)	40 - 10 (E-Hybrid), 17 (Turbo S)	12	11
STARTING PRICE (฿BART) ราคาขายเริ่มต้น (บาท)	E Hybrid 1,300,000 Turbo S 1,740,000	E Hybrid 1,200,000 Turbo S 1,740,000	R-Design 2,199,000 Inscription Expression 2,390,000	1,990,000
MORE INFO. ดูข้อมูลเพิ่มเติม				

JAGUAR

	E-Pace PHEV 4-DYNAMIC S, R-DYNAMIC SE	F-Pace PHEV SE, 4-DYNAMIC SE	Discovery Sport PHEV R-DYNAMIC SE	Range Rover Evolvee PHEV SE PLUS, R-DYNAMIC SE PLUS
EV RANGE (KM) สามารถวิ่งด้วย แบตเตอรี่ได้ (กม.)	68	56	61	65
BATTERY CAPACITY (kWh) ความจุของแบตเตอรี่	15.17	13.68	15.17	12.17
DRIVE SYSTEM ระบบขับเคลื่อน	1.8 Litre Turbo Charge Power, 11 CVT, AWD	2.0 Litre Turbo Charge Power, F, 11 CVT, AWD	2.0 Litre Turbo Charge Power, 11 CVT, AWD	2.0 Litre Turbo Charge Power, 11 CVT, AWD
MAX. E-MOTOR OUTPUT (kW) กำลังสูงสุดของมอเตอร์ไฟฟ้า (กิโลวัตต์)	80	100	80	80
ENGINE SIZE (CC) ขนาดเครื่องยนต์ (ซีซี)	1,495	1,997	1,497	1,447
MAXIMUM SPEED (km/h) ความเร็วสูงสุด (กม./ชม.)	211	210	200	212
FUEL CONSUMPTION (L/100KM) การใช้เชื้อเพลิงต่อระยะทาง 100 กม. (รวม E-mode และโหมดขับขี่ด้วยมอเตอร์ไฟฟ้า)	2.0	2.4	2.0	2.2
CO2 EMISSION (g/km) อัตราการปล่อย CO2 (กรัม/กม.)	43	51	44	43
STARTING PRICE (฿BART) ราคาขายเริ่มต้น (บาท)	R-Dynamic SE 2,700,000 R-Dynamic SE 3,200,000	SE 2,800,000 R-Dynamic SE 3,200,000	1,200,000	SE Plus 1,990,000 R-Dynamic SE Plus 2,499,000
MORE INFO. ดูข้อมูลเพิ่มเติม				

42 | EVAT DIRECTORY 2021  
ELECTRIC VEHICLE GUIDEBOOK

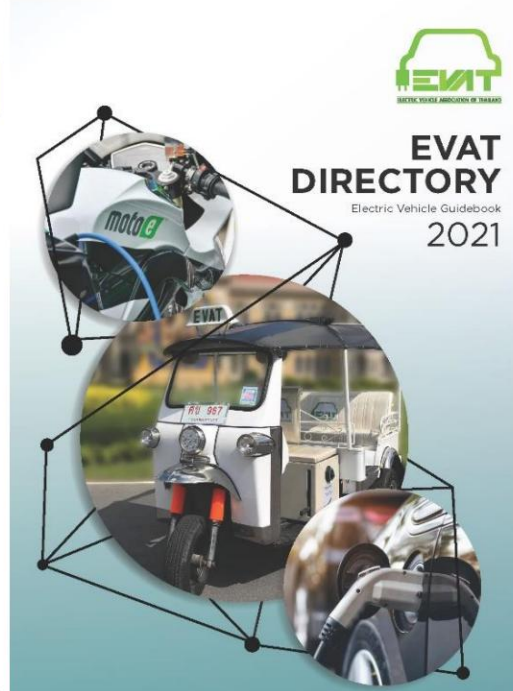
MINI

	V60 RECHARGE TS AND R-Design Expression	XC40 RECHARGE TS Inscription, R-Design R-Design Expression	XC60 RECHARGE TS AND Inscription, R-Design R-Design Expression	XC90 RECHARGE TS AND Inscription, R-Design R-Design Expression
EV RANGE (KM) สามารถวิ่งด้วย แบตเตอรี่ได้ (กม.)	40	44	45	49
BATTERY CAPACITY (kWh) ความจุของแบตเตอรี่	11.6	12.7	11.6	11.6
DRIVE SYSTEM ระบบขับเคลื่อน	Plug-in hybrid with 2.0L I4 engine, turbocharged, and electric motor.	Plug-in hybrid with 2.0L I4 engine, turbocharged, and electric motor.	Plug-in hybrid with 2.0L I4 engine, turbocharged, and electric motor.	Plug-in hybrid with 2.0L I4 engine, turbocharged, and electric motor.
MAX. E-MOTOR OUTPUT (kW) กำลังสูงสุดของมอเตอร์ไฟฟ้า (กิโลวัตต์)	65	60	65	65
ENGINE SIZE (CC) ขนาดเครื่องยนต์ (ซีซี)	1,969	1,477	1,969	1,969
MAXIMUM SPEED (km/h) ความเร็วสูงสุด (กม./ชม.)	180	180	180	180
FUEL CONSUMPTION (L/100KM) การใช้เชื้อเพลิงต่อระยะทาง 100 กม. (รวม E-mode และโหมดขับขี่ด้วยมอเตอร์ไฟฟ้า)	1.8	2.2	2.0	2.1
CO2 EMISSION (g/km) อัตราการปล่อย CO2 (กรัม/กม.)	42	52	41	49
STARTING PRICE (฿BART) ราคาขายเริ่มต้น (บาท)	Inscription 2,590,000 R-Design Expression 2,790,000	Inscription/R-Design 1,990,000 R-Design Expression 2,190,000	Inscription/R-Design 1,990,000 R-Design Expression 2,190,000	Inscription/Recharge R-Design 1,990,000 R-Design Expression 2,190,000
MORE INFO. ดูข้อมูลเพิ่มเติม				

# Model PHEV (2021)

• ปี 2021

26 mẫu PHEV từ 8 thương hiệu Đối với xe sedan,  
BEV : PHEV : HEV : ICE =  
3,994 : 31,085 : 187,269 : 10,85 triệu  
hoặc 1 : 7,8 : 46,9 : 2,717



Source: <http://www.evatt.or.th/16803970/evatt-directory>



# EV địa phương ở Thái Lan

## Xe điện



## xe buýt điện



## xe tuk tuk điện





# Các mẫu xe buýt và xe tải EV ở Thái Lan



Truck mate TM iBlue45  
Battery 44.9 kWh  
Driving range 275 km/charge  
Motor 75 kW



ARUN-Plus ENCO



Auman EST iBlue280  
Battery 282 kWh  
Driving range 200 km/charge  
Motor 360 kW




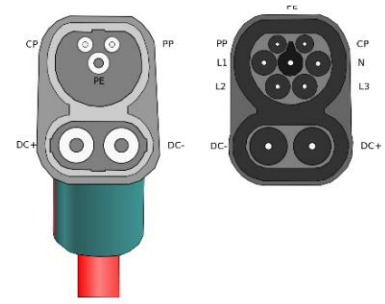
























SCG: EV Mining Truck

Cement and Green Solution  
(2025)

# Ổ cắm và đầu vào tiêu chuẩn (TISI2749-2016)



Viện tiêu chuẩn công nghiệp Thái Lan

Xe cộ	Bộ sạc AC	Bộ sạc DC	Xe cộ																								
xe buýt điện	<p>Cấu hình IEC 62196-2 Loại 2</p>  <p>Diagram showing Type 2 Female Plug Pinout (CP, PE, PP, N, L1, L2, L3) and Type 2 Male Plug Pinout (PP, PE, CP, L1, L2, L3).</p>	<p>Cấu hình IEC 62196-3 FF</p>  <p>Dòng điện định mức: Lên đến 200 A Điện áp định mức: <math>\geq 500</math> V DC Giao thức truyền thông: PLC</p>	Điện Xe buýt																								
Điện Hành khách Xe hơi i	<p>Giai đoạn: Đơ n / Ba Dòng điện định mức: 70A (Một pha) / 63A (Ba pha) Điện áp định mức: 480 V Công suất: Lên đến 22 kW (Chế độ 2) Lên đến 43 kW (tối đa)</p>	<table border="1"> <thead> <tr> <th rowspan="2"></th> <th>System A CHAdeMO (Japan)</th> <th>System B GB/T (PRC)</th> <th colspan="2">System C</th> </tr> <tr> <th></th> <th></th> <th>COMBO1 (US)</th> <th>COMBO2 (DE)</th> </tr> </thead> <tbody> <tr> <td>Connector</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Vehicle Inlet</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Communication Protocol</td> <td colspan="2">CAN</td> <td colspan="2">PLC</td> </tr> </tbody> </table>		System A CHAdeMO (Japan)	System B GB/T (PRC)	System C				COMBO1 (US)	COMBO2 (DE)	Connector					Vehicle Inlet					Communication Protocol	CAN		PLC		Điện Hành khách Xe hơi i
	System A CHAdeMO (Japan)	System B GB/T (PRC)		System C																							
			COMBO1 (US)	COMBO2 (DE)																							
Connector																											
Vehicle Inlet																											
Communication Protocol	CAN		PLC																								

# EV Charging Equipment Installation Standard

Year 2020

MPESTD-001.2563



การไฟฟ้านครหลวง  
Metropolitan Electricity Authority

คณะกรรมการกำกับกิจการพลังงาน  
Energy Regulatory Commission

**มาตรฐานการติดตั้งทางไฟฟ้า**

สำหรับ

บริษัทจ่ายไฟยานยนต์ไฟฟ้า เพื่อการอัดประจุไฟฟ้า  
สำหรับประเภทบ้านอยู่อาศัย อาคารชุด อาคารสำนักงาน  
และลักษณะที่คล้ายกัน

การไฟฟ้านครหลวง การไฟฟ้าส่วนภูมิภาค  
และสำนักงานคณะกรรมการกำกับกิจการพลังงาน

พ.ศ. 2563

Residential, Condominium, Office and Similar

MPESTD-002.2563



การไฟฟ้านครหลวง  
Metropolitan Electricity Authority

คณะกรรมการกำกับกิจการพลังงาน  
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สำหรับประเภทสถานีอัดประจุไฟฟ้า

การไฟฟ้านครหลวง การไฟฟ้าส่วนภูมิภาค  
และสำนักงานคณะกรรมการกำกับกิจการพลังงาน

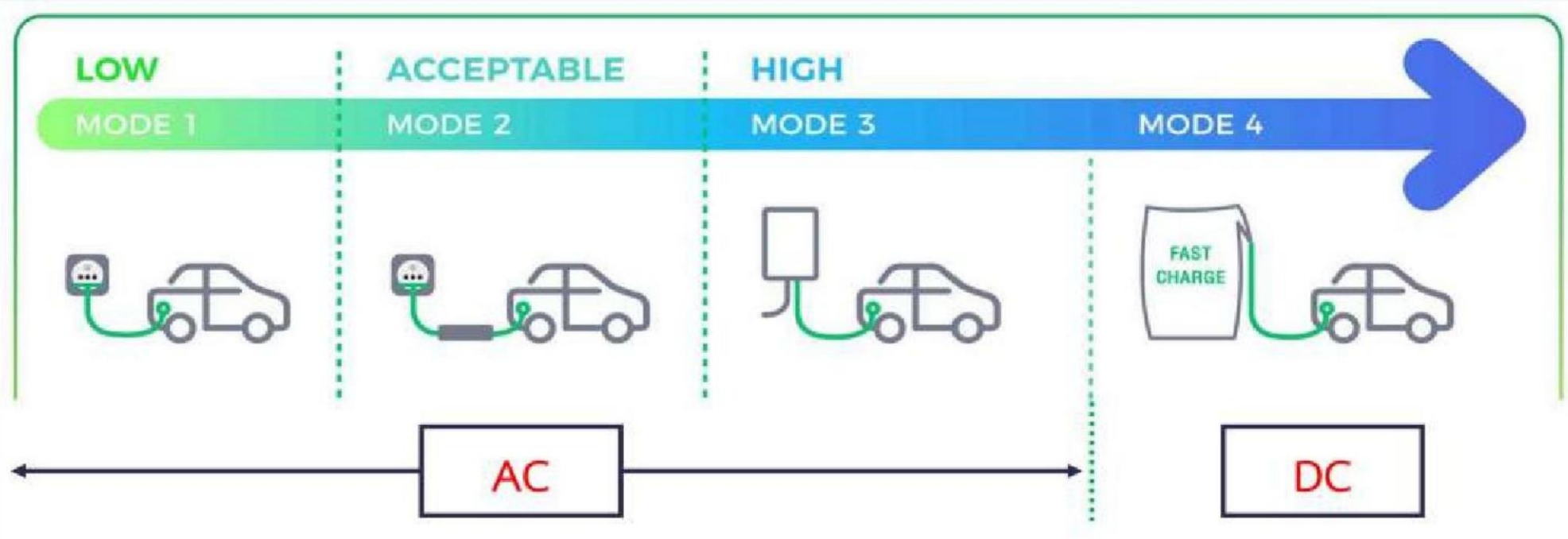
พ.ศ. 2563

EV Charging Station



# EV Charging Equipment Installation Standard

## EV Charging Modes



Residential, Condominium, Office and Similar

EV Charging Station

# EV Charging Equipment Installation Standard

## MODE 2



## MODE 3



## MODE 4





# Tổng số trạm sạc ở Thái Lan.



## สถานีอัดประจุไฟฟ้า Elex พร้อมให้บริการแล้วจ้า

by EGAT

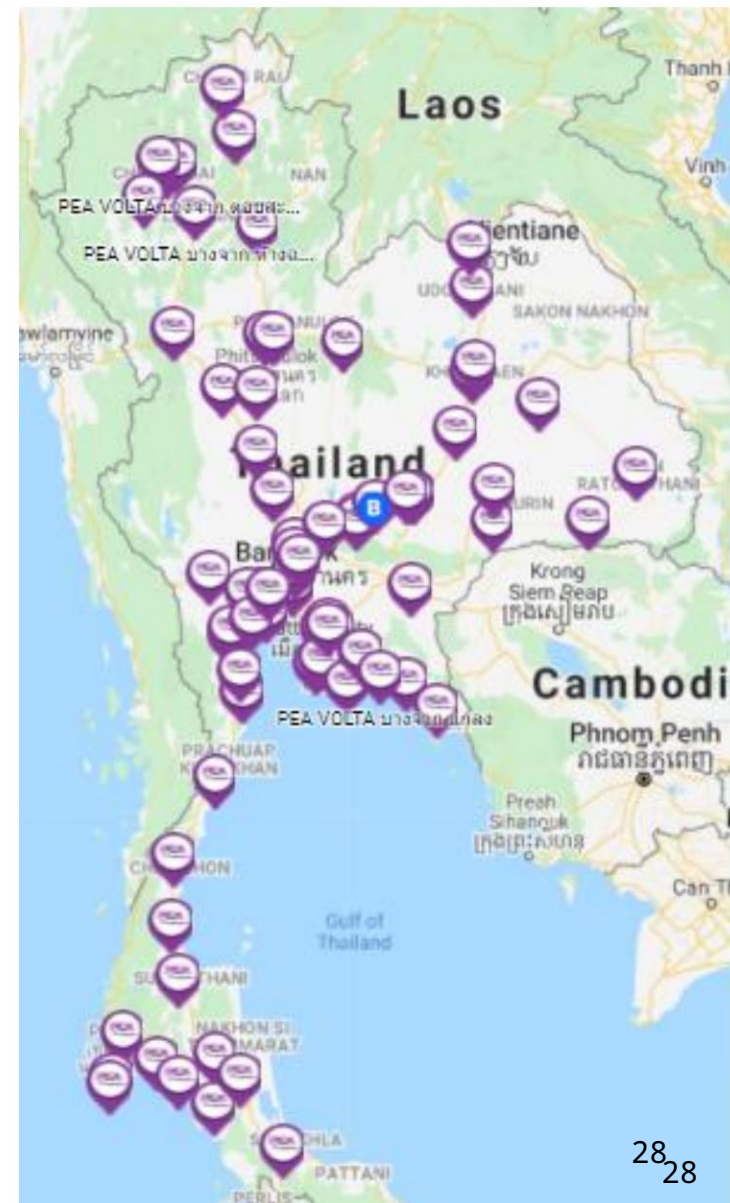


ผู้ใช้รถยนต์ไฟฟ้าสามารถดูสถานะ Realtime ผ่านแอปพลิเคชันดาวน์โหลดได้ที่ 

Download App Now!

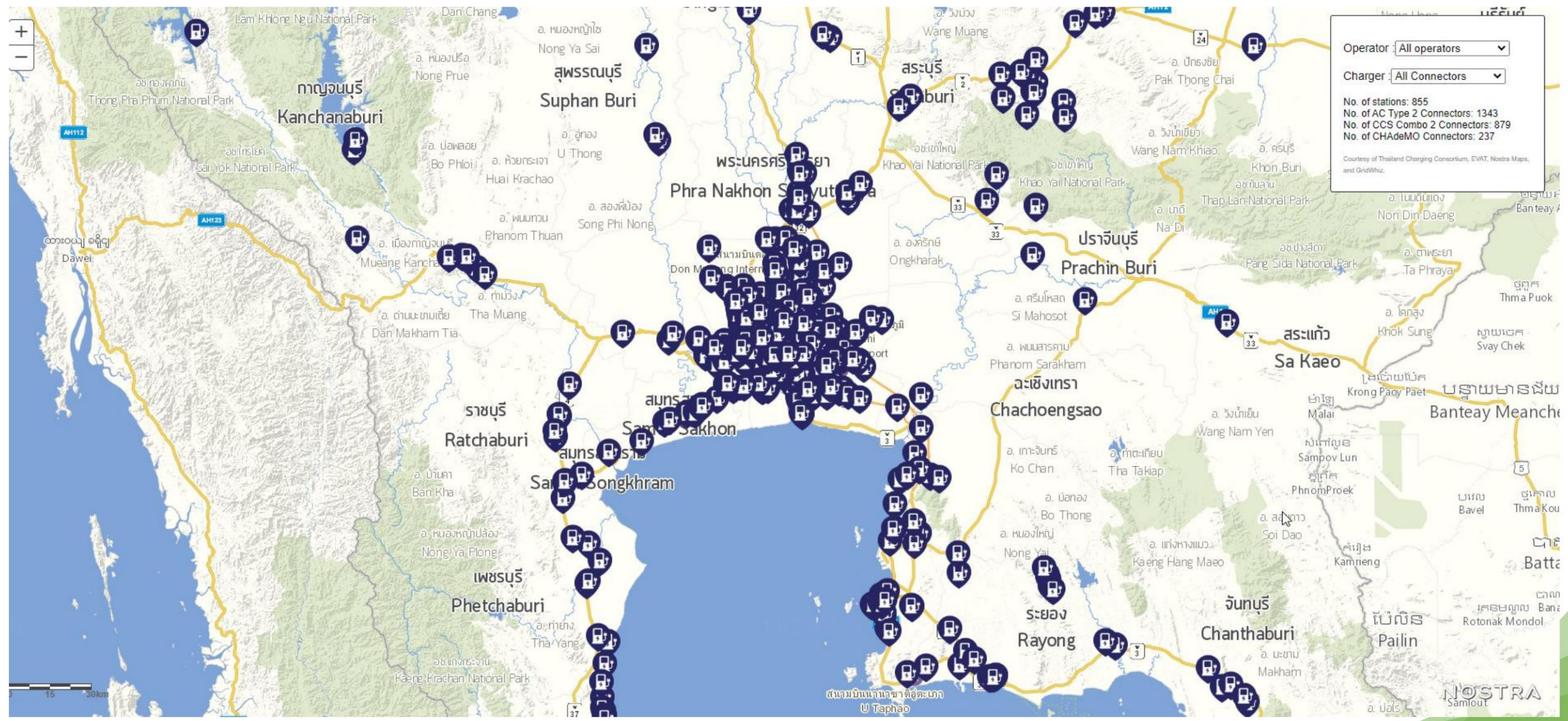
Available on the App Store and Google Play.

\*\* ข้อมูล ณ วันที่ 15 ก.ย. 2564





# Bản đồ trạm sạc tổng thể của các nhà khai thác trong phạm vi Hiệp hội sạc





# TIS Standards on EV



[shorturl.at/dEG03](https://shorturl.at/dEG03)

## Safety and Related systems

UNR 10 (TIS 2326) EMC  
 UNR 94 (TIS 2400) frontal, UNR 95 (TIS 2399) Lateral collisions  
 UNR 138 (TIS 3291) Quiet Road Transport Vehicles  
 ISO 6469-2,3,4 (TIS3102-2,3,4) Operation, Electrical, Post crash  
 ISO 15118 (TIS 3381) Vehicle to grid  
 ISO 23273 (TIS 3267) Fuel cell vehicle  
 ISO 26262 (TIS 3268) Functional Safety

## Cables

ISO 6722 (TIS 3248) Single Core  
 ISO 14572 (TIS 3249) Single/Multi

## Electric Power Train

UNR 85 (TIS 2331) Net Power  
 UNR 100 (TIS 3026) Part 1 – Safety  
 UNR 101 (TIS 2335), ISO 8714 (TIS 3265) Energy Consumption  
 ISO 21782 (TIS 3382) Motor System, Inverter, DC/DC Converter  
 IEC 60349 (TIS 3032) Motor

## On-board Charger

CISPR 25 (TIS 2929) EMC  
 ISO 17409 (TIS 2776) Conductive  
 ISO 19363 (TIS 3380) Wireless  
 IEC 62335 (TIS 2909), ISO 10924 (TIS 3247) Circuit Breaker

## REESS

UNR 100 (TIS 3026) Part 2 - Safety  
 ISO 6469-1 (TIS 3102-1) Safety  
 ISO 12405-4 (TIS 3378-4) Performance  
 ISO 18300 (TIS 3379) Lithium+Lead acid  
 IEC 61982 (TIS 61982) Non-Lithium

## Charging System

CISPR 12 (TIS 2930) EMC  
 IEC 61851 (TIS 61851) Conductive  
 IEC 61980 (TIS 61980) Wireless  
 IEC 62840 (TIS 62840) Swap  
 IEC 60364-7-722 (TIS 3068) Installation  
 IEC 61439-7 (TIS 1436-7) Switchgear  
 IEC 62463 (TIS 2955) Type F,B CB  
 IEC 62955 (TIS 3462) RDC-DD

## Plug and Sockets

IEC 62196 (TIS 2749)

## IC-CPD

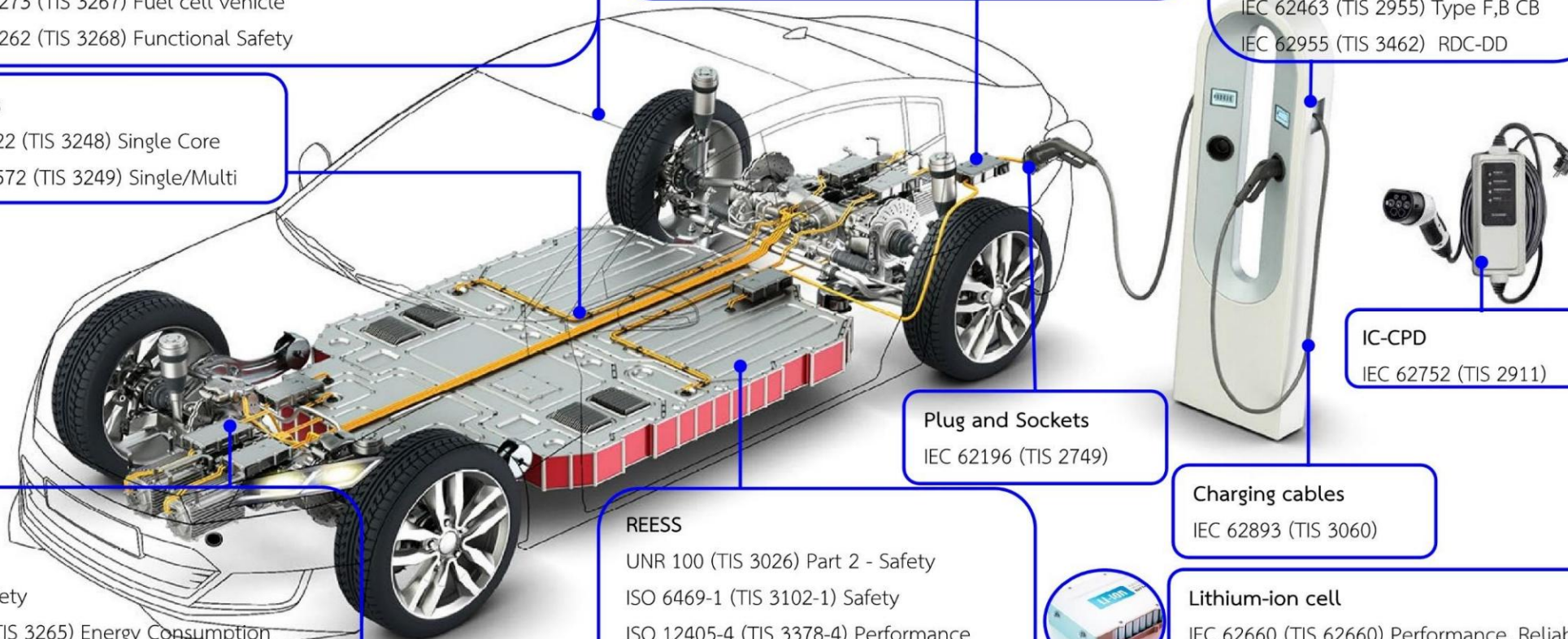
IEC 62752 (TIS 2911)

## Charging cables

IEC 62893 (TIS 3060)

## Lithium-ion cell

IEC 62660 (TIS 62660) Performance, Reliability, Safety





## Mức độ phổ biến và chấp nhận của xe điện 2 bánh



- Dự án SolaRyde do Thammasart Univ và Star8 Thái Lan thực hiện taxi e2w trong khuôn viên trường

<https://www.bangkokpost.com/thailand/General/1437523/thammasats-electric-motorbikes-hit-streets>

- Lữ đi điện quốc gia (EGAT: Cơ quan phát điện Thái Lan) ra mắt “Xe ôm và thuyền điện” để hỗ trợ kết nối giao thông công cộng đường bộ, đường sắt và đường thủy.

<https://www.egat.co.th/en/news-announcement/news-release/egat-launches-electric-motorbike-taxis-and-boats-to-support-public-transportation-connection-of-wheels-rails-và-thuyền>



- DHL Express Thái Lan trình diễn 50 e2w cho đội giao hàng.

<https://lot.dhl.com/electric-motorcycles-powered-up-for-deliveries-in-thailand/>



- Một trong những Công ty Dầu khí Quốc gia (Bangchak) trình diễn xe taxi e2w với tùy chọn hoán đổi pin cho chuyến đi 150 km.

<https://www.bangchak.co.th/en/newsroom/bangchak-news/575/bangchak-launches-startup-winnonie-nợ-miễn-phi-motorcycle-taxi-stand-deploys-green-innovation-in-Raising-taxi-người-đi-xe-máy-chất-lượng-cuộc-sống>

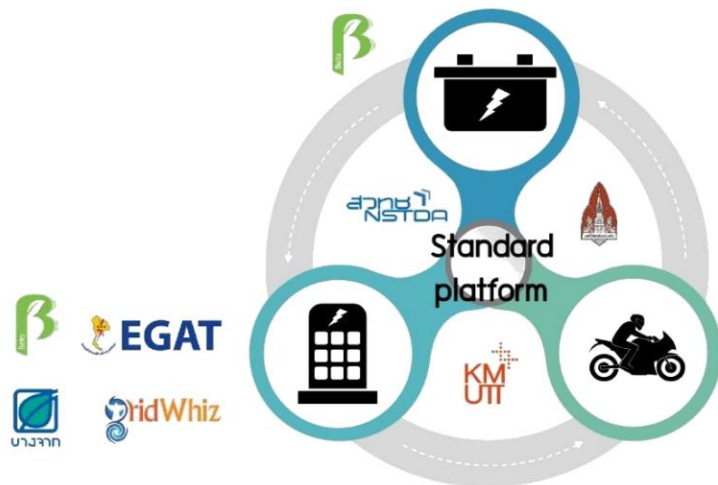
Động lực cho Năng lực Khoa học và Công nghệ Quốc gia





# Nền tảng hoán đổi pin Thái Lan (2021-23)

## Participating Parties



Co-Funded by PMUC and Participating Companies

## STD. BATTERY PACK – REQUIREMENT SET

- Standard pack (for prototype) requirement - Finished

Number of pack	2 packs (parallel)
Pack nominal voltage	72 V (48V - 84V)
Minimum pack energy	> 1.5 kWh (for 1 pack)
Continuous discharge power	> 1.0 kW (for 1 pack)
Max discharge power	> 3.75 kW (for 1 pack)
Maximum pack weight	Preferably < 9.5 kg
Max width, length, height	150, 185, 345 mm
Communication type	CAN

## Prototype: Expected



BATTERY PACK

80 packs



MOTORCYCLE

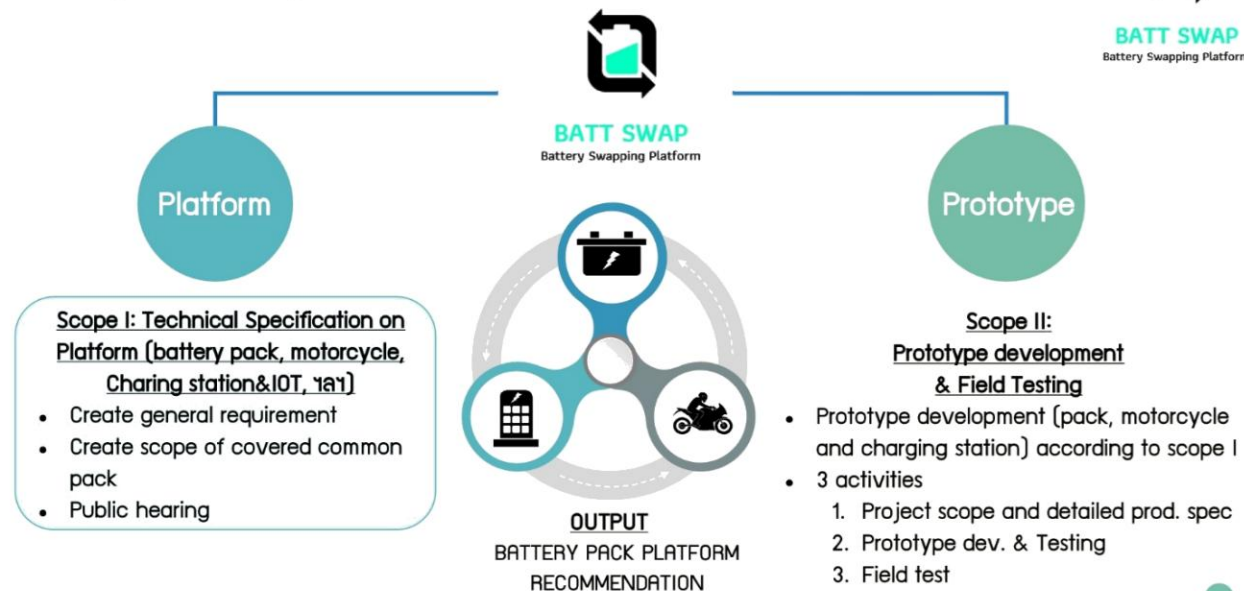
2 models - 20 units



SWAPPING STATION

4 stations

## Project Scope



THANK YOU 😊



FOLLOW US VIA

email: [battery.swap.pmu@gmail.com](mailto:battery.swap.pmu@gmail.com)

website: [www.batteryswapping.in.th](http://www.batteryswapping.in.th)



# Quảng bá e2w với tư cách là Xe ôm



Signing Ceremony of the Memorandum of Agreement on Promotion of Electric Motorcycle as Motorcycle Taxi and Collaborative Research Project Kick-off.

## "Mainstreaming Electric 2 and 3 Wheelers in Thailand: Phase II"

Signing Ceremony of the Memorandum of Agreement on Promotion of Electric Motorcycle as Motorcycle Taxi and Collaborative Research Project Kick-off.

## "Mainstreaming Electric 2 and 3 Wheelers in Thailand: Phase II"

Thursday 5<sup>th</sup> May 2022 | NSTDA Building (Yothi), Rama 6 Road, Bangkok, Thailand



Mr. Li Yao  
TAILG President

## Govt agencies, private firms sign MoU to study EV motorcycle taxi riders

Home » In-Focus » Govt Agencies, Private Firms Sign MoU to Study EV Motorcycle Taxi Riders

The National Energy Technology Centre (ENTEC) on Thursday signed a memorandum of understanding with the National Science and Technology Development Agency (NSTDA), the Electricity Generating Authority of Thailand (EGAT), The Stallions Co Ltd, and Dongguan Tailing Electric Vehicle Co Ltd to promote electric motorcycles among bike taxi riders in Thailand.



Signing Ceremony of the Memorandum of Agreement on Promotion of Electric Motorcycle as Motorcycle Taxi and Collaborative Research Project Kick-off.

## "Mainstreaming Electric 2 and 3 Wheelers in Thailand: Phase II"

Thursday 5<sup>th</sup> May 2022 | NSTDA Building (Yothi), Rama 6 Road, Bangkok, Thailand



**ENTEC, NSTDA, EGAT, Thai-Chinese companies in pilot 50 EV motorbike taxi project:** National Science and Technology Development Agency (NSTDA)'s National Energy Technology Center (ENTEC), signed an agreement to promote 50 EV motorbike taxis and related projects. The event was honoured by Sumittra Charojoekkul, Director, ENTEC; Suttipong Chalermkiat, Assistant Governor – Sustainability Management, Electricity Generating Authority of Thailand (EGAT); Areerat Sriprathai, CEO, The Stallions Co., Ltd.; and Li Yao, Chairman, Dongguan Tailing Electric Vehicle Co., Ltd. and was witnessed by Dr. Mushtaq Memon, Regional Coordinator, Chemicals & Pollution Action, and Bert Fabian, United Nations Environment Programme.

<https://www.nationthailand.com/in-focus/40015266>

<https://www.egat.co.th/home/20220505-pre01/> | <https://tna.mcot.net/business-936525>

<https://www.thansettakij.com/motor/523740> | <https://mgronline.com/science/detail/9650000042612>

# nội dung

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- Về ENTEC/EVAT

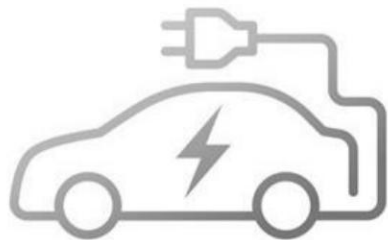
- Trạng thái xEV SEA và Thái Lan bao gồm các trạm sạc EV

- Triển vọng và Cơ hội cho EV





## Nội các gần đây đã phê duyệt các Kế hoạch Hỗ trợ BEV.



### Xe BEV có giá < 2,0 triệu THB

- Giảm thuế nhập khẩu xe BEV nguyên chiếc tới 40% (2022-2023)
- Giảm thuế tiêu thụ đặc biệt từ 8% xuống 2% (2022-2025)
- Hỗ trợ tiền tệ ở mức 70.000 THB/chiếc cho BEV với pin < 30 kWh và 150.000 THB/chiếc cho BEV với pin > 30 kWh (2022-2025)

### Xe BEV với giá 2,0-7,0 triệu THB

- Giảm thuế nhập khẩu ô tô BEV nguyên chiếc tới 20% (2022-2023)
- Giảm thuế tiêu thụ đặc biệt từ 8% xuống 2% (2022-2025).



### Xe bán tải BEV

- Giảm thuế tiêu thụ đặc biệt xuống 0% (2022- 2025) • Hỗ trợ tiền tệ 150.000 THB/chiếc cho xe bán tải BEV có pin > 30 kWh (2022-2025)



### Xe máy BEV < 150.000 THB

- Hỗ trợ tiền tệ ở mức 18.000 THB cho Xe máy BEV, cả CBU và CKD (2022-2025)

### Điều kiện chung • Phải

cam kết lắp ráp / sản xuất BEV trong nước. • Đến năm 2024, ô tô/ xe máy BEV lắp ráp/sản xuất trong nước phải bằng

- Xe nhập khẩu nguyên chiếc giai đoạn 2022-2023.
- Trừ ờng hợp mở rộng sản xuất lắp ráp trong nước ô tô/xe máy BEV đến năm 2025, số lượng sản xuất trong nước ít nhất phải gấp 1,5 lần số xe CBU trong giai đoạn 2022-2023.
- Đối với việc lắp ráp/sản xuất BEV tại địa phương, các thành phần chính như pin, biến tần PCU, Động cơ kéo, v.v. phải được cung cấp tại địa phương.



# Promoted Projects on Electric Cars

(source: BOI Information Database (BIS) as of 31st August 2022)

	80,208.0 MB. *	26 Projects **	838,775 Cars	Promoted Projects ** <b>26</b>	Certificate Issuance (Projects) <b>14</b>	Commercialized Distribution <b>11</b>
<b>HEV</b> (38,623.9 MB.)		7 Projects (7 Entities)	440,955			
<b>PHEV</b> (11,665.7 MB.)		8 Projects (8 Entities)	137,600			
<b>BEV</b> (27,745.2 MB.)		15 Projects (14 Entities)	256,220			
<b>Battery Electric Bus</b> (2,173.8 MB.)		2 Projects (2 Entities)	4,000			

THERE ARE COUNTLESS REASONS TO  
**INVEST IN THAILAND**

**Remarks:** \* Investment Values excluding Cost of Land and Working Capital  
\*\* 17 Promoted Entities. 1 entity can be promoted more than 1 project.  
1 project can be manufactured more than 1 type of the EVs.

# Promoted Projects on EVs' Parts & Components

(Source: BOI Information Database (BIS) as of 31<sup>st</sup> August 2022)

Parts & Components	35 Projects * (26 Entities)	15,410.2 MB. ****
Battery	22 Projects (16 Entities) **	11,728.6 MB.
Traction Motor	5 Projects (5 Entities)	1,708.1 MB.
Inverter, On-board Charger, DC/DC Converters, BMS and DCU	1 Project (1 Entity) ***	1,047.3 MB.
Air Conditioning System	2 Projects (1 Entity)	557.3 MB.
EV Charging Devices	2 Projects (2 Entities)	157.0 MB.
High Voltage Harness	3 Projects (3 Entities)	118.2 MB.
Battery Cooling System	1 Project (1 Entity)	93.7 MB.



THERE ARE COUNTLESS REASONS TO  
INVEST IN THAILAND

Notes \* 1 project can be manufactured more than 1 type of the EV's Parts  
 \*\* 6 are promoted under activity 5.2.6.1 (High Density Battery)  
 \*\*\* In 1 project of "DELTA", Traction Motor, Inverter, On-board Charger, DC/DC Converters, BMS and DCU are manufactured  
 \*\*\*\* Investment Values excluding Cost of Land and Working Capital



# Thailand flagship EV investment projects



Mercedes-Benz

**FOXCONN**



**BYD**  
 比亞迪汽車



No.	Manufacturer	Project	Investment value (USD)	Production (unit/annum)
1.	Honhai precision industry (Foxconn)*	Electric car assembly plant and EV parts	\$1.04 billion	150,000 (2 <sup>nd</sup> phase)
2.	BYD auto industry (Thailand)	Electric car assembly plant and Battery production	\$522 million	150,000
3.	Mine mobility corporation	Electric commercial vehicle assembly plant	\$203.6 million	59,000 (2 <sup>nd</sup> phase)
4.	Ford motor manufacturing (Thailand)	Electric pickup truck production and plant upgrade**	\$1.02 billion	150,000
5.	Mercedes Benz manufacturing (Thailand)	Electric car assembly line and Battery production**	\$125.29 million	-

\* Honhai precision invested through joint venture with Thailand's PTT

\*\* Mercedes Benz and Ford EV are produce In the same factory as internal combustion car



# FOXCONN HORIZON+



Rojana Industrial Park, Nong Yai, Chonburi





# BYD 比亞迪汽車







EA ส่งมอบ จักรยานไฟฟ้า "COMPUTER FORMS (MALAYSIA) BERHAD" พันธมิตรใหญ่ในมาเลเซีย ลงนาม HOA สหพันธ์การขนส่งมวลชนไฟฟ้าต้นรูปแบบ

### Gemilang buys 200 electric buses from Thailand's EA, eyes local assembly

By NST Business - September 27, 2022 @ 8:24am



The purchase was driven by the Letter of Mandate (LOM) that GML received from Go Electric Automotive Sdn Bhd (GEA), which authorised GML to explore and assist with the procurement, retrofitting and homologation of electric buses manufactured by EA.





" Thailand is going to be a hub for manufacturing zero-emission vehicles as these changes come around the world. We're going to be part of that. You're going to see that coming from Ford "

- John lawler -  
Ford chief financial officer







Mercedes-Benz





# Cơ hội đầu tư



**บทพิสูจน์ความตั้งใจ ขยายระบบนิเวศ EV**

ขับเคลื่อนทุกชีวิต ด้วยพลังแห่งอนาคต

มุ่งเน้นด้าน Go Green Go Electric ผลักดันประเทศไทยให้ก้าวเป็นศูนย์กลางการผลิต EV ของอาเซียน ผ่านการสร้างธุรกิจยานยนต์ไฟฟ้าแบบครบวงจร โดยกลุ่ม ปตท.

**ARUN+**

**ปตท. ได้จัดตั้งบริษัท อรุณ พลัส จำกัด**  
โดยร่วมมือกับพันธมิตรชั้นนำจากไทย และต่างประเทศ เพื่อขยายฐานธุรกิจยานยนต์ไฟฟ้า และพัฒนา EV Ecosystem

**HORIZON+**  
ร่วมกับ Foxconn จัดตั้งบริษัทร่วมทุน Horizon Plus สำหรับผลิต และประกอบรถยนต์ไฟฟ้าครบวงจรด้วยเทคโนโลยี MIH Platform

**onion**  
ขยายเครือข่ายสถานีอัดประจุสำหรับยานยนต์ไฟฟ้า

**SWAP4GO**  
แพลตฟอร์มสลับแบตเตอรี่สำหรับมอเตอร์ไซค์ไฟฟ้าแบบไม่ต้องรอชาร์จ

**me**  
ให้บริการ EV ในรูปแบบ Subscription ผ่าน Digital Platform รายแรกในไทย แบบครบวงจร จ่าย คุ้ม จบในแอปเดียว

**ลงทุน E-Bus**  
เพื่อผลิต E-Bus ขนาด 7 เมตร และ 12 เมตร ร่วมกับ Partner

**ลงทุน 2 Wheeler (มอเตอร์ไซค์ไฟฟ้า)**  
เพื่อทำ Marketing New Product และทดสอบ Prototype Product

**GC irpc**  
ลงทุนด้าน Raw Materials โดยนำเนื้อหาจากเทคโนโลยีขั้นสูง

**GPSC**  
ผู้นำนวัตกรรมธุรกิจไฟฟ้า และแบตเตอรี่ เพื่อพัฒนาแบตเตอรี่ลิเธียม EV

**GOR**  
ให้บริการสถานีชาร์จไฟ และบริการซ่อมบำรุงภายในศูนย์บริการ FIT Auto



**NEW MG4 ELECTRIC ICON**

**1,598 คัน ภายใน 8 ชั่วโมง!**


กับยอดจองสูงสุดของ **NEW MG4 ELECTRIC ICON**

**Thai-US partnership to invest in EV tech**

*Egat International, Evolomo join forces*

PUBLISHED: 1 NOV 2022 AT 04:34

NEWSPAPER SECTION: BUSINESS WRITER: LAMONKSET.ASSETHAN



**EVOLOMO** **EGAT International**

**MOU signing ceremony**

27<sup>th</sup> October 2022

Ms Wu and Mr Bandit participate in a memorandum of understanding signing ceremony on a joint investment project on EV and clean energy-related

## GWM to double EV investment in Thailand

Yusin Hu, DIGITIMES Asia, Taipei | Wednesday 23 November 2022 | 0 | Like 0



Narong Sritalayon, managing director at Great Wall Motor (GWM) Thailand, told *Nikkei Asia* that the company plans to invest a total of THB22.6 billion (US\$62.5 million) in manufacturing EVs, EV parts, and EV infrastructure in Thailand.

The Chinese carmaker has invested THB12 billion in ramping up EV production in Thailand after acquiring an auto assembly plant from General Motors in 2020.

GWM Thailand's sales this year have beat forecast. According to *Nikkei Asia*, the Federation of Thai Industries projected EV sales to reach 10,000 units in 2022, but GWM Thailand has scored 11,796 units so far this year thanks to government subsidies.

GWM is now the biggest EV seller in Thailand, said *Nikkei Asia*. As for charging infrastructures, it expects to have a total of 12,000 fast-charging stations across Thailand by 2030.

# Cảm ơ n



Hiệp hội xe điện Thái Lan (EVAT)

Hiệp hội xe điện Thái Lan

<http://www.evat.or.th>

Điện thoại : +66 86 390 3339

Email: [contact@evat.or.th](mailto:contact@evat.or.th) (Liên hệ chung)

[member@evat.or.th](mailto:member@evat.or.th) (Tư cách thành viên)