Chantakorn David Chamsilp

FOUNDER & CEO
GRIDWHIZ (THAILAND) CO. LTD.

dave@gridwhiz.com

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PumpCharge Platform Contribution to Thailand's EV Charging Infrastructure

October 2020

Brief Introduction to GridWhiz - GridWhiz Milestones

www.gridwhiz.com

2012 2013 2014 2015 2016 2017 ..18...19

- Founded in Singapore
  GridWhiz Singapore Pte. Ltd.
  International Plaza, Singapore

- Registered in Thailand
  GridWhiz (Thailand) Co. Ltd. (Headquarters)
  Talingchan, Bangkok, Thailand

- GridWhiz Laboratory Inaugurated
  GridWhiz (Thailand) Co. Ltd.
  Ladkrabang, Bangkok, Thailand

- GridWhiz Laboratory : New headquarters
  GridWhiz (Thailand) Co. Ltd.
  Huai Khwang, Bangkok, Thailand

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Brief Introduction to GridWhiz - Areas of Expertise

www.gridwhiz.com

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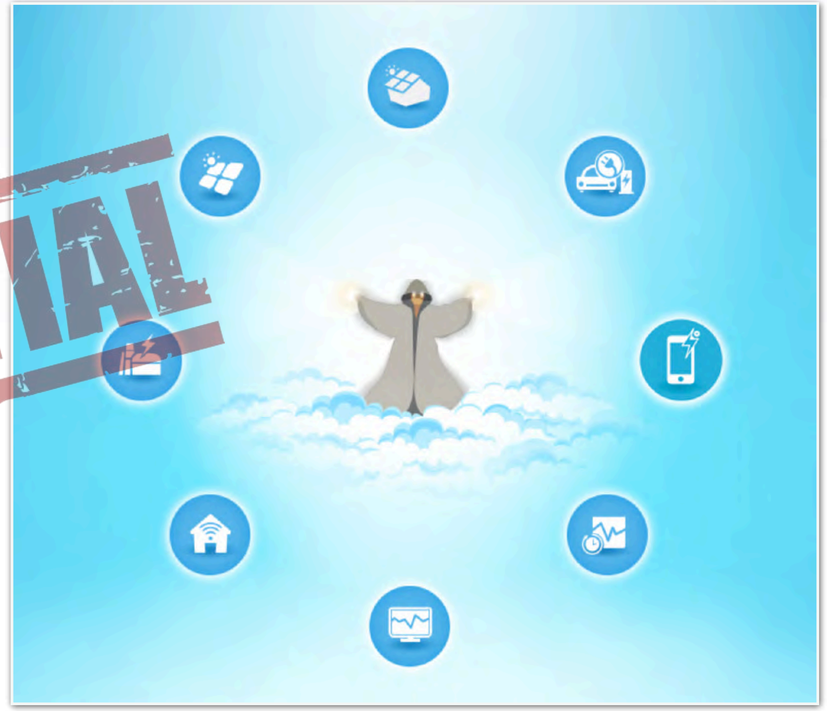
- Engineering Consultancy (Smart Grids)
- System Integration
- Blockchain Technology
- Real-time / Big-data Analytics
- AI / Machine Learning
- Software / application Developer : UX-oriented / User-centered Design

EXCLUSIVELY FOR **POWER & ENERGY** INDUSTRY

Brief Introduction to GridWhiz - Innovative Products

- **iSolarWhiz, iSolarWhiz-TM, iSolarWhiz-RT** : Real-time big-data analytics and visualization platform for large-scale photovoltaic power stations, ticketing system, O&M task manager, essential mobile application for roof-top PV system owners
- **iEnergyWhiz** : Energy-saving solutions for factory/ building owners
- **iHomeWhiz** : Wireless smart home (ZigBee) for next-generation home owners
- **iChargerWhiz** : Integrated electric-vehicle charging station network & **PumpCharge.com** platform
- Others - MicroEMS for Microgrids, IoTs for home/ building, RTDS for power applications, Applied ERP, etc.



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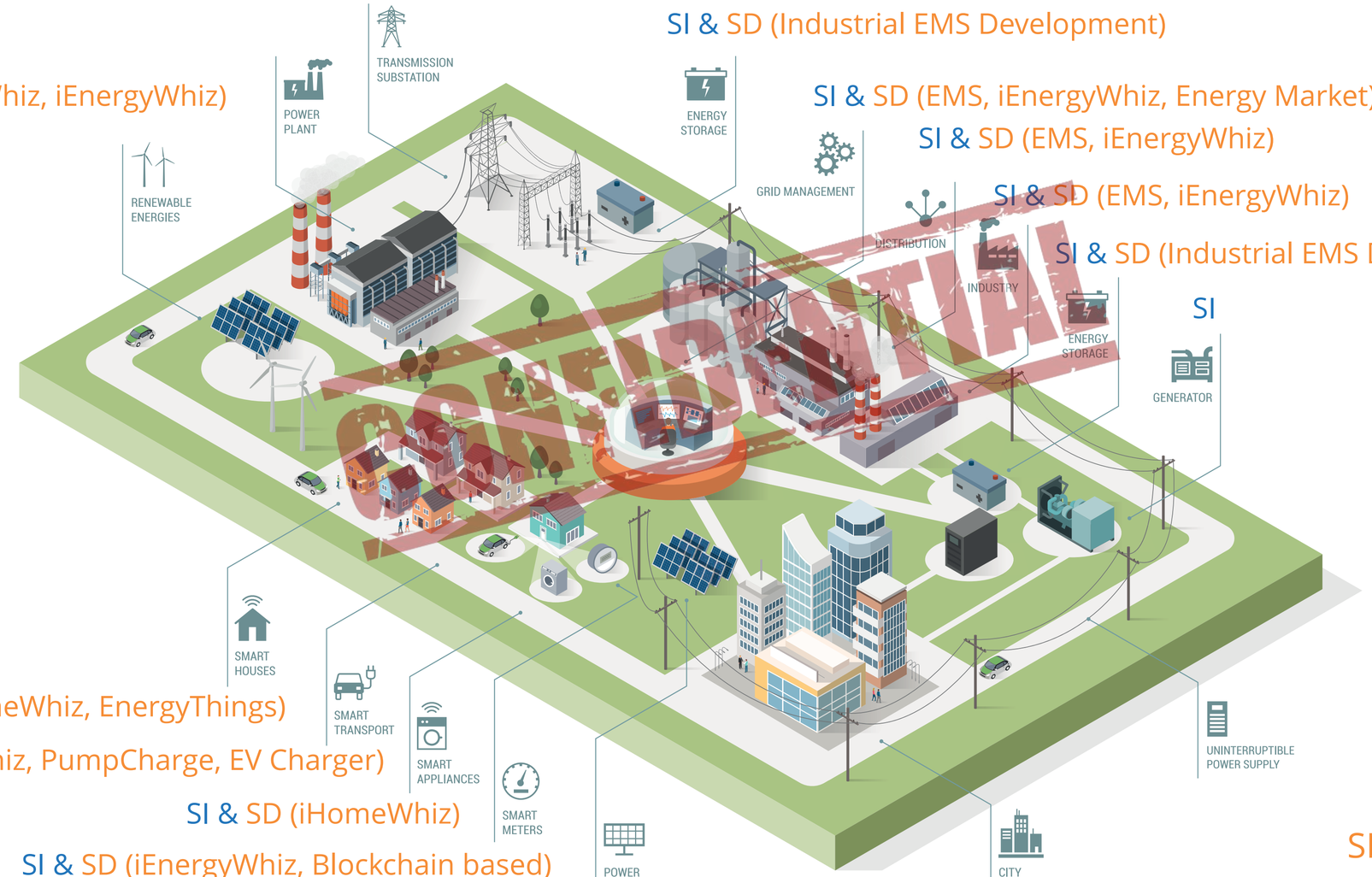
Smart Grids - Areas of Our Contribution

www.gridwhiz.com



SI & SD (Industrial EMS Development)

SI & SD (EMS, iSolarWhiz, iEnergyWhiz)

SI & SD (EMS, iEnergyWhiz, Energy Market)

SI & SD (EMS, iEnergyWhiz)

SI & SD (EMS, iEnergyWhiz)

SI & SD (Industrial EMS Development)

SI

SI & SD (iHomeWhiz, EnergyThings)

COMPLETE SD (iChargerWhiz, PumpCharge, EV Charger)

SI & SD (iHomeWhiz)

SI & SD (iEnergyWhiz, Blockchain based)

SI

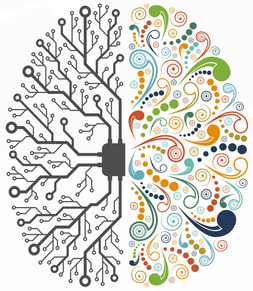
SI & SD (EMS, iEnergyWhiz)

SD = Solution Developer

SI = System Integrator

Business Opportunities Summary : Products & Services

Analytical



Creative

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www.pumpcharge.com

- Provide engineering designs with customization if needed

- Provide a normal charger (AC) ranging from 7kW - 43kW
- Provide a fast charger (DC) ranging from 50kW-150kW
- Provide a ultra-fast charger (DC) ranging from >150kW-400kW
- All chargers mentioned above could be under OEM or ODM contract
- Provide installation, commissioning, and maintenance services

- Provide PumpCharge platform for all 4 layers of operation e.g. for EV user, station owner or network operator, service provider or card issuer, and data analytics platform. (both cloud or dedicated platform)

Supported Types of EV Charging Stations

www.gridwhiz.com

	Private	*Local (Single group)*	*Partly-public (Time-vary, Location-based)*	*Public*
Slow Charger	(Mobile)	X	X	X
Slow/Normal Charger				
Quick Charger	(Portable)			(Up to 400kW)
Accessories	(Canopy)	(Stand)		

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Commercial EV Charger - Specification

www.gridwhiz.com

Portable Charger
(7kW)
650mm (W) x 300mm (H) x 450mm (D)

Mobile Charger
(3kW)

Home/Public Charger
(7kW)
*With or without cable, Wall or floor mounted

Standard Reel Charger
(1 x 7kW, 2 x 7kW)
Floor mounted

Fast Charger
(50kW - 200kW)
Floor mounted

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Commercial EV Charger - Specification

www.gridwhiz.com

Distributed Fast Charger
Charging Dispenser
(50kW-200kW)
Floor mounted

Distributed Fast Charger,
Powerbank
(400kW)
Floor mounted

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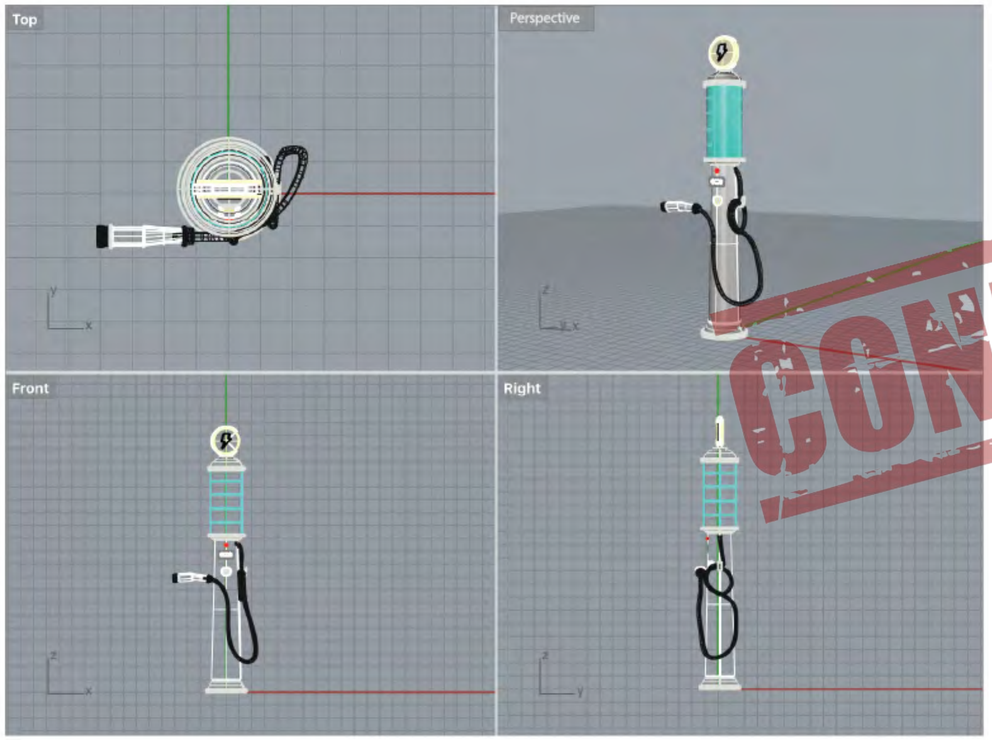
GridWhiz's Services - EV Charger Design and Fabrication

www.gridwhiz.com



EV Charger

EV Charger

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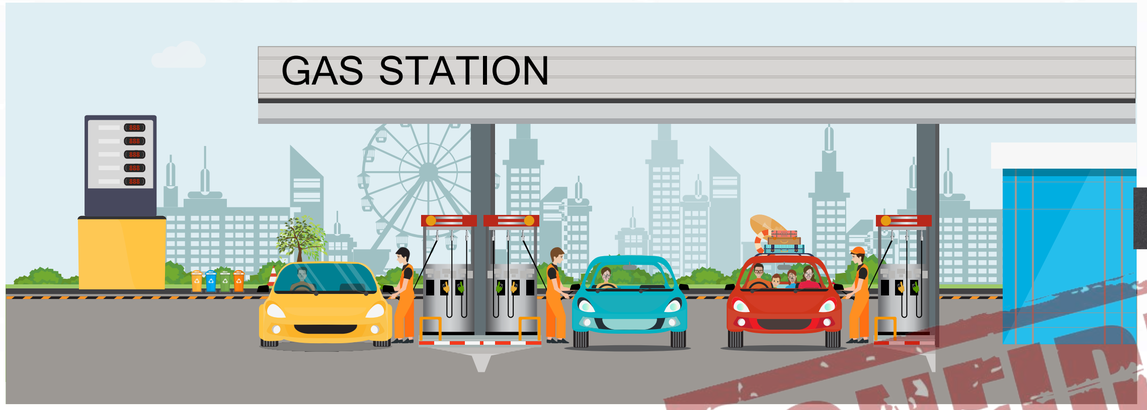
Charge Point Operator Services - Differentiation

PumpCharge Platform - Full Commercial Operation



- Manual payment process
- More on local services
- A driver sits in his/her car
- Short service period
- More attendants/people

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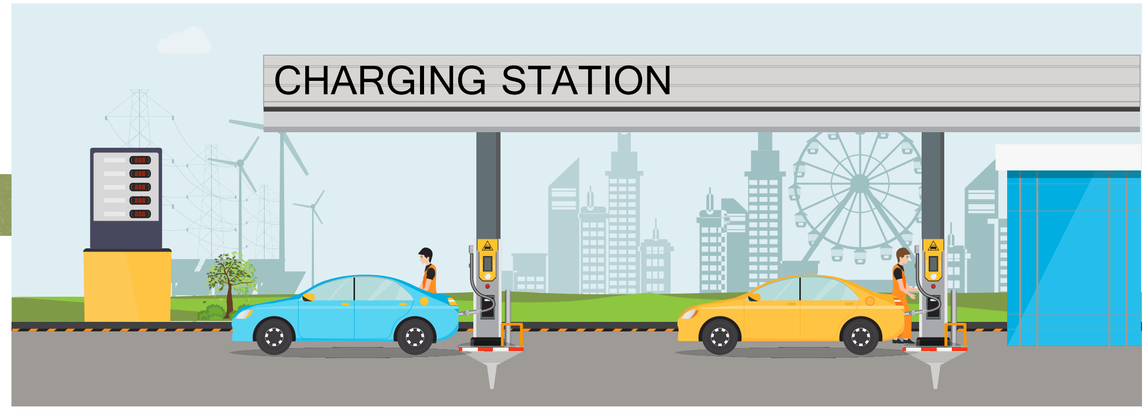
- Automatic payment process
- More on automatic transaction
- A driver leaves his/her car
- Long service period
- Less attendants/people or unmanned stations



GridWhiz's Innovative Product : www.pumpcharge.com

GO!

Will be launched in 2017

PUMPCHARGE

ค้นหาสถานีชาร์จไฟฟ้าที่ถูกใจคุณ

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- Thailand's first and largest EV charging communication network supporting all sorts of electric vehicles, hydrogen vehicles, and many more to come
- Dedicatedly designed for EV owners, station owners, network owners, and network operators

GridWhiz's Innovative Product : PumpCharge Key features

https://www.pumpcharge.com

Fast and easy charging steps

Special design of the management platform for all people concerned

Mobile applications at your service

Secured layers in data communication

Real-time/Near real-time data provided with various EV chargers Supported

PUMPCHARGE

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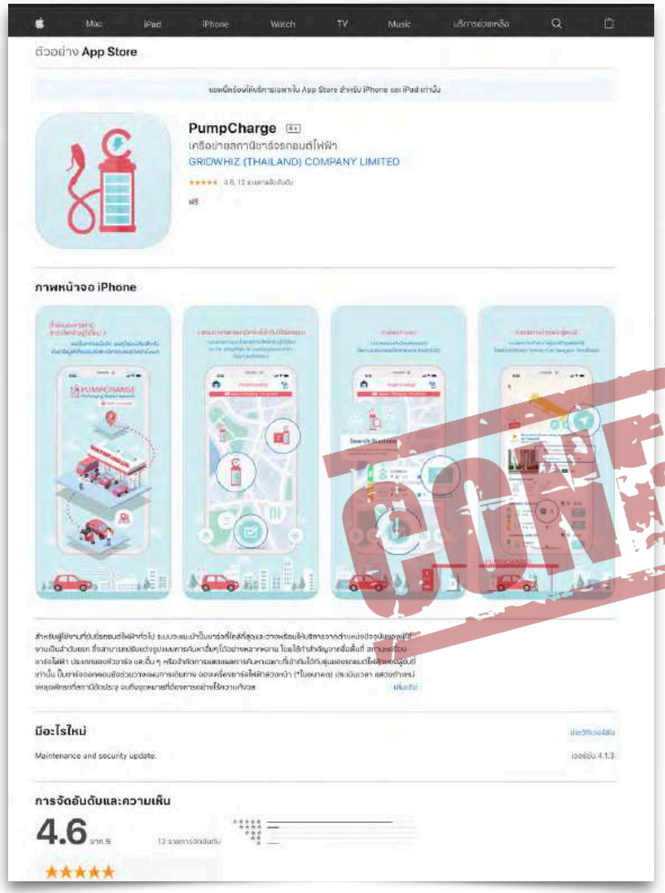
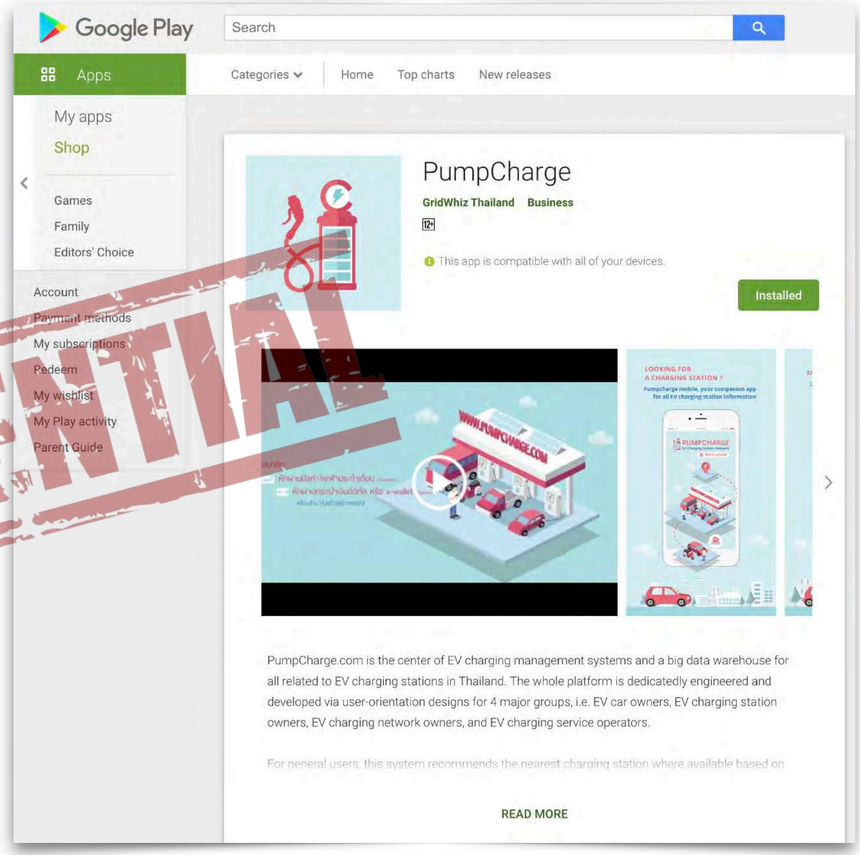
PumpCharge Mobile Application

www.pumpcharge.com





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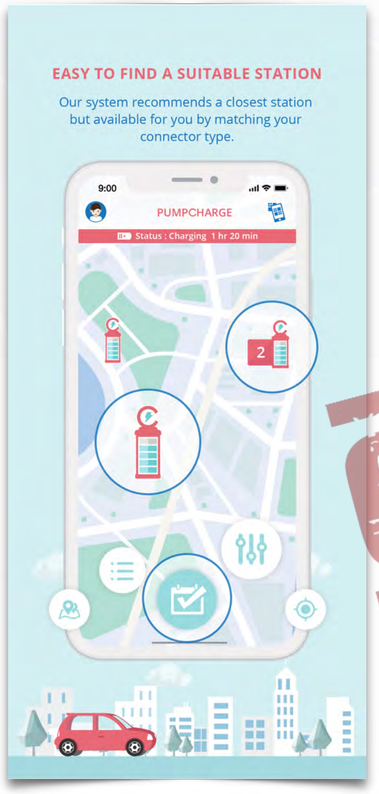
Available on the App Store

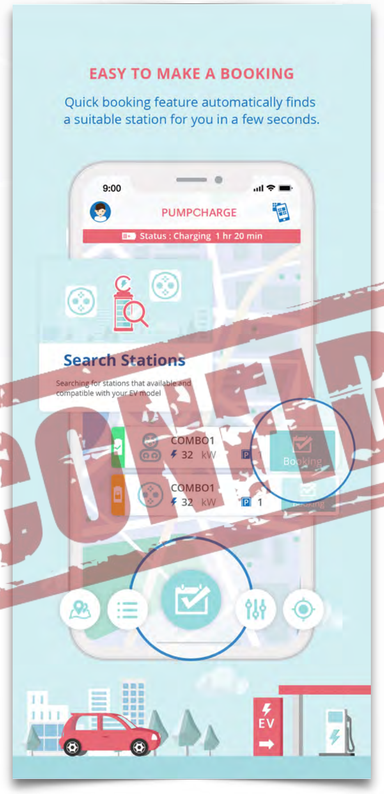
Available on Google Play

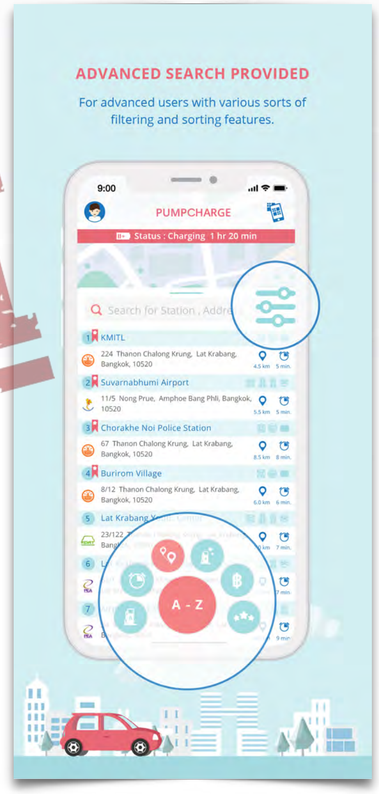
GridWhiz's Innovative Product : www.pumpcharge.com

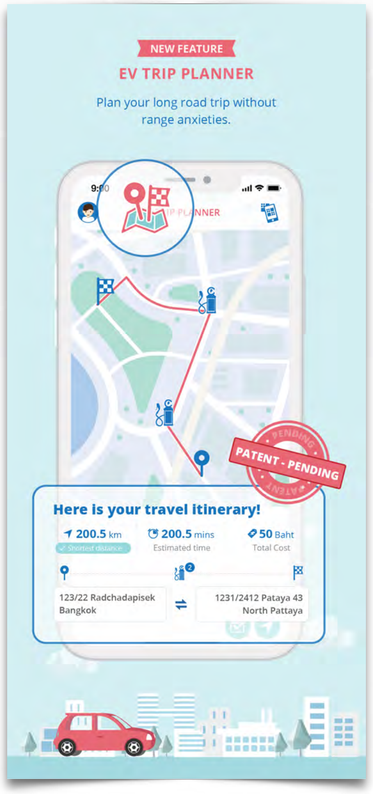
GO!

First launched in 2017









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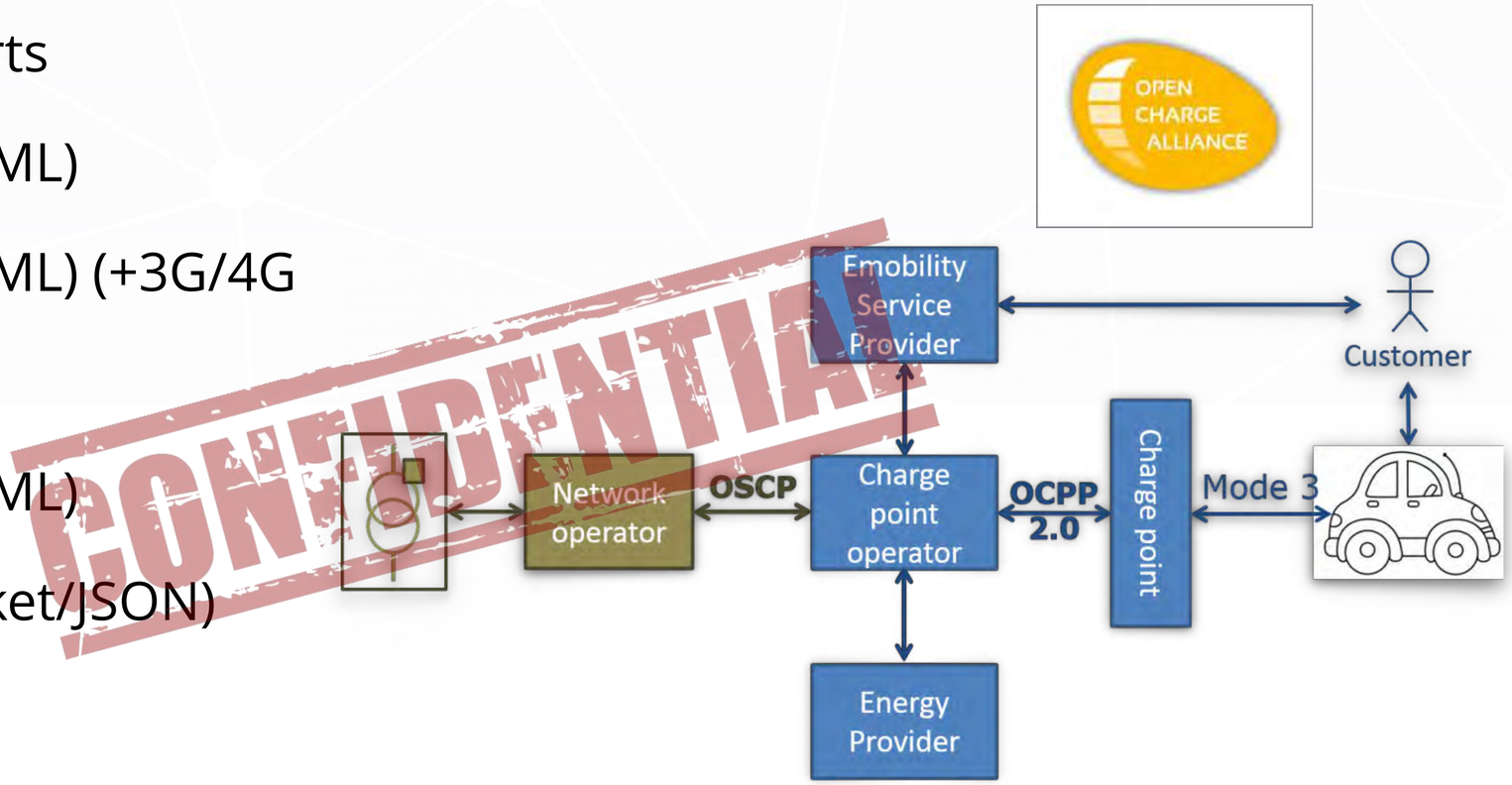
Available on the App Store

Available on Google Play

iChargerWhiz : Supporting Open Standards

For electricity authorities, operators, and other parties involved

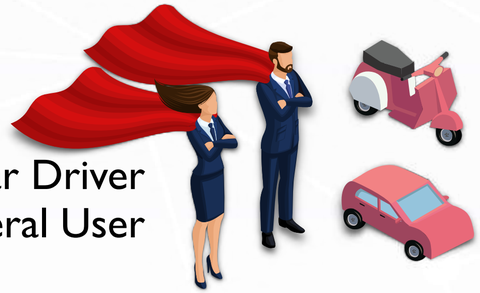
- iChargerWhiz supports
  - OCPP1.5S (SOAP/XML)
  - OCPP1.5S (SOAP/XML) (+3G/4G Module with SSL)
  - OCPP1.6S (SOAP/XML)
  - OCPP1.6J (Websocket/JSON) (ws:// & wss://)
  - OCPP2.0J (Under development)
- Support multiple brands of EV Chargers



***VPN & Firewall Enabled**

Wrap-ups : PumpChargeDotCom Platform

www.pumpcharge.com



EV Car Driver
General User

Station Owner
Network Owner
Charge Point Operator

eMobility Service Provider
Member Card Issuer

Analyst
Authorities
Government

https://www.pumpcharge.com
(2017-present)
+ Roaming Services (2020)

POS

https://cpo.pumpcharge.com
(2018-present)
+ Roaming Services (2020)

https://emsp.pumpcharge.com
(2019-present)
+ Roaming Services (2020)

https://analyst.pumpcharge.com
(2020 Q2-Q3)

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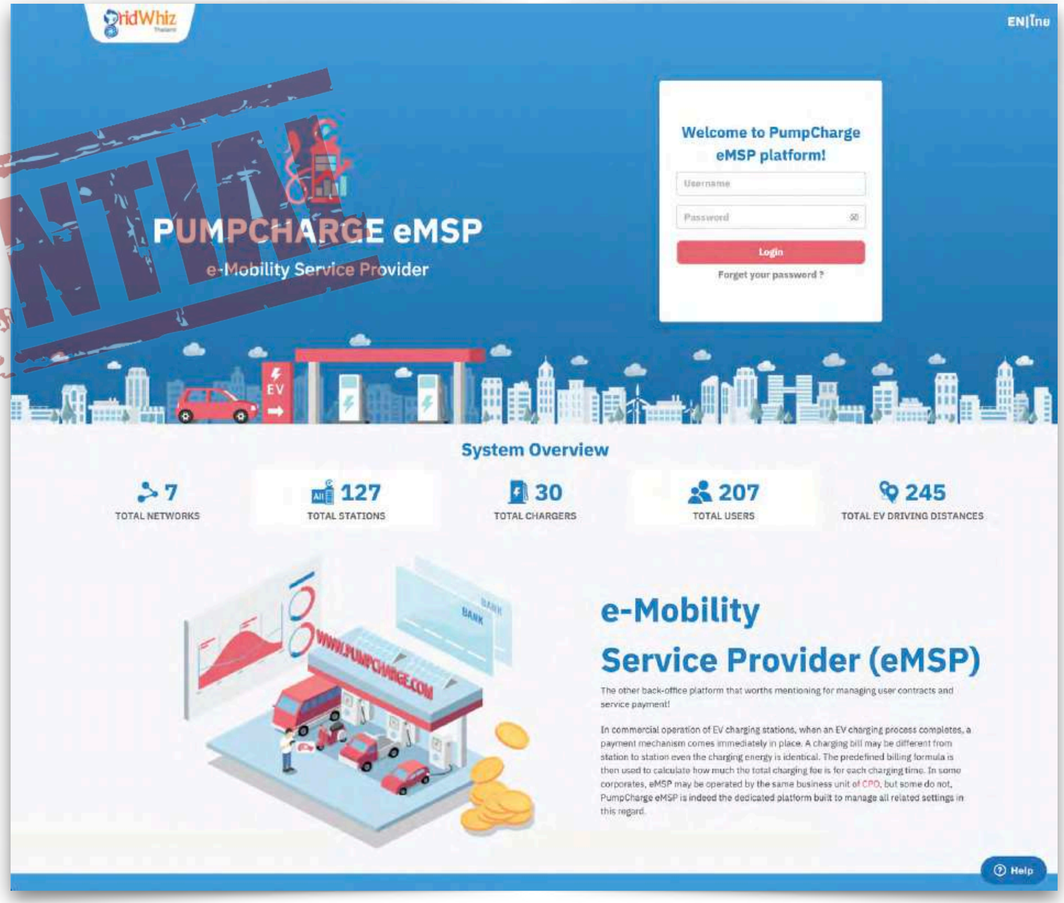
PumpCharge CPO & e-MSP

www.pumpcharge.com

https://cpo.pumpcharge.com

https://emsp.pumpcharge.com



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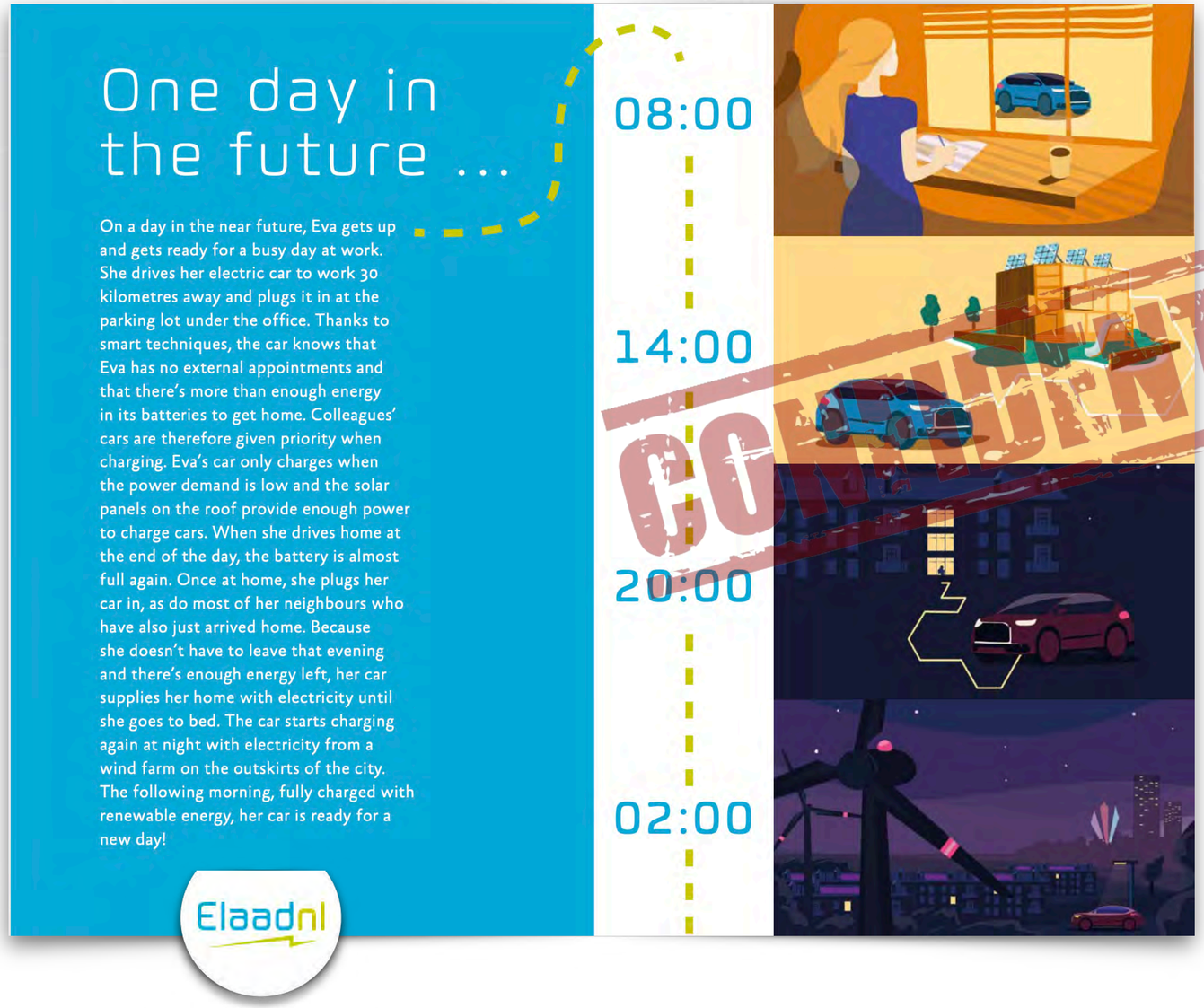
PumpCharge - Smart Charging Platform

www.pumpcharge.com



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- Bidirectional V2G operation
- CCS & CHAdeMO compatible
- Optional PV Input with MPP-Tracker
- V2G Home/Office Charger
- Industrial Battery Charger
- Smart Grid and Peak Shaving
- Integrated PumpCharge Smart Charging Platform e.g. Virtual Power Plant , Resource Aggregator

CHAdeMO

Station Owner - Preliminary Assessment

PumpCharge Platform - Full Commercial Operation

Station Owners

Private stations

- Property project
- Private community/club
- Member service center
- Office building
- Apartment/Hotel
- Temple
- etc.

Service

LOCAL PAYMENT

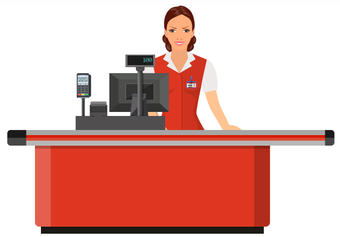
Partly-public stations

- Above-mentioned facilities
- Connected home chargers (Future)

***NOTES**

- The station is also accessible & operation-able for other EVs like passenger cars
- The on-line station is also available for public via PumpCharge mobile application

Service



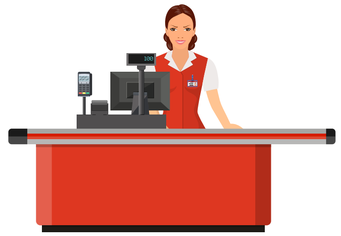
ONLINE PAYMENT or POS

* Or integration to existing ERP/payment system

Public stations

- Above-mentioned facilities
- Charging station
- Restaurant
- Coffee/gift shop
- Grocery store
- Massage center
- etc.

Service



ONLINE PAYMENT or POS

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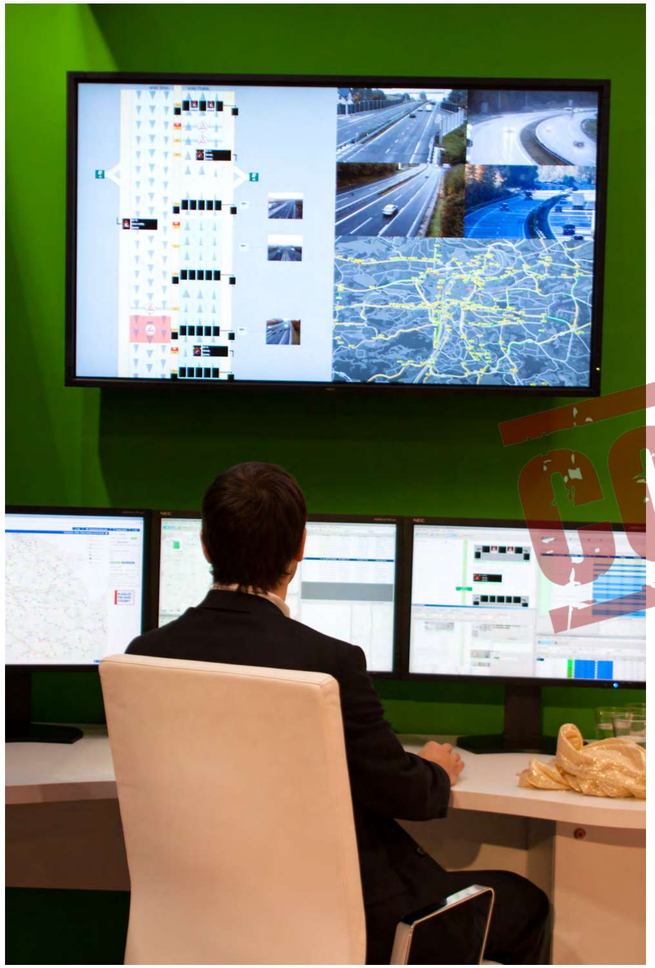
The 1st EV Charging Station Control Center in Thailand

By PumpCharge or partners



Goal : 100% Satisfaction Guaranteed

Network Operation Program, GPS with real-time status, Reporting Ticket Summary Report, etc.

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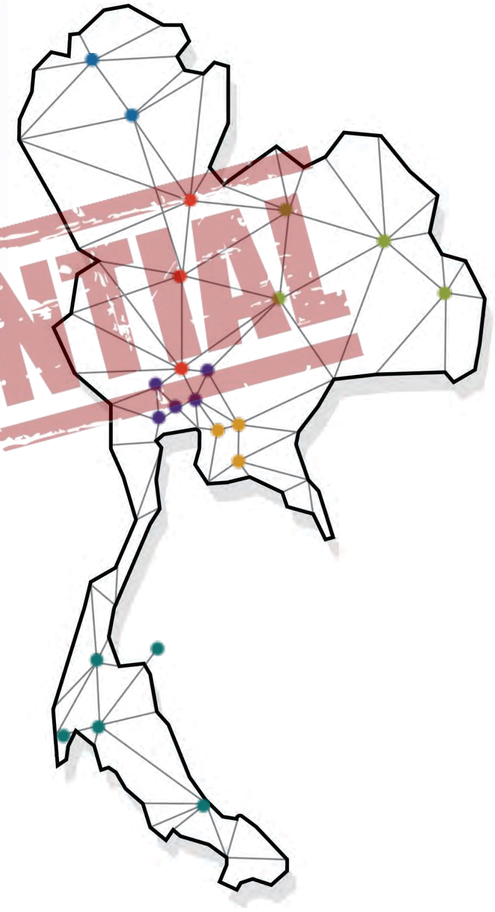
After Sales Services - 24/7 Supports

By PumpCharge support team and our partners

Northern Zone
2 Service Centers
- Chiang Mai
- Lampang

Central Zone
3 Service Centers
- Ayutthaya
- Nakhon Sawan
- Phitsanulok

Bangkok and Vicinity Zone
9 Service Centers
- Bangkapi
- Chatuchak
- Huai Khwang
- Nakhon Pathom
- Nonthaburi
- Rama 3 (HQ)
- Samut Sakhon
- Sumut Prakan
- Thonburi



Northeastern Zone
4 Service Centers
- Khon Kaen
- Nakhon Ratchasima
- Roi Et
- Ubon Ratchathani

Eastern Zone
3 Service Centers
- Chonburi 1
- Chonburi 2
- Rayong

Southern Zone
5 Service Centers
- Krabi
- Phuket
- Songkhla
- Surat Thani 1
- Surat Thani 2

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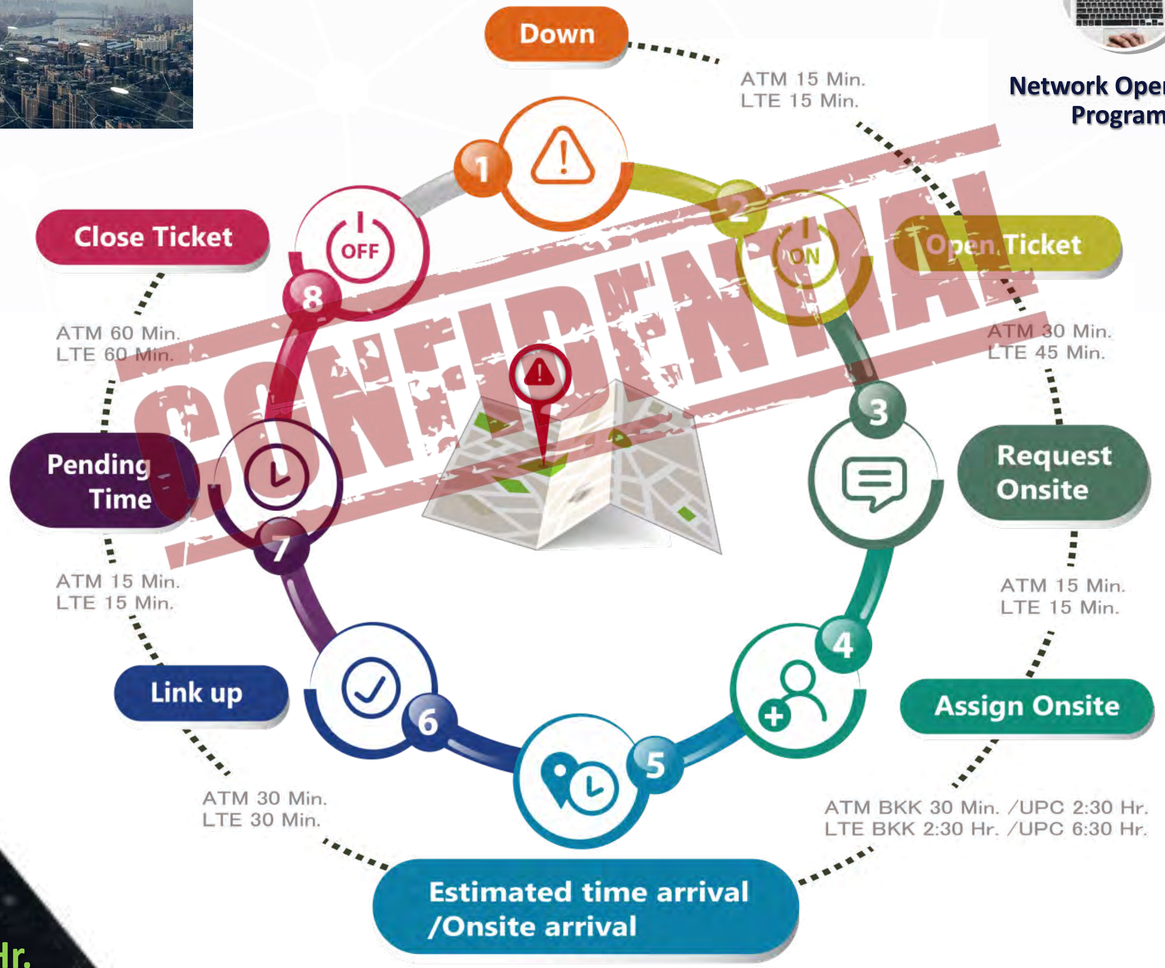
After Sales Services - 24/7 Supports

By PumpCharge support team and our partners

Network Operation Program

GPS with Tracking Service

Reporting



PROCESS
SERVICES

ATM (Bank) SLA : **BKK 2 Hr./UPC 4 Hr.**

LTE (Enterprise) SLA : **BKK 4 Hr./UPC 8 Hr.**

Electric Vehicle Outlook 2020

By BloombergNEF

Figure 5: Global annual passenger vehicle sales by drivetrain

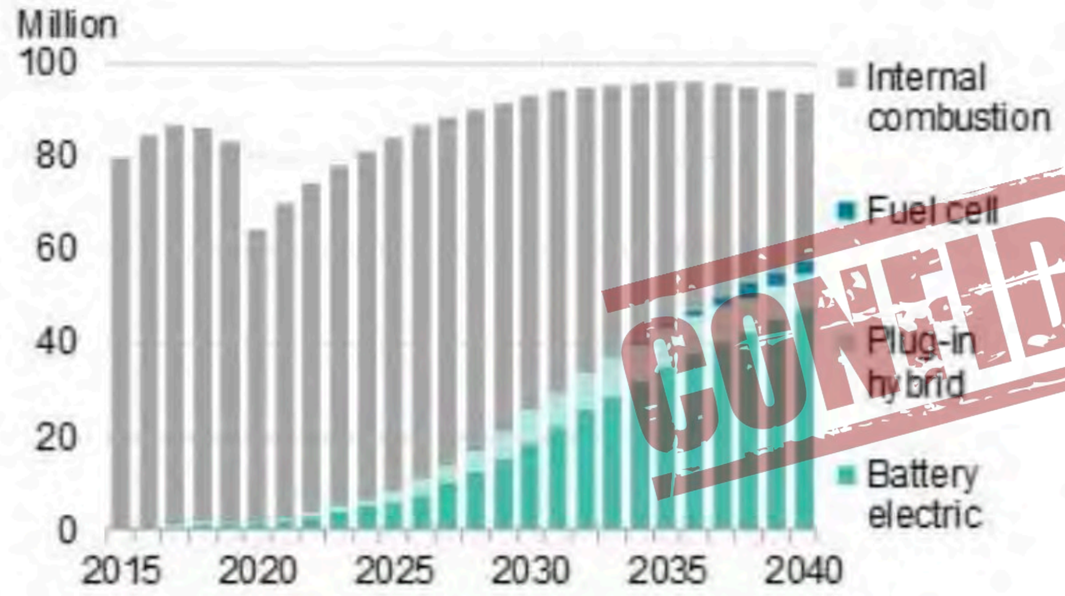
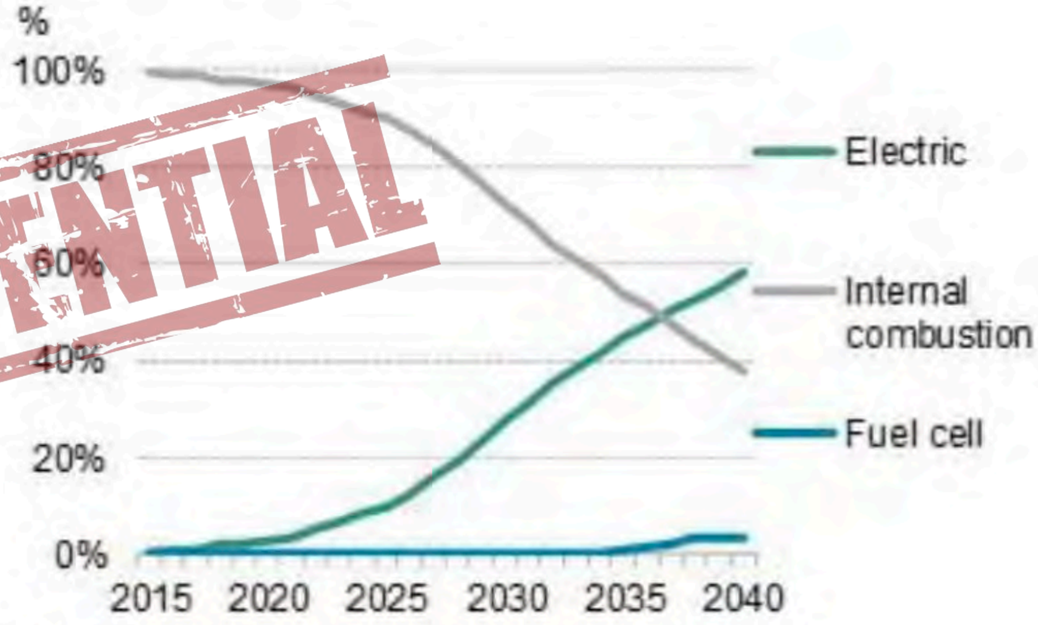


Figure 6: Global share of total annual passenger vehicle sales by drivetrain



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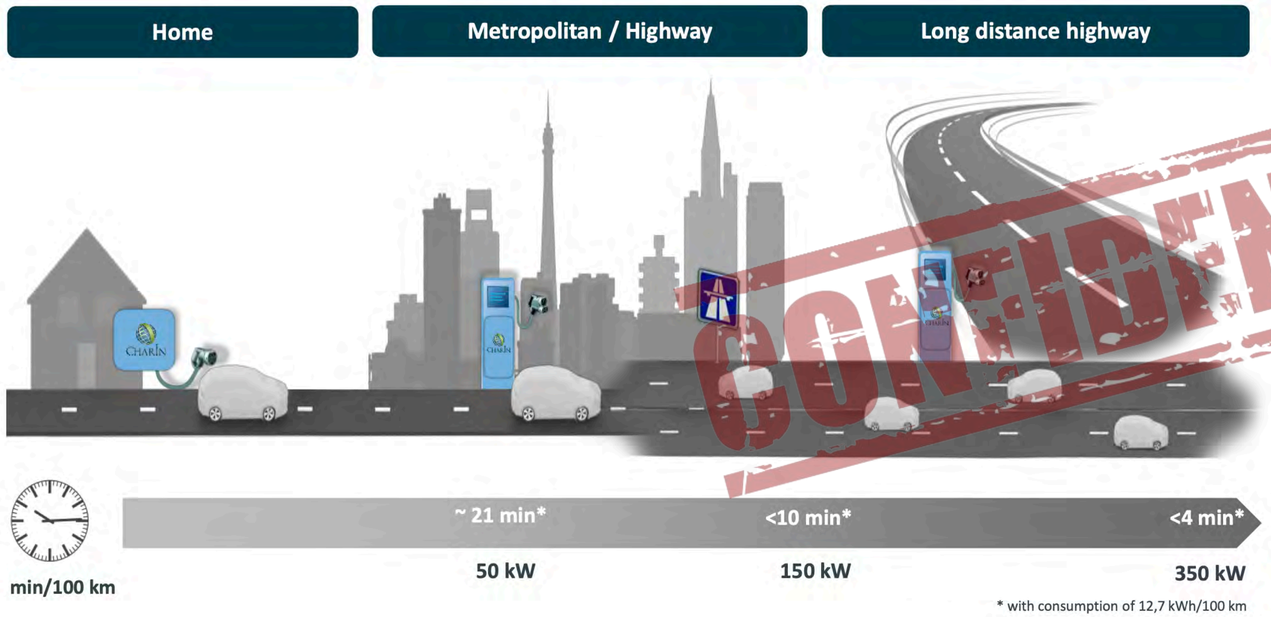
Source: BNEF. Note: Electric share of annual sales includes battery electric and plug-in hybrid.

"Despite the dip from Covid-19, shared mobility plays a growing role, reaching 16% of all road kilometers traveled in 2040, from around 5% in 2019."

Electric Vehicle Outlook 2020, BloombergNEF

EV Charging Scenarios

For both normal and quick charge



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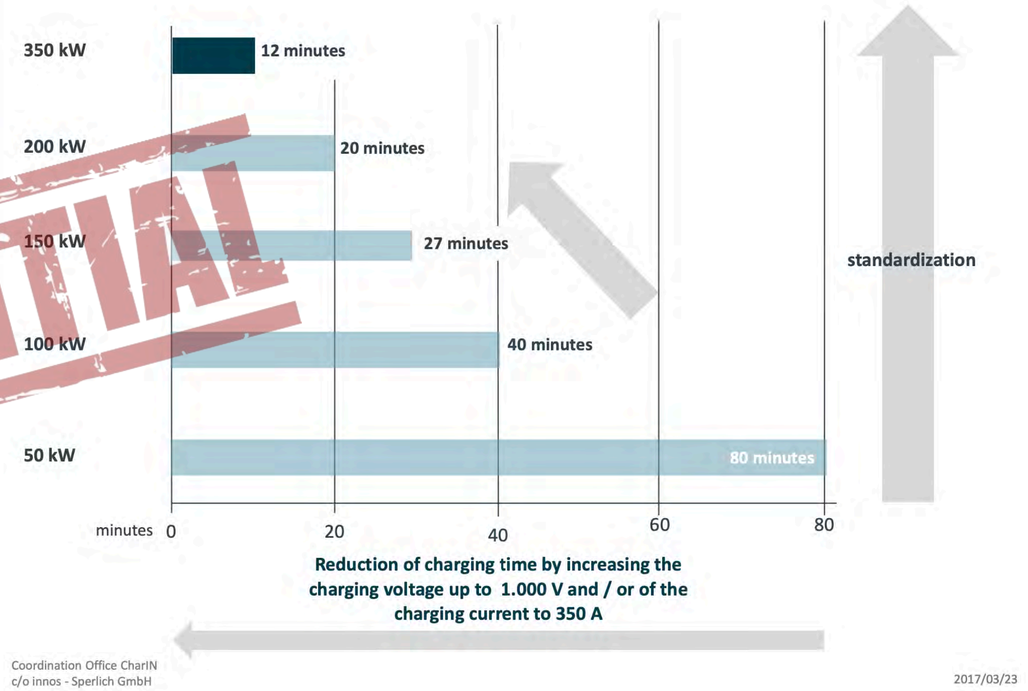


Coordination Office CharIN
c/o innos - Sperlich GmbH

2017/03/23

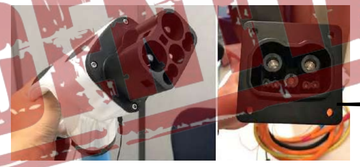
CHARIN

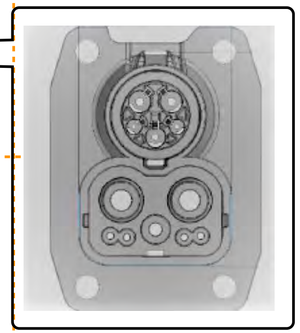
Standardization – perspectives for CSS

Charging times for about 400 km range

EV Charging Standard Summary - Ultra-charge

Thailand Adaptation

	FAST	HIGH POWER	HIGH POWER (>1MW)
Global	CCS ISO15118 (PLC)	CCS ISO15118 (PLC)	?
Japan	CHAdeMO 11 Bit (CAN)	ChaoJi  11 Bit (CAN)	?
China	GB/T 29 Bit (CAN)	ChaoJi 29 Bit (CAN)	?
Thailand	?	?	?



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Ref.CharIN, CHAdeMO, CCS, TeslaMotoClub,TUDelft

Domestic Standard or International Adoption ?

Thailand Adaptation

NEWS

Tesla updates Model S/X charge port to support China's charging standard

By Gene

Posted on October 16, 2017

Tesla has made good on its pledge to support domestic charging standards in China, which arguably has been a barrier to sales for the California electric car maker in the world's largest auto market. The company announced on Monday that a modified version of the Model S and Model X with a new charge port design will be sold in China that supports the country's GB/T DC fast charging standard.

The China-only version of the Model S and Model X features a new charge port door that resembles a gas tank door and replaces Tesla's ubiquitous motorized charge port door that's discreetly tucked away into the vehicle's rear taillight housing. Tesla will be **providing free charging adapters** to customers that own the earlier versions of the Model S and Model X without the newly integrated GB/T charge port.

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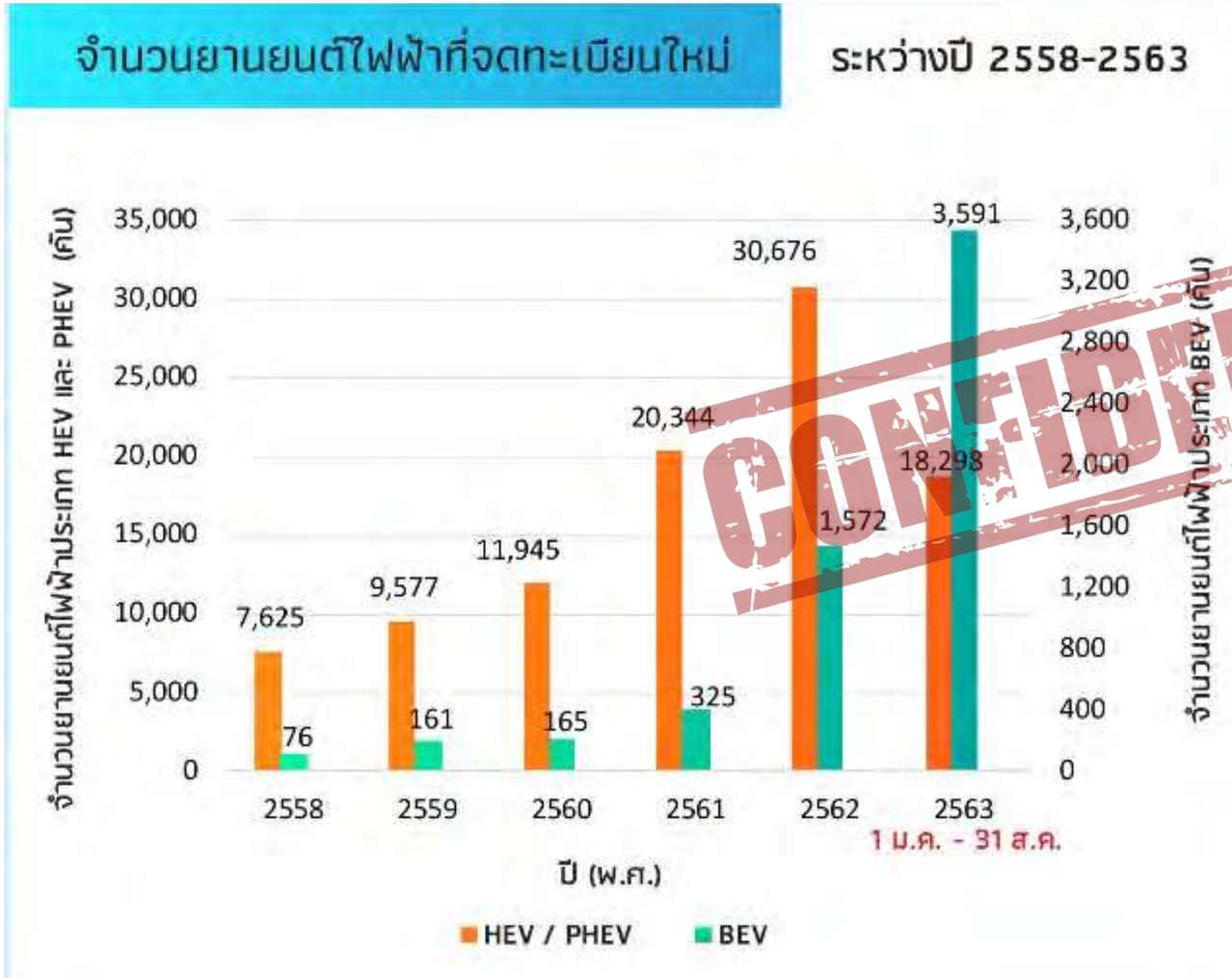
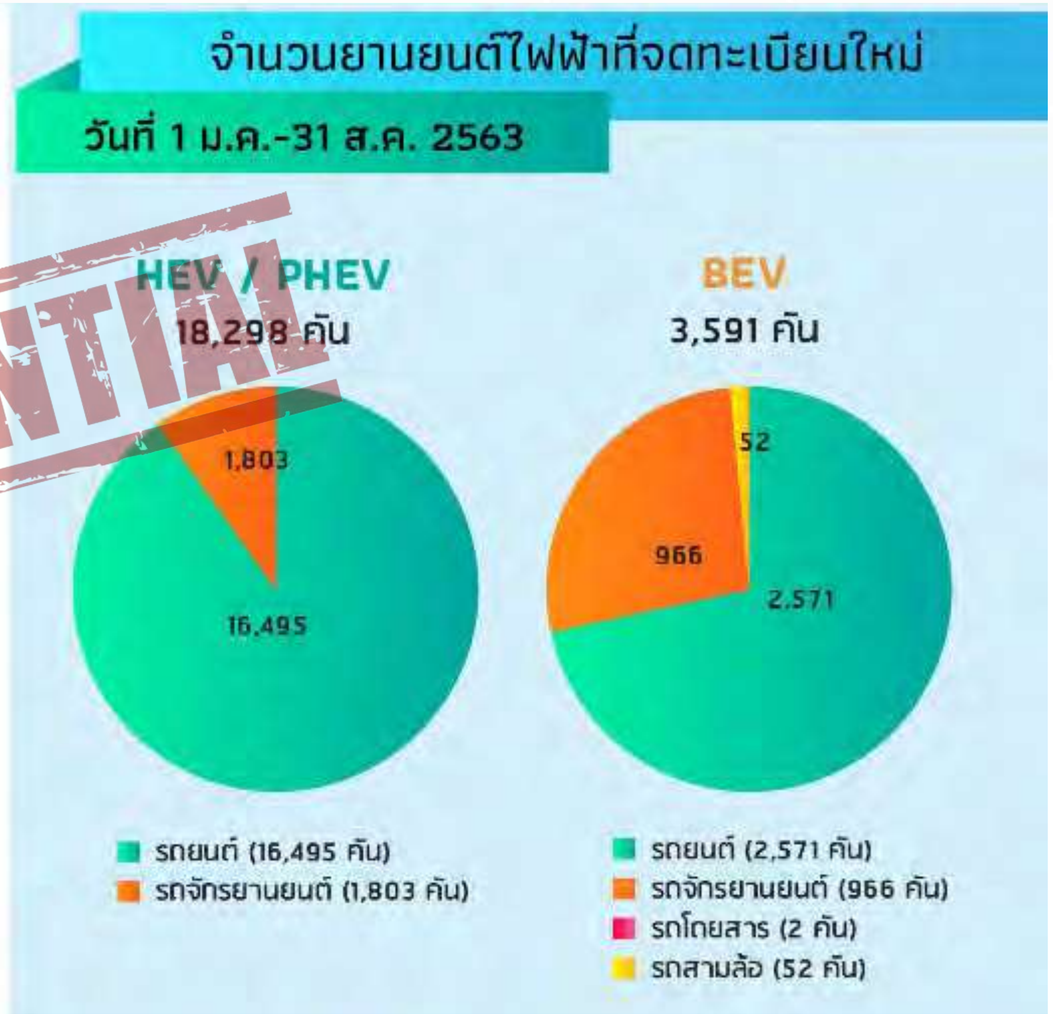
Ref. https://www.teslarati.com/tesla-udpates-chargeport-china-gb-t-charging-standard/

Ref. GridWhiz

Cumulative EV Registration in Thailand

By Department of Land Transport





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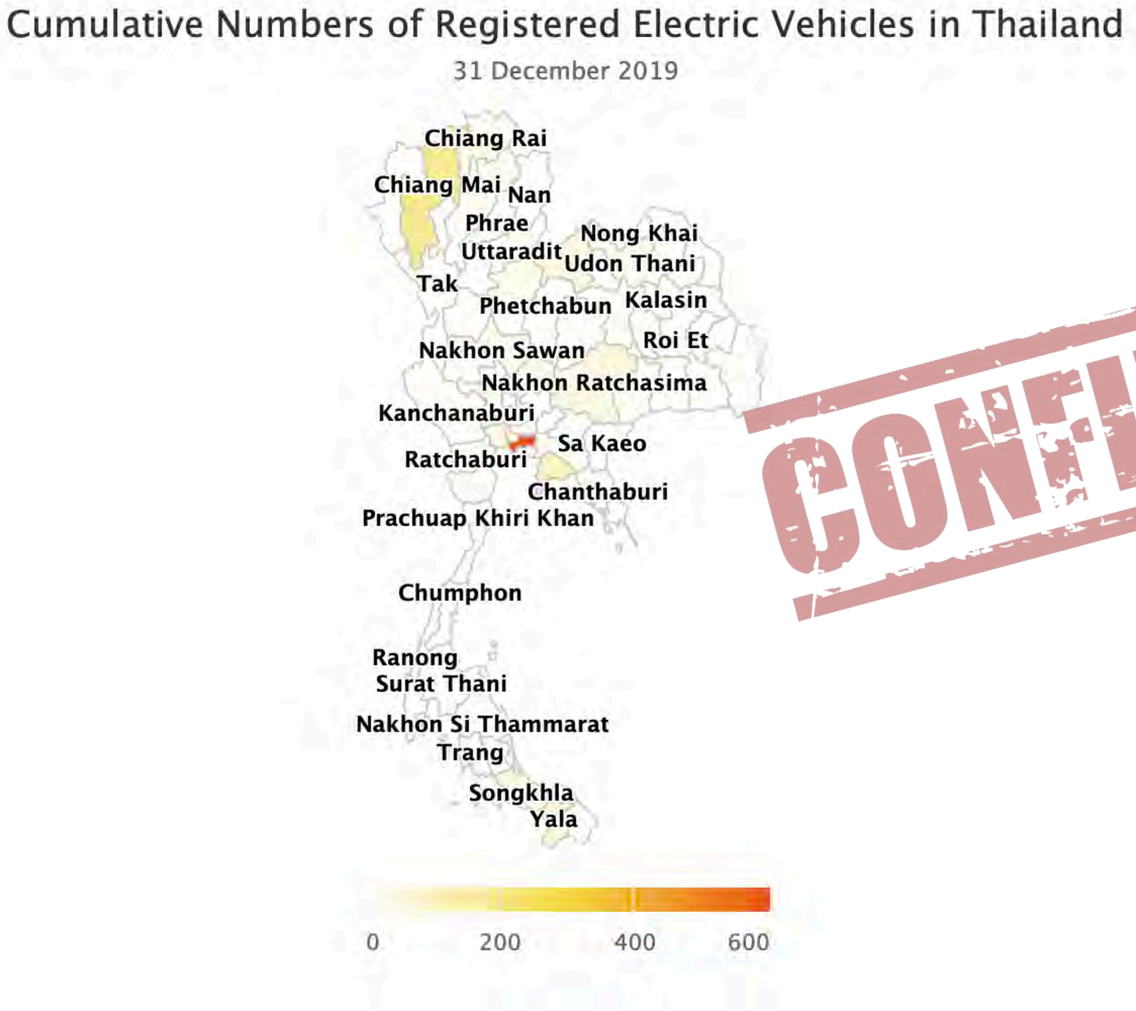
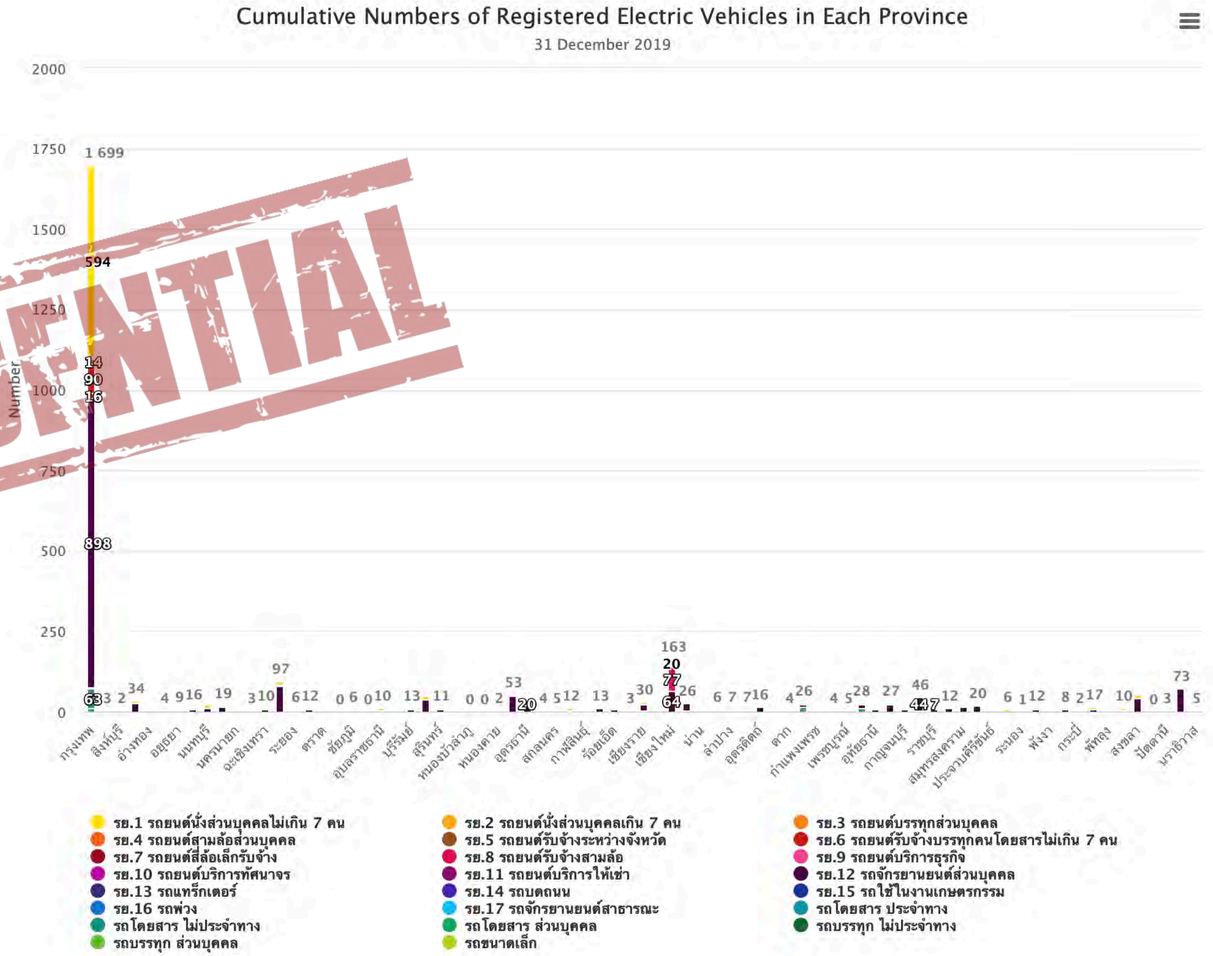
Cumulative Numbers of Registered EVs in Each Province

By Department of Land Transport





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Thailand's BEV Market - Brands and Models

As of June 2020

ELECTRIC VEHICLE ASSOCIATION OF THAILAND

สรุปรุ่นรถยนต์ไฟฟ้า BEV ที่มีจำหน่ายในประเทศไทยปี 2020

Summary of Battery Electric Vehicle Models in Thailand

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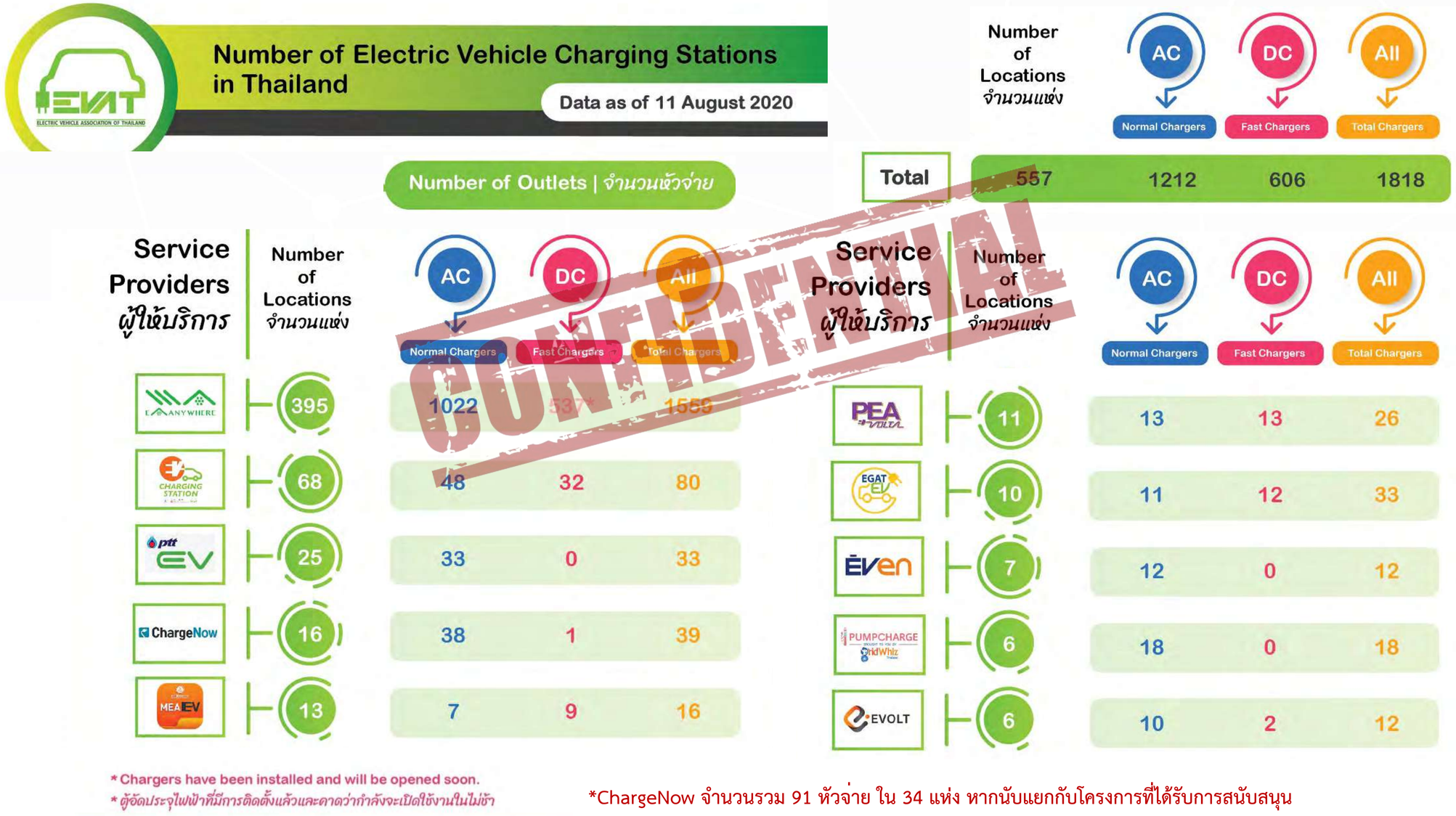
	Audi e-tron 55 quattro	BMW i3s	BYD e6	BYD M3, T3	Foom ONE	Hyundai KONA Electric	Hyundai IONIQ Electric	Jaguar I-PACE	Kia All-New Soul EV	MG ZS EV	MINI Cooper SE	Nissan LEAF	TTE 500
ประเภทหัวชาร์จ Socket Type	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2	AC Type 2	AC Type 2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 1 & CCS1	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 1 & CHAdeMO	AC Type 2
ระยะทางวิ่งสูงสุด EV Range (km)	417	280	400	300	160	312 (SE) 482 (SEL)	280	470	452	337	217	311	100
ขนาดแบตเตอรี่ Battery Size (KWh)	95	33	80	50.3	11.8	39.2 (SE) 64 (SEL)	28	90	64	44.5	32.6	40	11
ประเทศที่ผลิต Country of Origin	Belgium	Germany	China	China	Thailand	South Korea	South Korea	United Kingdom	South Korea	China	United Kingdom	Japan	Thailand
ภาษีนำเข้า Import Tax	80%	80%	0%	0%	-	40%	40%	80%	40%	0%	80%	20%	-
ภาษีสรรพสามิต Excise Tax	8%	8%	8%	8%	0%	8%	8%	8%	8%	8%	8%	8%	0%
ราคาขาย Retail Price (Baht)	5,099,000	3,730,000	1,400,000	1,089,000 [M3] 1,059,000 [T3] 5 Seat 999,000 [T3] 2 Seat	664,000	1,849,000 (SE) 2,259,000 (SEL)	1,749,000	5,499,000 (S) 6,299,000 (SE) 6,999,000 (HSE)	2,387,000	1,190,000	2,290,000	1,490,000	438,000
ข้อมูลเพิ่มเติม More Info													

Thailand's Charge Point Operators

As of August 2020



*ChargeNow จำนวนรวม 91 หัวจ่าย ใน 34 แห่ง หากนับแยกกับโครงการที่ได้รับการสนับสนุน

EVs and Charging Station Ratios in Thailand

As of September 2020

0.21

Stations/EV

0.69

Chargers/EV

0.23

Quick Chargers/EV

557 Stations

2,625 EVs

(Excluding Electric Motorcycles)

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Key consideration 1 - charging stations

Current government **plan of public charging infra is not sufficient** to meet EV target; hence, it will require support from private sector

Number of Public Chargers / 1,000 BEV Units

(Unit: # Chargers / 1,000 BEV)

Source: Ministry of Energy, Thailand and IEA, 2017

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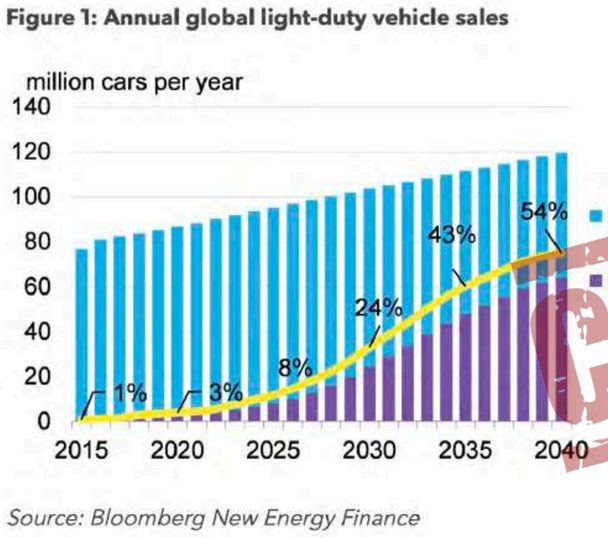
Global Markets and Possibilities in Thailand

By BloombergNEF

การเติบโตในประเทศไทยช้ากว่าต่างประเทศ 5 ปี



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The Growth of Electric Vehicles vs Total Cars

The number of total vehicles

1.2M ภายในปี 2573?

การเพิ่มขึ้นอย่างก้าวกระโดดจากการสนับสนุนอย่างเต็มที่

EV Forecast

การเพิ่มขึ้นจากการสนับสนุนเบื้องต้น

24% (240k)

8% (80k)

3% (30k)

1% (10k)

การเพิ่มขึ้นตามสภาวะความนิยม โดยปราศจากการสนับสนุน

1.0m
0.75m
0.5m
0.25m

31 ธันวาคม 2556
30 มิถุนายน 2557
31 ธันวาคม 2557
30 มิถุนายน 2558
31 ธันวาคม 2558
30 มิถุนายน 2559
31 ธันวาคม 2559
30 มิถุนายน 2560
31 ธันวาคม 2560
30 มิถุนายน 2561
31 ธันวาคม 2561
30 มิถุนายน 2562
31 ธันวาคม 2562
30 มิถุนายน 2563
31 ธันวาคม 2563
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31 ธันวาคม 2577
30 มิถุนายน 2578
31 ธันวาคม 2578
30 มิถุนายน 2579
31 ธันวาคม 2579

2020 2025 2030 2035

Date

THANK YOU

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