

新南向布局經驗分享

創奕能源科技股份有限公司
Tron Energy Technology Corporation



Eric Chiu 丘為臣

VP of Tron Energy Technology Corporation 創奕能源科技股份有限公司

Background:

- Experience of Computer Engineering (1987-2007)

Experience in Electric Vehicle and Battery :

- Experiences of electric vehicle and battery system since 2008
- EV System Integration of 4/7/8/9/12 meters electric bus since 2011
- Development of 4 meters and 6 meters autonomous bus for POC since 2018
- International EV business development for tender project and JV company setup in Singapore, India, Indonesia, Malaysia and Thailand since 2018
- Product marketing of battery energy storage system (BESS) since 2021

Electric Bus Total Solution

Electrification

Connection

Automation



Tron Energy Technology Corporation
創奕能源科技股份有限公司

Company Profile

Tron Energy Technology Corporation

Tron-e History and Milestones



Tron Energy Technology was founded in 2011, with primary focus on R&D and production in the green energy industry.

Cathode Material > Battery System > Electric Bus > Autonomous Bus > Energy Storage System.



Set up



Telecom Base Station UPS



Electric Bus

12M Low Floor



EV Bus Market Share NO.1 in 2018

8.8 M Low Entry



Autonomous Bus

4M & 6M Autonomous



Tow Tractor



LFP Cathode Material






Battery System

Giga Storage /Giga Solar
(Strategic Investor)

Energy Storage System

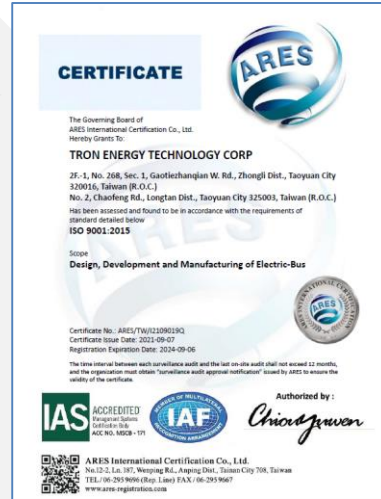
Green Energy Industry Layout



Material	Battery Pack System	Electric Bus	Autonomous Vehicle
Giga Storage 國碩 Giga Solar 碩禾 (Solar Power)	Mintron Energy 明創能源 (Battery System)	Tron Energy 創奕能源 Taiwan	Turing Drive 台灣智駕 (Autonomous Solution)
Long Time Tech. 榮炭 (Anode Materials)	Tron Giga Energy 創碩能源 (Battery System)	Somboon Tron Energy Thailand 	
Green Energy Electrode 芯和 (Cathode Materials)	Shuoitai Green Energy 碩奕太 (Peak Shaving, Demand- Response)	Tron Bradbury Energy Malaysia 	
	Bradbury Energy 源盛聚 (Solar Power, EV Charging, Frequency Control)	Tron Bradbury Energy Singapore 	
		Twin Green, Taitron Energy India 	
		WinTron Indonesia 	

Manufacturing and RD Center, Taiwan

Headquarters and factory located in Taoyuan City, Taiwan, tron-e consists of management pros from high-tech industry and battery R&D teams with more than a decade of experience.



Production Capacity : 300 EV Buses + 300 Electric Bus Chassis

Factory No.1



Factory No.2



Products and Services – One Stop Solution

- Electric Bus
- Battery Pack
- Energy Storage System
- Autonomous Bus
- Smart Transportation
- Micro Grid



Features of Tron-e EV Buses



Self Develop BMS and Patented Liquid Cooling Battery System

Longer battery lifespan, Safety and Reliability
NREL: Lifespan degrade to half every 10 degree higher

Cloud Based EV Bus Fleet Management System

Real time monitoring and big data to provide preventive maintenance decision and R&D improvement

Best EV Bus Availability

Tron-e EV buses total operation mileage over 21,000,000 km
In 2018, our market share jumped to No.1



Innovative Autonomous Technology

Operating 6 Autonomous Buses (4M & 6M) for 5 Government Pilot Projects in Taiwan

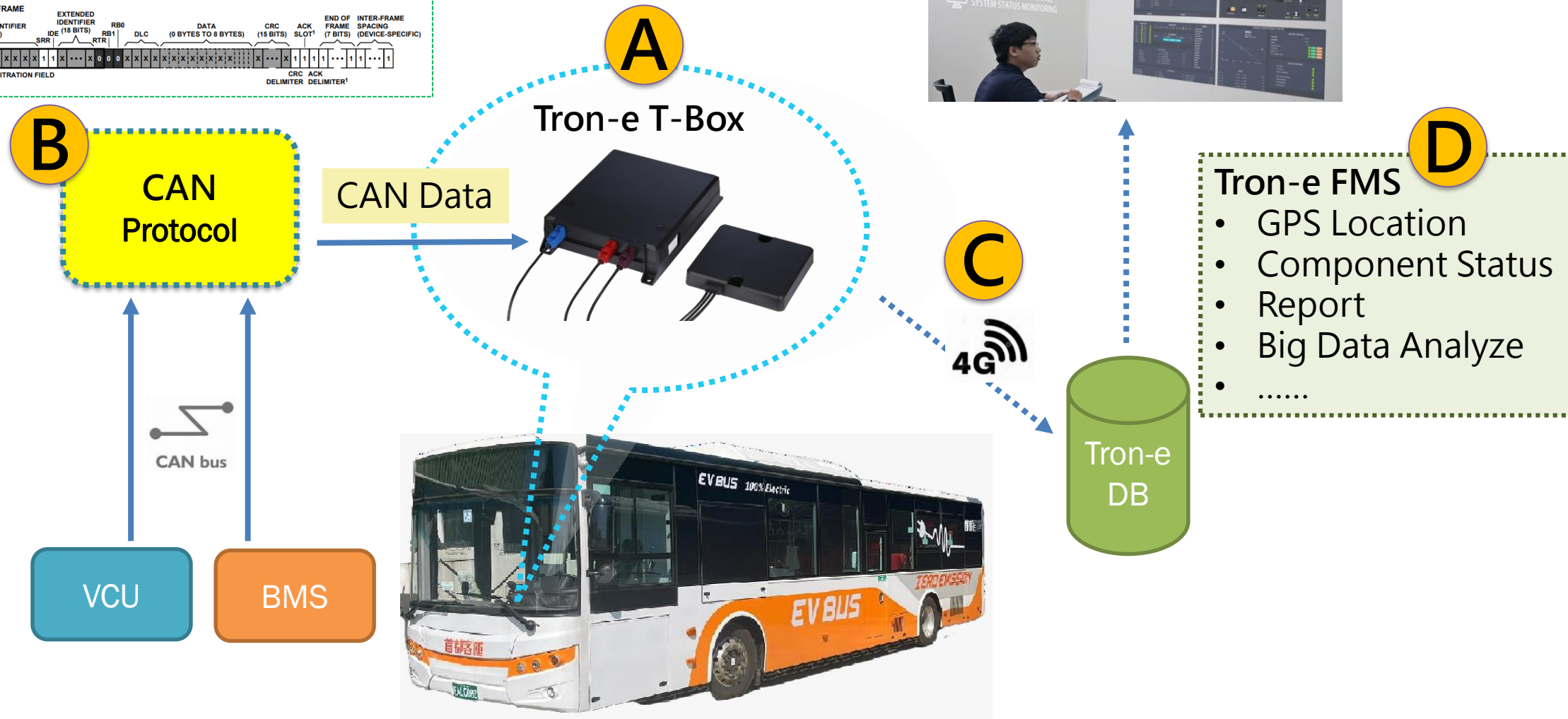
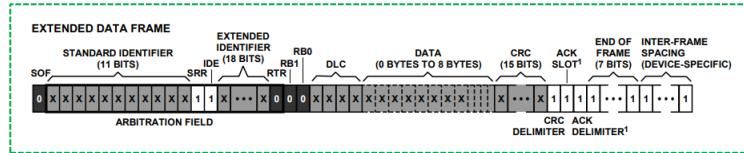
Best Energy Efficiency

Tron-e EV-bus consumption is 20% better than competitor (12 Meter) :
Tron-e: 0.9~1.0 vs Competitor: 1.2~1.3 (kwh/km)

In Time After-Sales Service

Self-developed key technology of the battery packs, experienced after-sales service team (Availability over 99.5%)

Advantage - Fleet Management System (FMS)



Advantage - Fleet Management System (FMS)

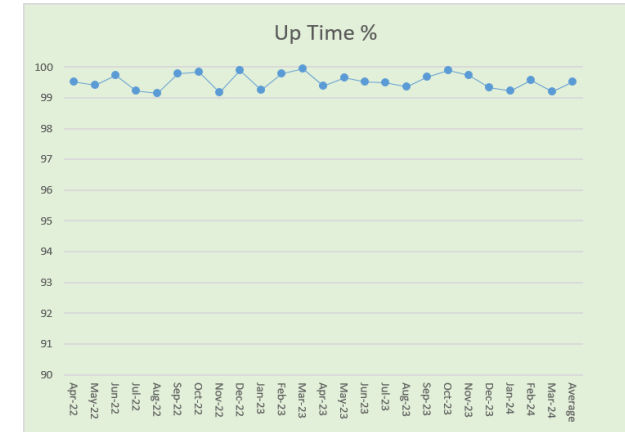
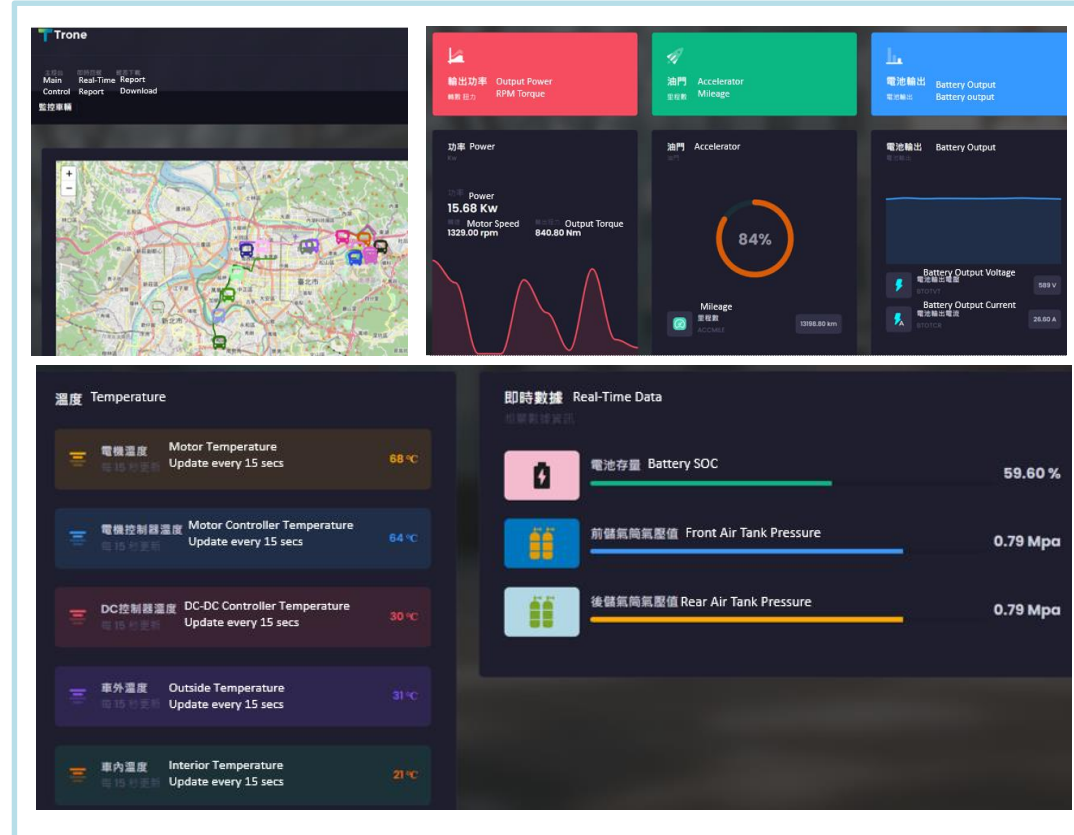
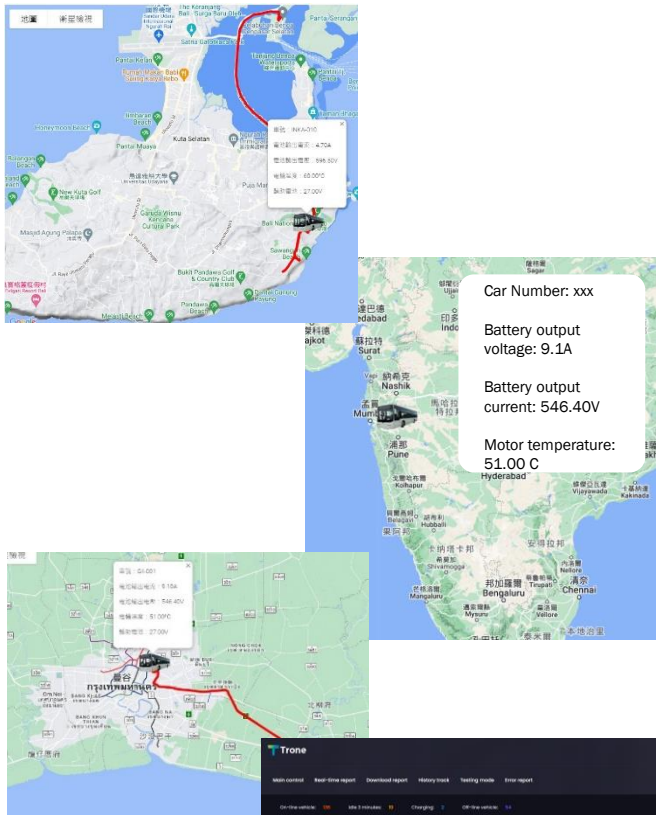


The self-developed battery management system (BMS) and fleet management system (FMS) can offer real time status monitoring of battery and other key components and thus made our electric bus availability up to 99.5%.

Worldwide Real Time Monitoring

Decision of Preventive Maintenance

Best Reliability



General report

VEHICLE PLATE	BATTERY CHARGE CURRENT (A)	BATTERY OUTPUT (Watt)	SOC(%)	TEMPERATURE (MOTOR)	TEMPERATURE (MOTOR CONTROLLER)	TEMPERATURE (DC-DC)	TEMPERATURE (OUTSIDE)	TEMPERATURE (INTERIOR)	VEHICLE SPEED (km/h)	DRIVING ROUTE	TIME	ACTION
BAK-0000	23.90	998.10	83.0%	67.00	27.00	2.73	31.88	21.00	11.00	10202/10204	10/20/24	+
EAK-0076	NA	NA	NA	NA	NA	NA	NA	NA	0.00	10202/10204	10/20/24	+
EAA-006	45.80	995.50	83.0%	67.00	27.00	2.73	31.88	21.00	11.00	10202/10204	10/20/24	+
EAA-010	23.90	998.00	83.0%	67.00	27.00	2.73	31.88	21.00	11.00	10202/10204	10/20/24	+

Real Time Bus and Battery Status Monitor and Big Data Collection

Project Reference

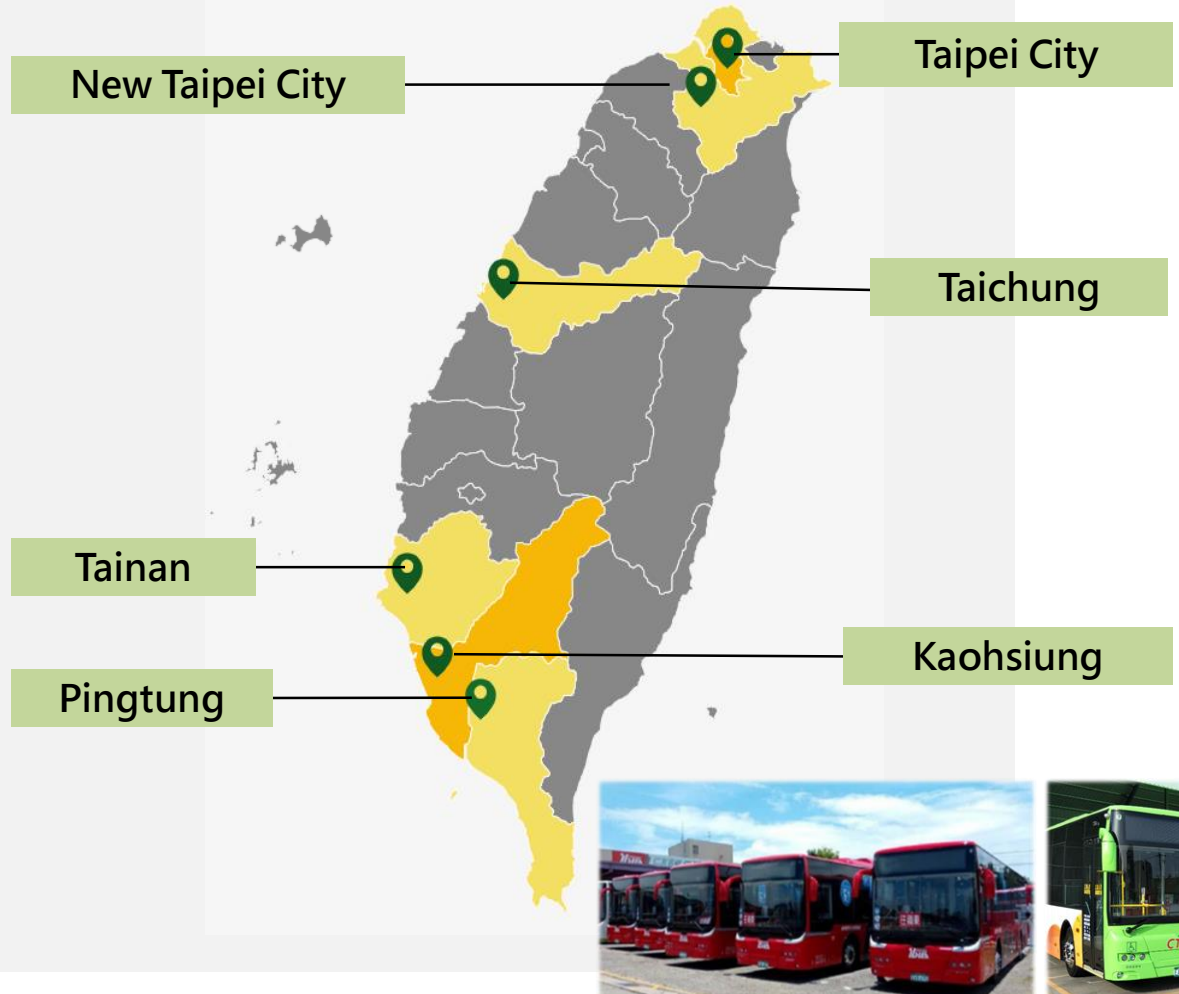
Market and Sales - Taiwan

Tron Energy Technology Corporation

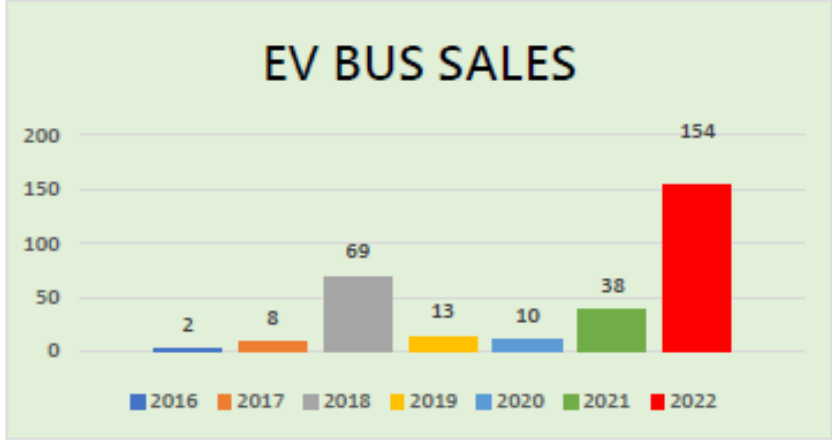
Track Record in Taiwan



Because of the high availability, in 2018, **within only 2 years**, Tron-e supplied over 50% of market demand for EV bus across Taiwan, which brought us to the position of **No.1 in domestic market of year 2018** and obtained valuable experience in operating the electric bus fleet. **This is also the clear proof of our competitive advantages in the electric bus market.**



Total sales of Tron-e market share ranking No.1 till Jan 2023 (23%).



By replacing 300 diesel bus with an electric bus can reduce carbon emissions by planting more than 870,000 trees each year. (Equivalent to the carbon absorption of 50 Daan Parks)



Project Reference

Market and Sales - Overseas

Tron Energy Technology Corporation

Global Layout



Overseas Market – JV Company



Indonesia



India



Malaysia



Thailand

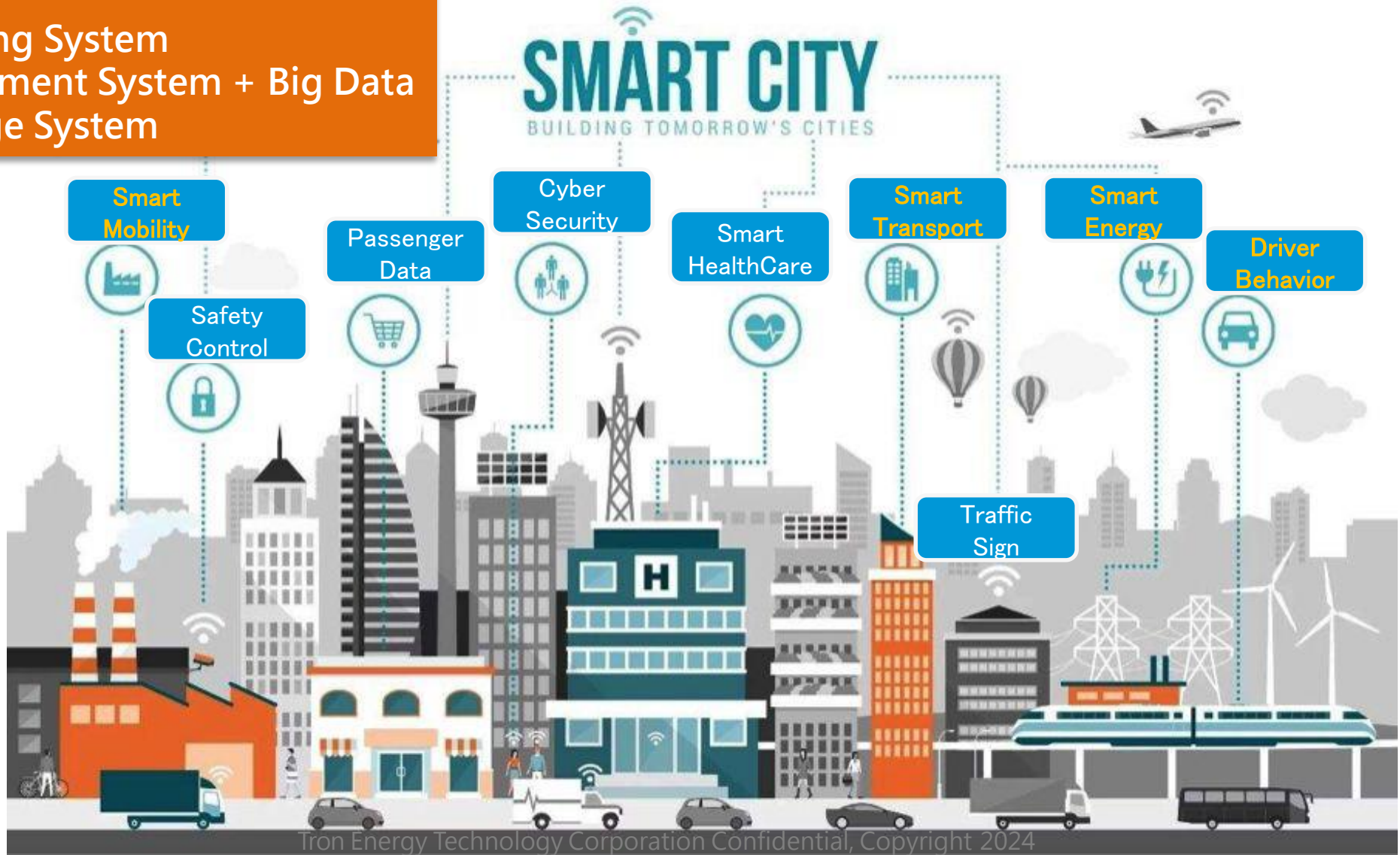
Product Map

Tron Energy Technology Corporation

Why tron-e

One Stop Solution

- Electric Bus
- Smart Charging System
- Fleet Management System + Big Data
- Energy Storage System



E-Mobility Product - Smart Electric Bus



EV Bus + Control-by-Wire System(Acceleration, Steering, Braking) = Autonomous Vehicle Platform



12 Meter Low Entry



4.3 Meter
(Autonomous)



12 Meter Low Floor



8 Meter High Floor
(RHD @ Indonesia)



9 Meter High Floor
(RHD @ India)

2016

2017

2018

2019

2020

2021

2022

2023

2024



8.8 Meter Low Entry



6.5 Meter (Autonomous)



7.2 Meter Low Entry
(RHD @ Thailand)

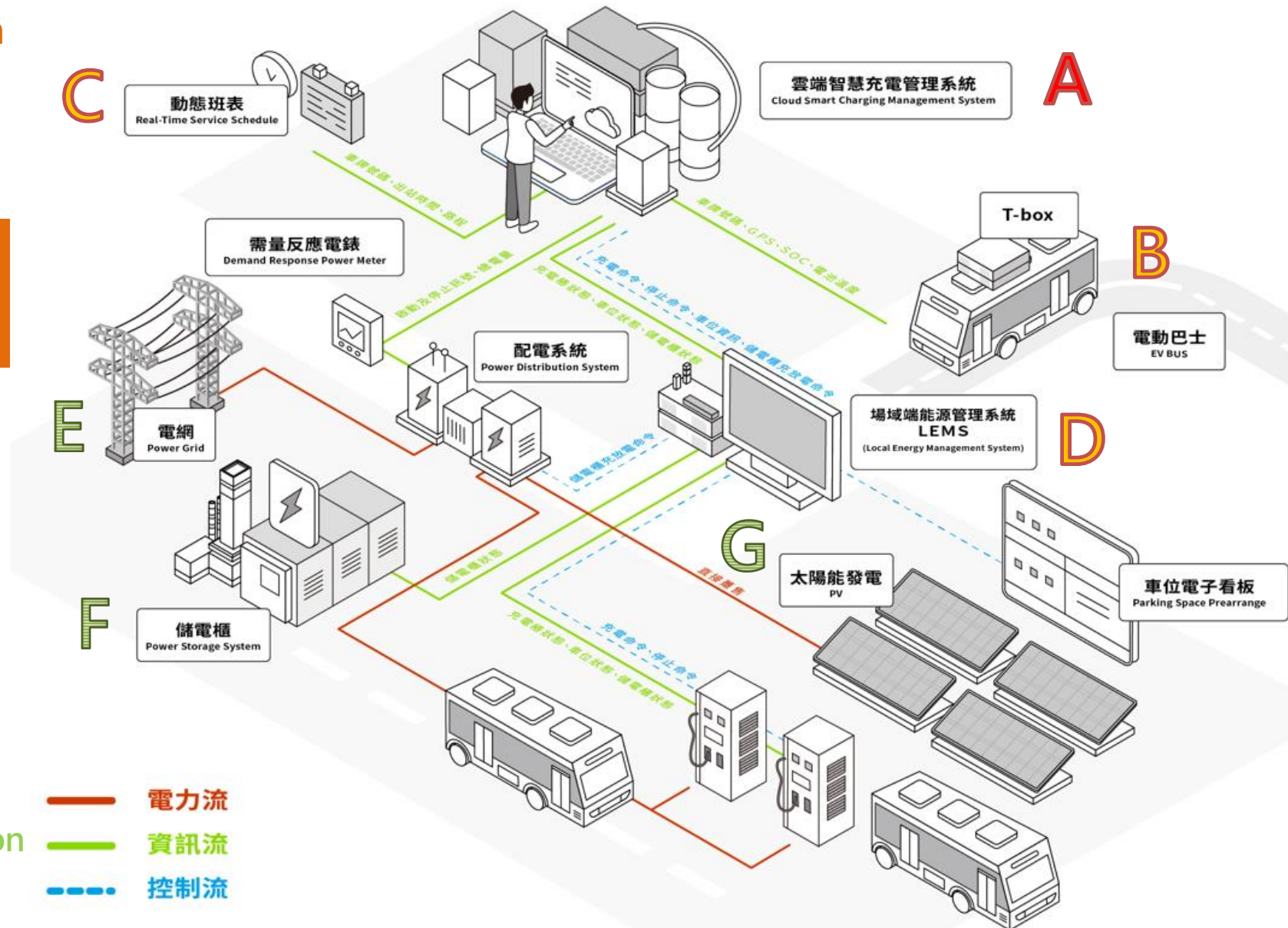


12 Meter High Floor
(RHD @ Indonesia)

Smart Charging Management System

- **Optimize energy consumption**
Leverage time and power, resulting in **different profiles and strategies of charging.**

- **Minimizes the impact on the grid by integrating the renewable energy resources.**



Track Record – Autonomous Platform (+ Partner)



- 場域: 桃園農業博覽會會場。
- 地點: 新屋區東興路二段與省道台15線路口
- 期間: 107年4月4日到5月13日, 共計40日

透過40天試運行, 驗證技術可行性



累積搭乘人次4000人!
累積發車班次660趟次!

2018 | Taoyuan Agriculture Expo Shuttle Taiwan first autonomous pilot project

策略聯盟台灣隊 -

目前測試的車種有9人座電動小型巴士、34人中型巴士2種, 2種電動巴士的續航里程皆為150公里。除了 NVIDIA 和 Altair 以外, 其他大部分都是台灣廠商, 包括有創奕能源 (Tron-e 電動巴士)、奕兆綠能 (Trillion 線性控制工程)、與創知能 (ThinkTron 車載移動測繪系統)、資拓宏宇 (iisi 車聯網/車隊管理系統)、英研智能移動 (AIMobile 車載電腦)、大都會客運 (營運規畫) 等。



台北自駕公車上路
<https://www.merit-times.com.tw/NewsPage.aspx?unid=587745>
<https://www.youtube.com/watch?v=8Nv6rimOCTQ&feature=youtu.be>

2020 | Taiwan first public road district pilot plan (Taipei Xinyi Road Bus Lane)

2018

2019

2020

2021

2022

2023

2024

2019 | Taoyuan City Self-driving Bus Trial Project (Taoyuan Metro Factory)



桃園自駕巴士 <https://www.youtube.com/watch?v=nooxoWRndRk&feature=youtu.be>

2019 | Lihpao Resort Shuttle

- 規劃3條路線/6輛自駕車實際營運。
- 停車場接駁: 連接停車場至5大場域, 配置2輛。
- 陸上樂園巡遊: 陸上樂園巡遊服務, 配置1輛。
- 賽車場接駁: 連接停車場、公車站至賽車場, 配置3輛。

驗證階段	期程規劃	驗證內容
POC	2018/9-2019/8	自動駕駛小巴中巴開發 封閉區域自駕接駁車技術方案評估與實證
POS	2019/9-2019/12 (免費試營運)	封閉區域自動駕駛接駁服務場域實證 人車分流與安全管理機制規劃與實證 營運管理系統導入與實證
POB	2020/1-2020/8 (導入折帳/收費機制)	遊樂園折帳機制設計與實證 維護管理制度規劃與設計與實證 未來永續財務機制評估

台中麗寶樂園渡假區自駕車 <https://www.youtube.com/watch?v=J7tjuUcNd2U&feature=youtu.be>



2021 Taoyuan Metro Station A17 – public area pilot run

路線	1.7公里
站位	3站(皆設有站位)
時段	平日 10:00-16:00 離峰時段
發車	捷運領航站
時刻	每小時 00、10、20、30、40 共5班
天氣	晴天/晴天/雨天(遇暴雨、颱風暫停)
速率	原則 0-20km/hr

Battery Product



Power Battery



Electric Vehicles
(Buses, 3 wheelers)



Baggage Tractors



Forklifts

Energy Storage System

BESS (AFC service)



BESS (Small Business)



Telecom station



Telecom Center



UPS



Portable Power Station



Battery Energy Storage System (BESS)

Cost savings, Renewable energy integration, Stabilization of grid

	Application	Field	Capacity	System Response Speed	Duration	Battery Charge and Discharge C-Rate
A	Load transfer	after meter	KW~MW	seconds to 3 minutes	more than 2~4 hours	$\leq 0.5C$
B	Storage of solar energy	after meter	KW~MW	seconds to 3 minutes	more than 2~4 hours	$\leq 0.5C$
C	Emergency backup power	after meter	KW~MW	~30 minutes	more than 2~4 hours	$\leq 0.5C$
D	Peaks Shaving	after meter	KW~MW	seconds to 3 minutes	15 minutes to 1 hour	0.5C~1C
E	EV charging station	after meter	KW	seconds to 3 minutes	15 minutes to 1 hour	0.5C~1C
F	Demand response	before meter/ after meter	KW~MW	milliseconds ~ 30 minutes	3~30 minutes	$\geq 1C$
G	Frequency control services	before meter/ after meter	MW	seconds to 3 minutes	more than 15 minutes	$\geq 1C$



Tron - Battery Energy Storage System (BESS)

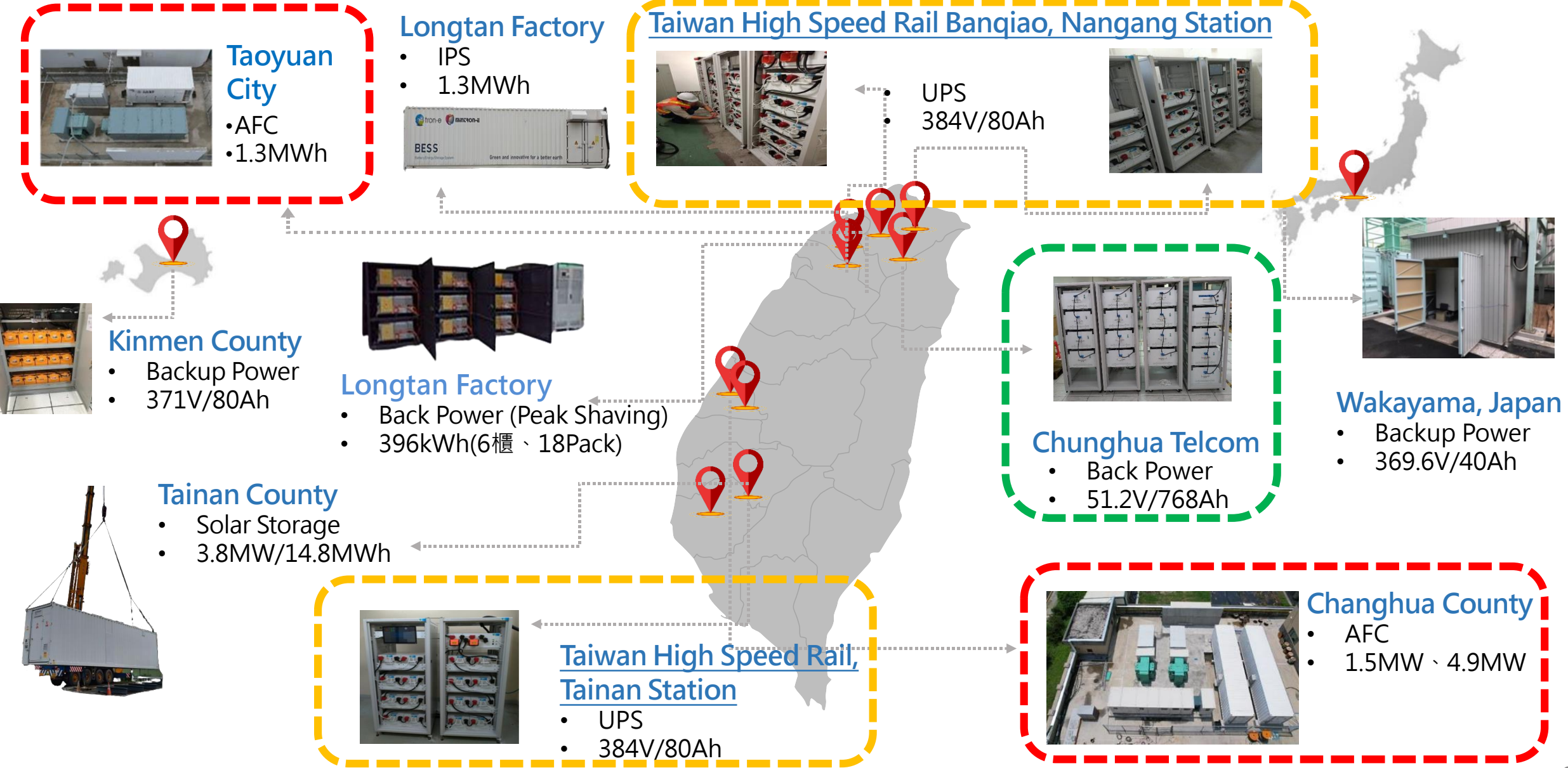


	Large ESS	Integrated medium-sized ESS	Integrated small ESS	Integrated small ESS	Home use ESS
Capacity	> 2 MWh	500kWh~2000 KWh	200kWh~1000 KWh	100kWh~300 KWh	10kWh~20 KWh
ESS	20" Container 3.7 MWh	Distributed 372 KWh	Distributed 215 KWh	Distributed 114 KWh	10 KWh Battery module
PCS	Outdoor (PE/ Fimer)	Outdoor (AblereX)	Built-in	Built-in	Outdoor Compound
EMS	Outdoor	Outdoor	Built-in	Built-in	Null

Tron reserves right to modify the specifications.



Project Reference - Track Record of ESS



Project Reference - Track Record

Grid Stabilization – AFC (Automatic Frequency Control)

1.3 MWh

Location : Taoyuan



4.9 MWh

Location : Changhua



Comply with IEC certification to ensure the safety and reliability of battery system

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de la Mobilité et des Travaux publics
Département de la mobilité et des transports

SOCIÉTÉ NATIONALE DE CERTIFICATION ET D'HOMOLOGATION S.A.
Registre de Commerce: B 27180
L-8070 Bertrange
snch

Référence: E13*100R02/04*0304*00

Annexes: - Rapport Technique
- Fiche de Renseignements du constructeur
Bertrange, le 24 mai 2023

E13

Communication concernant: - DELIVRANCE D'HOMOLOGATION APPROVAL GRANTED
- EXTENSION D'HOMOLOGATION APPROVAL EXTENDED
- LE REFUS D'HOMOLOGATION APPROVAL REFUSED
- LE RETRAIT D'HOMOLOGATION APPROVAL WITHDRAWN
- L'ARRÊT DÉFINITIF DE LA PRODUCTION PRODUCTION DEFINITELY DISCONTINUED

d'un type de SRSEE en tant que composant/entité technique distincte⁽¹⁾ conformément au Règlement N° 100 of a REESS type as component/technical entity⁽¹⁾ pursuant to Regulation No. 100

Numéro d'homologation: E13*100R02/04*0304*00
Approval number:

1. Marque de fabrique ou de commerce du SRSEE: Manufacturer's logo, Trade name or mark of the REESS: refer to manufacturer's information document
2. Type du SRSEE: EVB-304
Type of REESS:
3. Nom et adresse du constructeur: MINTRON ENERGY CORP
Manufacturer's name and address: No. 2, Chaofeng Rd., Longtan Dist., Taoyuan City 325003, Taiwan (R.O.C.)
4. Le cas échéant, nom et adresse du représentant du constructeur: not applicable
If applicable, name and address of manufacturer's representative:
5. Description du SRSEE: refer to manufacturer's information document
Description of the REESS:

IEC R100
(Electric Vehicle)

IEC TECEE

Ref. Certif. No. SE-111225

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Rechargeable Li-ion Battery System
Name and address of the applicant	MINTRON ENERGY CORP 2F-3, No.268, Sec. 1, Gaotiezhanqian W. Rd., Zhongli Dist., Taoyuan City 32056, Taiwan, China
Name and address of the manufacturer	Tron Giga (Yancheng) Energy Co., Ltd. Building 3, No. 108, Wutaishan Road, Yancheng City, Jiangsu Province, China
Name and address of the factory	Same as manufacturer <input type="checkbox"/> Additional information on page 2
note: When more than one factory, please report on page 2	
Ratings and principal characteristics	1331.2V / 280Ah
Trademark / Brand (if any)	-
Customer's Testing Facility (CTF) Stage used	-
Model / Type Ref.	BP1-416-1331.2/280-Y
Additional information (if necessary may also be reported on page 2)	<input type="checkbox"/> Additional information on page 2
A sample of the product was tested and found to be in conformity with	IEC 62619:2022
As shown in the Test Report Ref. No. which forms part of this Certificate	230101210SHA-001

This CB Test Certificate is issued by the National Certification Body

Intertek Semko AB
Torshamnsgatan 43
Box 1103
SE-164 22 Kista, Sweden
Date: 01 June, 2023

Signature: Hyden Li

IEC 62619
(ESS Module)

AIC
AnTech Certification Inc.

Test Report
IEC 62933-5-2

Applicant
Mintron Energy Corp.

Product name
BESS

Model name
3.7MWh ENERGY STORAGE SYSTEM

7F, No. 361, Yangguang St., Neihu District, Taipei City 114, Taiwan
Tel: 02-8752-3779 / Fax: 02-8752-3778

IEC 62933-5-2
(ESS System)

Strategic Cooperation to Create a Win-Win Situation



As your innovative and reliable partner,
we continue to serve value-added products and service to green energy industry for a green Earth!

Q & A

創奕能源科技股份有限公司
Tron Energy Technology Corporation

Eric Chiu 丘為臣
Tron Energy Technology Corporation

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