



**GREEN BANK
NETWORK**



**Green
Investment
Group**

Green Banks and Financing Mobility, Storage and other Emerging Technologies

Sixth Annual Green Bank Congress

GREEN BANKS FINANCING MOBILITY, STORAGE AND OTHER TECHNOLOGIES

AJ JAUNCEY
6TH ANNUAL GREEN BANK CONGRESS
NOVEMBER 2018



OVERVIEW



MOBILITY & TRANSPORT

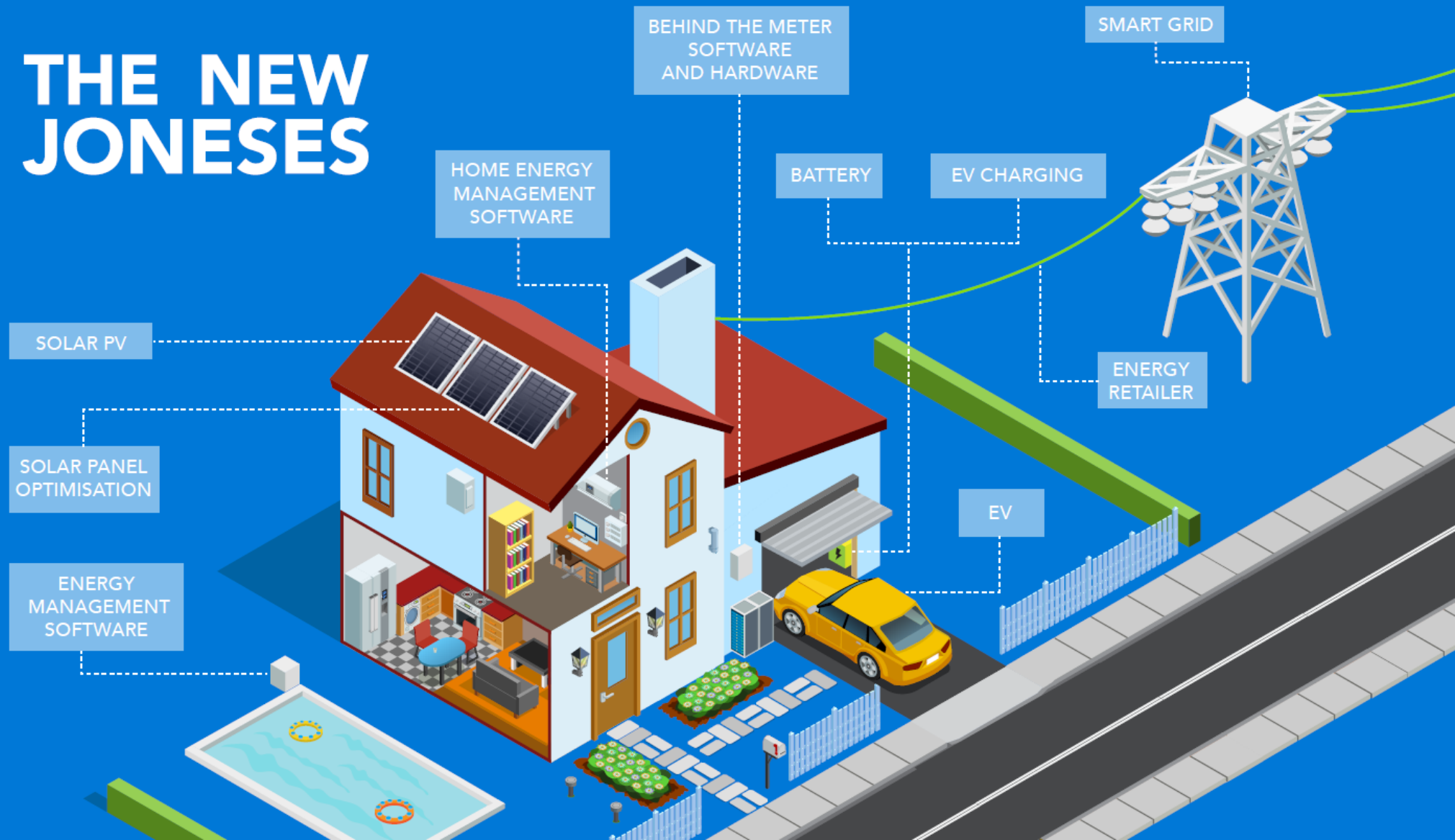


STORAGE



INNOVATIVE TECHNOLOGIES

THE NEW JONESES



MOBILITY & TRANSPORT ELECTRIC VEHICLES IN AUSTRALIA



It's about lowering prices, bringing more models to market and creating a charging network.



WHERE WE ARE HEADING

50% new purchases
are EVs **by 2030**

5 minute
supercharging

Matched driving
range with non-EVs

WHAT WILL GET US THERE

POLICY
INCENTIVES



MODEL
AVAILABILITY



CHARGING
NETWORK

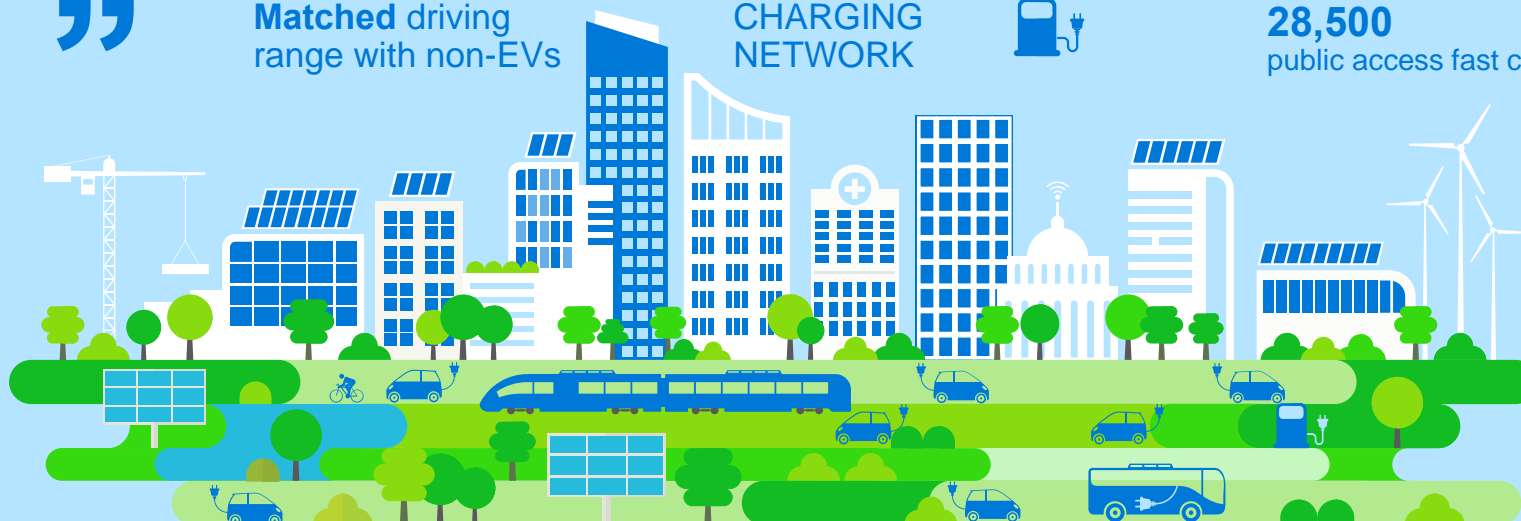


WHAT WE WILL SEE

2 year
payback on purchase price premium

20 EV models
on the market in Australia by 2020

28,500
public access fast charging points



MOBILITY & TRANSPORT INVESTMENTS



AGGREGATION
PARTNERSHIPS



CARBON
REVOLUTION



RELECTRIFY

STORAGE

Rate%Setter™

RATESETTER

**HOME BATTERY
SCHEME FINANCE**

CEFC ROLE: Senior debt facility

COMMITMENT: \$100 million

TRANSACTION DATE: September 2018



STORAGE

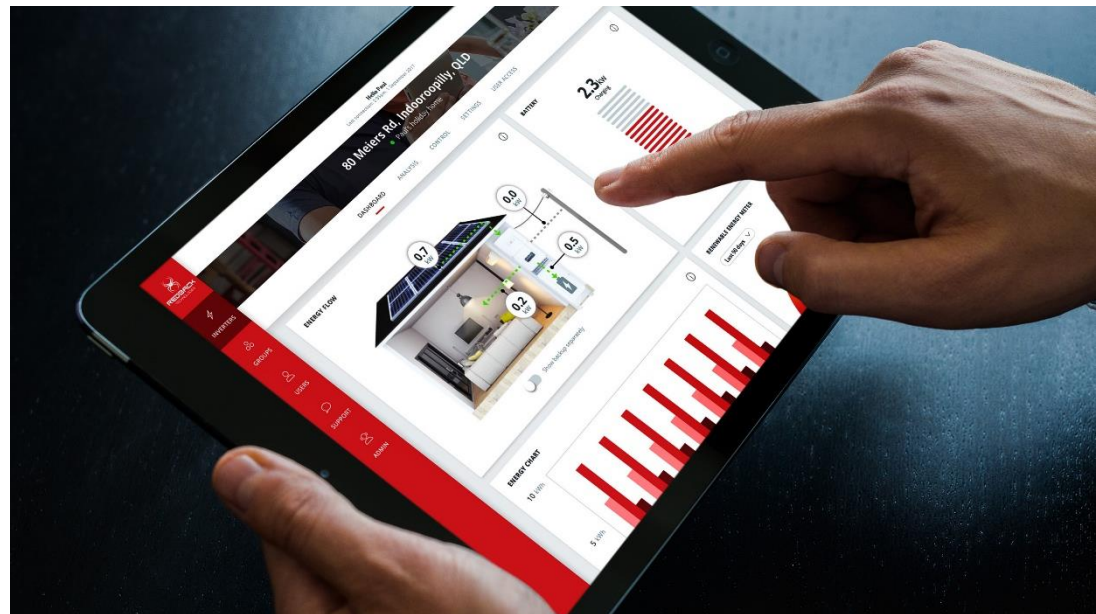
**REDBACK
TECHNOLOGY**

**SERIES A-2
EQUITY ROUND**

CEFC ROLE: Investor

COMMITMENT: USD\$5 million

TRANSACTION DATE: October 2017



INNOVATIVE TECHNOLOGIES

**ARTESIAN
CAPITAL**

**CLEAN ENERGY
SEED FUND**

CEFC ROLE: Cornerstone investor

COMMITMENT: \$10 million

TRANSACTION DATE: February 2017

thinxtra
Empowering Internet of Things

THINXTRA

**SERIES B
EQUITY ROUND**

CEFC ROLE: Investor

COMMITMENT: \$10 million

TRANSACTION DATE: August 2017



WATTWATCHERS

INVESTING IN **INNOVATIVE**
TECHNOLOGY TO BETTER
MANAGE **ENERGY USE**
AND COSTS



WATTWATCHERS

**SERIES A
EQUITY ROUND**

CEFC ROLE: *Investor*

COMMITMENT: *\$2 million*

TRANSACTION DATE: *August 2017*

CEFC
CLEAN ENERGY FINANCE CORP

ZEN ECOSYSTEMS

INTELLIGENT ENERGY MANAGEMENT SOLUTIONS TO HELP AUSTRALIAN BUSINESSES SAVE COSTS

ZEN
ECOSYSTEMS

ZEN

DEMAND MANAGEMENT TECHNOLOGY

CEFC ROLE: Cornerstone
equity investor

COMMITMENT: \$5 million capital raising

TRANSACTION DATE: April 2018

CEFC
CLEAN ENERGY FINANCE CORP





**TRANSFORMING
CLEAN ENERGY
INVESTMENT**

**CLEAN
ENERGY FINANCE
CORPORATION**

t. 1300 002 332
i. +61 2 8039 0800
e. info@cefc.com.au

cefc.com.au



Session 1.2: Green Banks and Financing Mobility, Storage and Other Emerging Technologies

Low Carbon Mobility

29 November 2018

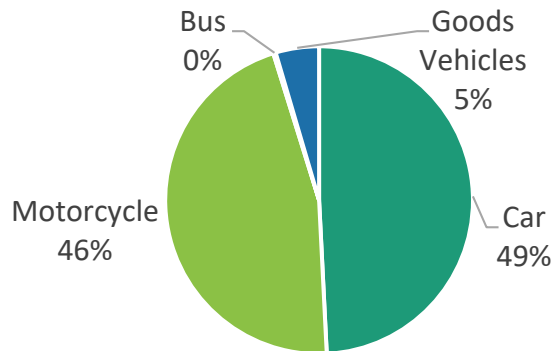
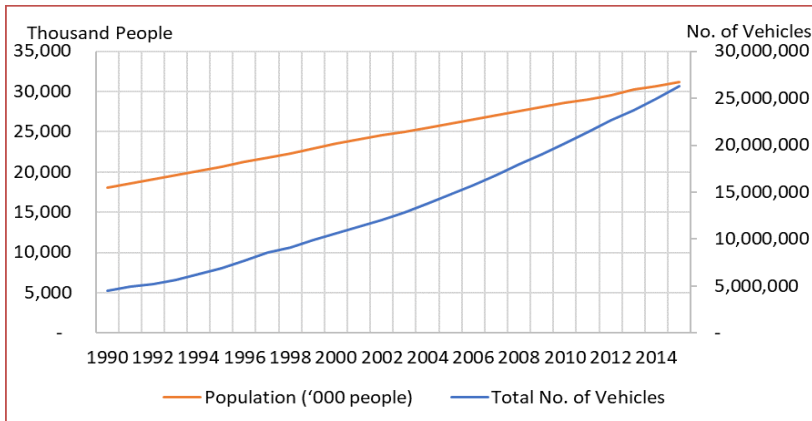
SYED AHMAD SYED MUSTAFA
Acting Chief Executive Officer
GreenTech Malaysia

**CHAMPIONING
GREEN ECONOMY**



MALAYSIA TRANSPORT SECTOR

MOTOR VEHICLE REGISTRATION



- Increasing trend in motor-vehicle registration for all categories
- **26.3 million registered vehicles in 2015**
- Vehicle population growth exceeded population growth rate

CO2 Emission and Energy Final Energy Consumption

Figure 2.5: Major Sources of Carbon Dioxide Emissions in 2011

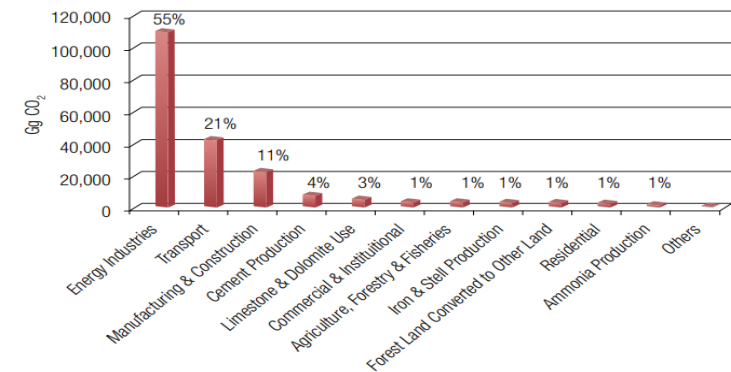
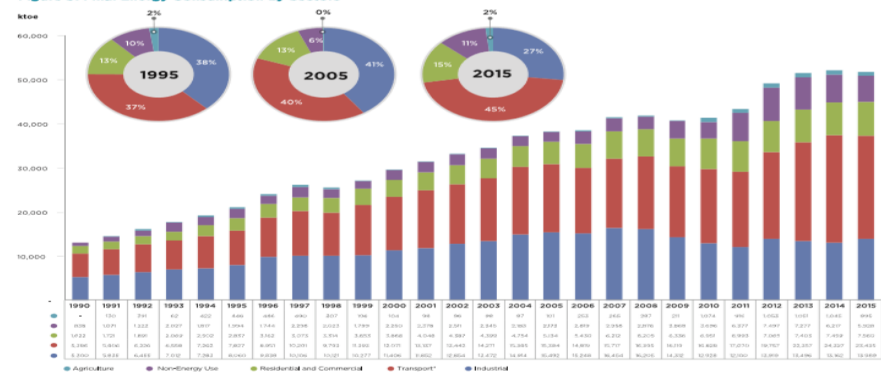


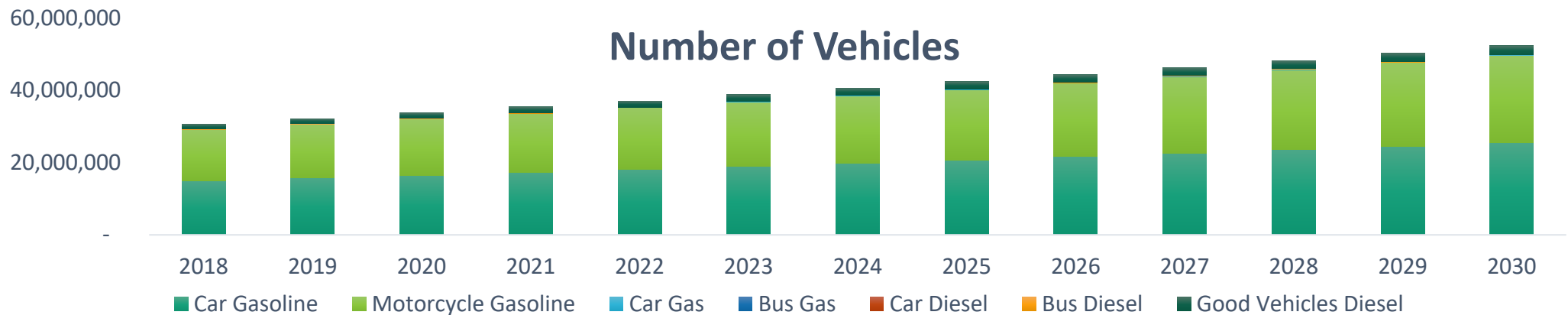
Figure 9: Final Energy Consumption by Sectors



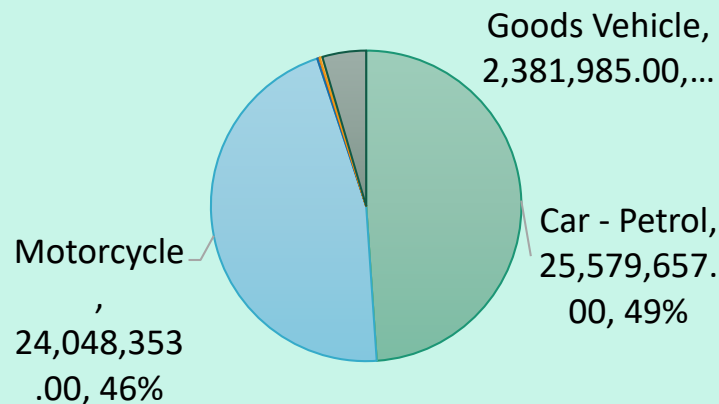
Transport sector – largest share of the final Energy consumption at 47% and 45% in 2014 and 2015 respectively

MALAYSIA TRANSPORT SECTOR

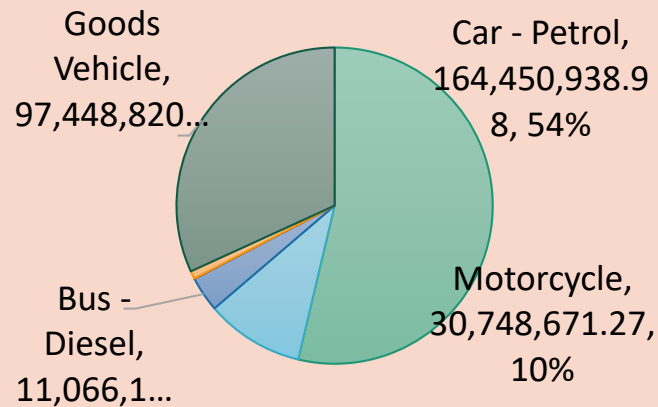
Quick glance to future, number of vehicles to keep growing



Vehicle Volume 2030



GHG emission 2030 (t CO2eq)



Estimated total of 52.3mil total vehicles at 2030. Car population itself will be double then 2015 level.

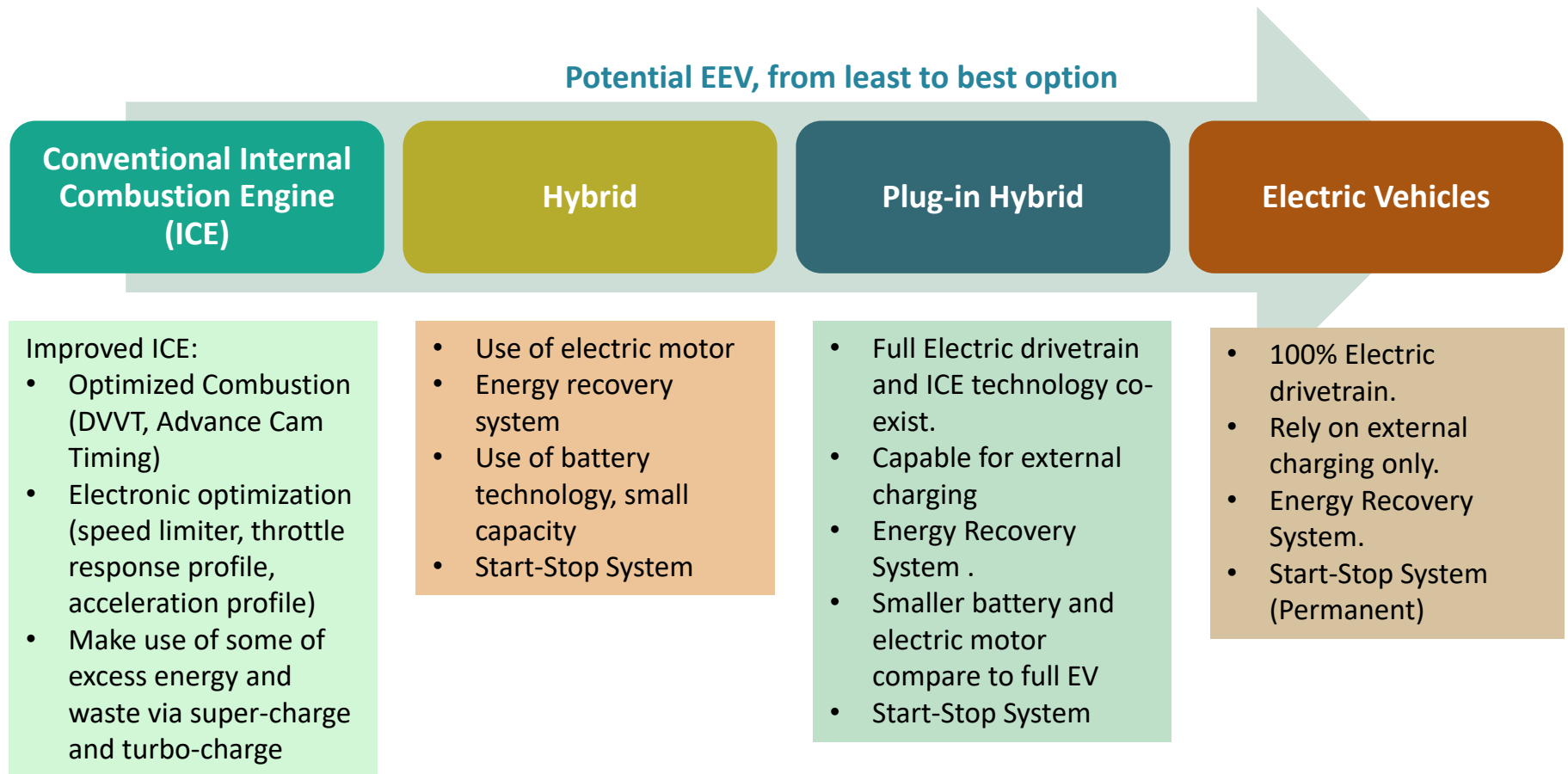
Passenger vehicle to remain as number one emitter and energy consumer.

Switching to other environmental friendly option is essential.

The simulation was done by TSSM for LCMB & AP study (on-going). The baseline data (BAU) used the Microfit statistical software to model the demand function of total vehicle volumes based on GDP growth rate.

TECHNOLOGY DISTINCTION

Option for more environmental friendly options:



GLOBAL OUTLOOK

Foresight for Global Mass Production in Engine Powertrain Technologies

2020



Hybrid Electric Vehicle (HEV) global take-off point

By 2020, HEV (50% electric and 50% fuel) will dominate the market.

Automotive manufacturer will mass produce HEVs and the market will offer Hybrid cars.

**HEV, PHEV, BEV and FCV
= e-Mobility**

2025



Plug-in Hybrid Electric Vehicle global take-off point

By 2025, PHEV (70% electric and 30% fuel) is expected to be dominating the market and the landscape of the automotive industry will change significantly.

People will be charging their vehicles wherever chargers are available – at home, offices, car parks or rest areas. We will find that less cars will be going to petrol pump stations.

2030/2050



Battery Electric Vehicle (BEV) + Fuel Cell Vehicle (FCV) global take-off point

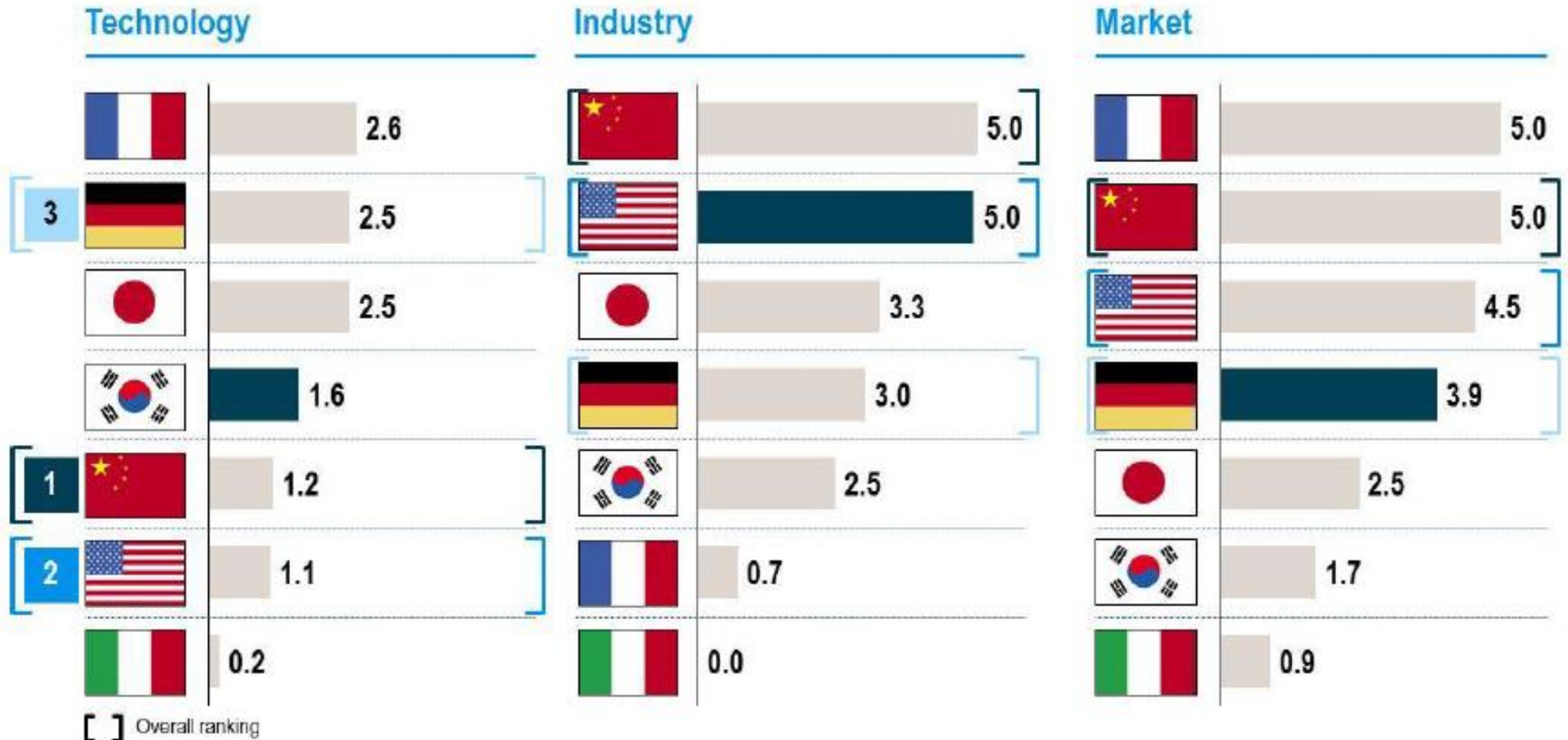
By 2030, EV (full electric vehicles - non emission powertrain technology) will dominate the automotive industry that most vehicles will be dependable on electricity or fuel cell.

Vehicles will no longer need to be charged at charging stations but charged by fuel cells which uses hydrogen. We will see a lot of hydrogen stations instead of fuel or petrol stations.

Source: ASM Mega Science 3.0, 2016_Automotive Industry Sector

LEADING NATIONS IN EV'S

E-Mobility Index – Ranking by indicator



Three individual indicators (Technology, Industry & Market) were weighted value ranges of 0-5 & combined to form the E-mobility Index

Source: Forschungsgesellschaft Kraftfahrwesen mbH Aachen; Roland Berger E-Mobility Index, Q2 2017

NUMBER OF EV'S IN MALAYSIA

CATEGORY	TOTAL NUMBER OF REGISTRATIONS									TOTAL
	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Hybrid	138	4,702	8,772	13,506	7,691	9,624	5,926	9,110	1,592	61,061
Electric	-	275	183	157	291	130	50	348	62	1,496
Total	138	4,977	8,955	13,663	7,982	9,754	5,976	9,458	1,654	62,557*

NOTE: As at February 2018

SOURCE: ROAD TRANSPORT DEPARTMENT

OUR EXPERIENCE WITH EV

GreenTech Malaysia EV Fleet :

	Renault Zoe	Mitsubishi i-Miev	Nissan Leaf	Tesla Model S 85
Acquired date	2014	2014	2014	2015
Distance travelled (km)	45,113	20,858	48,058	41,427
Electricity consumption (kWh)	4,749	2,781	8,286	8,814
Electricity cost (RM)	MYR 2,066	MYR 1,210	MYR 3,604	MYR 3,834
Fuel avoidance (litres)	3,383	1,564	3,604	3,107
Cost savings - electricity vs fuel	MYR 5,378	MYR 2,232	MYR 4,325	MYR 3,001
Tailpipe Emission saving (T CO2)	7.8	3.6	8.4	7.2
Emissions from Electricity Consumption	3.3	1.9	5.8	6.1
Net Emissions Reduction (Tonne CO2)	4.6	1.7	2.6	1.1
Maintenance cost	MYR 1,412	MYR 770	MYR 570	MYR 15,950

Data & Assumptions: Based on fleet database in GreenTech Malaysia (as at June 2018), standard petrol car fuel consumption 7.5litres/100km, fuel price RN95 MYR2.20 per litre, CO2 emissions 174 g/km, zero tailpipe emission, electricity tariff commercial B MYR0.43 per kWh

Facts:

- 92kWp Solar PV installed at GreenTech Malaysia's Green Energy Office (GEO) Building.
- Energy mix in Malaysia is taking in more RE, target at 20% by 2025. Future emission factor for electricity generation will be further improved.



CHARGING INFRASTRUCTURE

Enabling EV ownership; overcoming the range anxiety barrier



245

ChargeEV installed
(as at Oct 2018)

Hotels, shopping malls,
office buildings, hospitals,
community hub,
condominium, municipality
building, sports complex,
and R&R.

PUBLIC EV CHARGING

186

Location available in Malaysia

EV CHARGING SESSIONS

48,595

Sessions

ESTIMATED CO2 EMISSIONS AVOIDED

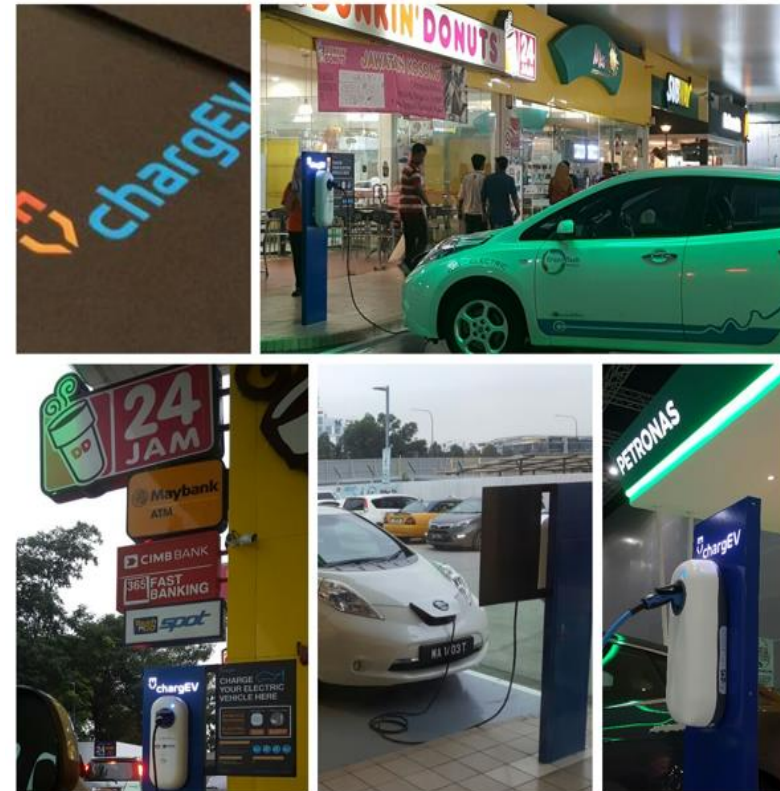
334,838

Kilograms

ESTIMATED ELECTRIC RANGE

1,753,080

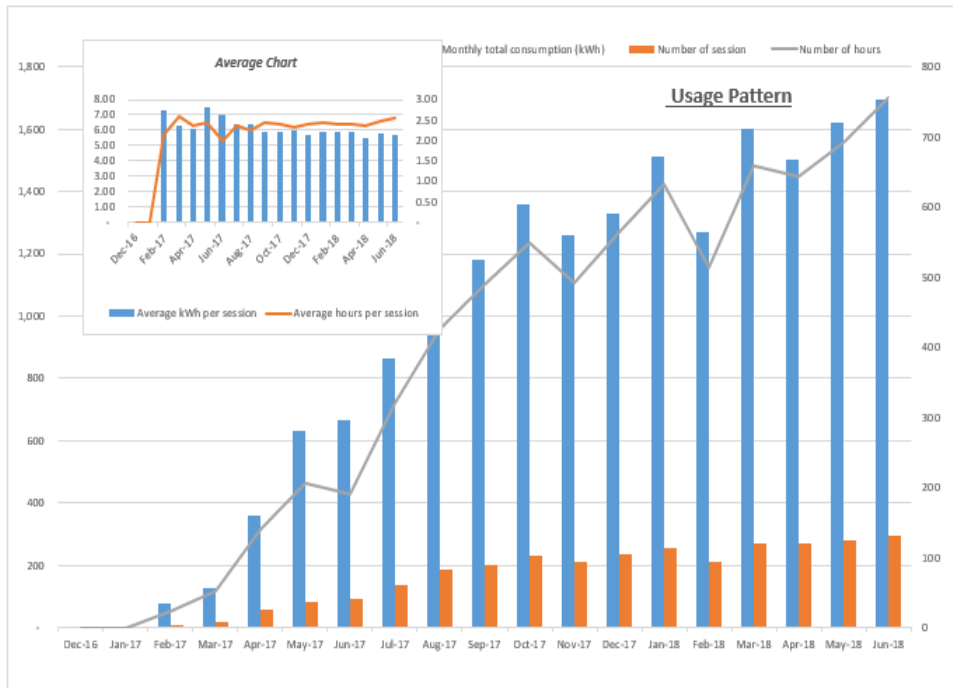
Kilometres



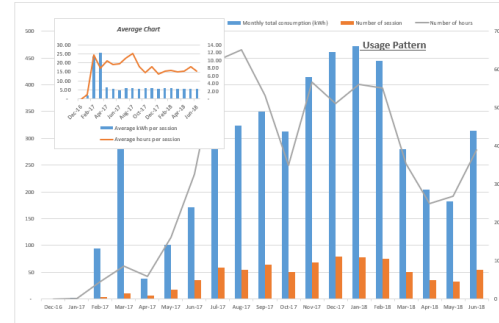
Subscribed by > 5000 users (mostly PHEV)

CHARGING INFRASTRUCTURE

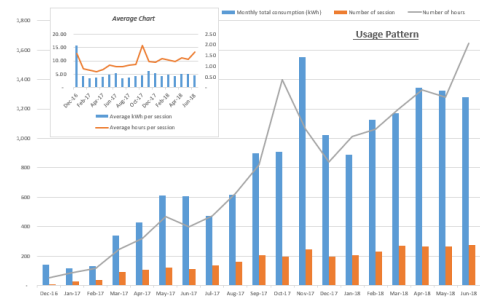
Data collection and user-behavior analysis:



Shopping Mall – Average charging time is 2.5 hours with 6 – 7 kWh per session. Highest usage frequency. Certain locations have shortage of charging points.

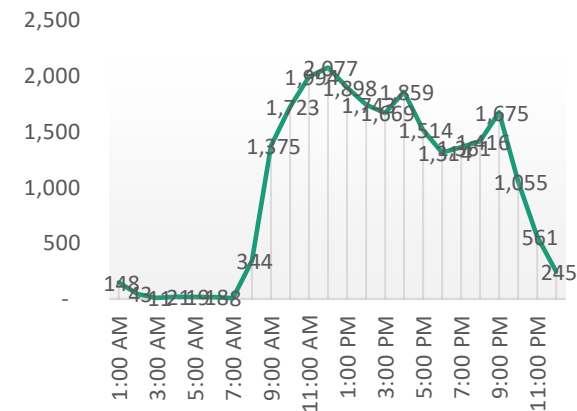


Condominium have long average stay time indicating mostly overnight charging.



Petrol stations have shorter average stay time with less kWh drawn. Lower usage frequency.

Daily Peak Analysis



The trend is reflecting EV charging pattern (public facility) is done alongside daily activities. This data also to predict the impact and enable predictability for electricity grid.



Thank You

For queries, please contact:
SYED AHMAD SYED MUSTAFA
ahmad@greentechmalaysia.my

Malaysian Green Technology Corporation

No.2, Jalan 9/10, Persiaran Usahawan,
Seksyen 9, 43650 Bandar Baru Bangi,
Selangor Darul Ehsan

Tel : 03 8921 0800
Fax : 03 8921 0801 / 0802
Email : info@greentechmalaysia.my

-  Greentech Malaysia
-  Greentech.My
-  Greentech.malaysia
-  greentechmalaysia.my

Green Bank Congress

Green Banks and Financing
Mobility, Storage and other
Emerging Technologies



U.S.-China Green Fund
November 29, 2018

Mission: Greenergize China through innovative investments and U.S.-China cross-border collaborations in finance, green technologies, and business models



Tackle 
China's environmental pollution
and reduce emissions

Obtain 
Policy and capital support in
China market

Improve 
U.S.-China bilateral relationship

Introduce 
Advanced U.S. technology
and resources to China

Create 
Green jobs and growth in
U.S. and China

Vision

To become the best-in-class green equity fund and the commercial implementer of U.S.-China green collaboration.

RMB PE Fund's investments are focused on four main sectors

- Investment criteria based on market performance, sustainability standards, and “P.R.I.M.E.” model.
- Invest in leading Chinese platform companies, creating viable channels for advanced green technologies to identify local markets and commercialization opportunities.
- Fund I already invested more than \$420 million and has a pipeline of deals totaling \$1.2 billion.

“Invest • Greenergize China” : Focus on the Theme of New Urbanization



RMB PE Fund Portfolio companies and special purpose platforms

Green Consumption



East Low Carbon: *provides energy performance contracting services and upgrades to luxury hotels, hospitals, industrial facilities, data centers, and supermarkets (100+ projects completed)*

Changcheng Property: an independent property management company with 750 properties creating green smart communities and eco-friendly properties.

Hos Joy: provides comprehensive smart and energy efficient O2O home improvement services including HVAC, heating, air and water purification, and green energy upgrades (300,000 households served)

New Starting Point: provides green blue-collar apartments to urban service workers through business model innovation and energy-saving retrofits

Huitongda: provides enhanced services to rural villages through an O2O platform of 90,000 mom-and-pop stores and empowers local entrepreneurs to sell green products (GMV 200 billion)

Green Mobility



AIpark: *utilizes 4th generation city-level (indoor + roadside) smart parking technology to address parking and traffic congestion problems and mitigate CO₂ emissions*



Green Energy

Capital Heat: recovers waste heat from power generation and transmits heat through distribution network to provide residential district heating

Green Liquid Sunshine Fund: invest in methanol and ethanol projects in the U.S. and China to facilitate green fuel and chemicals

Planned Investments:

Smart Energy and Heating Company: improves energy network efficiency and intelligence using IoT technology and big data analytics



Green Manufacturing

Green Supply Chain: *provides integrated energy efficiency and green enhancement services to companies' supply chain vendors*

CoolTera: enhances data center energy efficiency using liquid cooling technology

Four Rivers Steel Restructuring Fund: steel industry restructuring and green upgrades with BaoWu Steel, China Merchants Group, and W. L. Ross

Xiandou Recycling: Xiandou Recycling is an O2O recycling service platform focused on enterprise-level trash and renewable resource recycling

Case Study 1: Alpark



Alpark is the world's first company to develop image recognition + artificial intelligence technology to solve the difficulties of urban parking. The company brings together a group of advanced teams, builds the world's leading intelligent parking technology and operating system. It has developed over hundreds of Internet big data hardware core technology and patent with independent intellectual property rights.

Founder

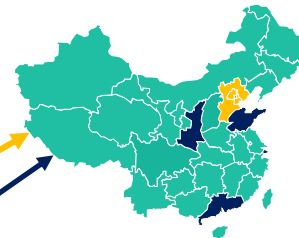
Dr. Yan Jun

-Alpark Chairman & CSO
-EMBA, Guanghua School of Management at PKU



Achievement

- Alpark Sky Eye
- Alpark APP
- Alpark City
- Alpark One



Prospects

Through an innovative "Internet + AI" model, realize the goal of one APP to connect cities, countries, and the world, driving a new era of "green travel, smart parking, and better life" for global drivers.

2015

2016

2016

2018

2018

Development

Fourth-generation intelligent parking technology to manage city-wide parking systems



Collaboration

U.S.-China Green Fund's investment helps with technological transformation, operational upgrades, and the development of a seamless system to improve parking space efficiency, alleviate congestion, and reduce CO2 emissions.

Case Study 2: East Low Carbon



East Low Carbon (ELC) is a leading energy servicing company in China that provides holistic solutions and capital to help energy-intensive facilities such as five-star hotels, hospitals, urban complexes, and industrial plants reduce their energy consumption. To-date it has successfully completed 60+ energy savings projects including collaborations with Shangri-La, IHG, and Hyatt Hotels.

Founder

Dr. Long Shengping

- Co-Chairman and CEO of ELC
- Professor, East China Normal University
- Director, Energy Savings and Environmental Protection Professional Committee, Shanghai Building Technology Research Association



Development

With the help of the Technology Research Institute, it has integrated supply chain, technical solutions and platforms



Prospects

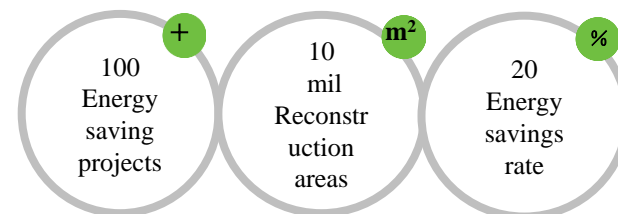
Committed to becoming the “energy solutions partner” to governments, hospitals, schools, businesses, industry, and large corporations



Collaboration

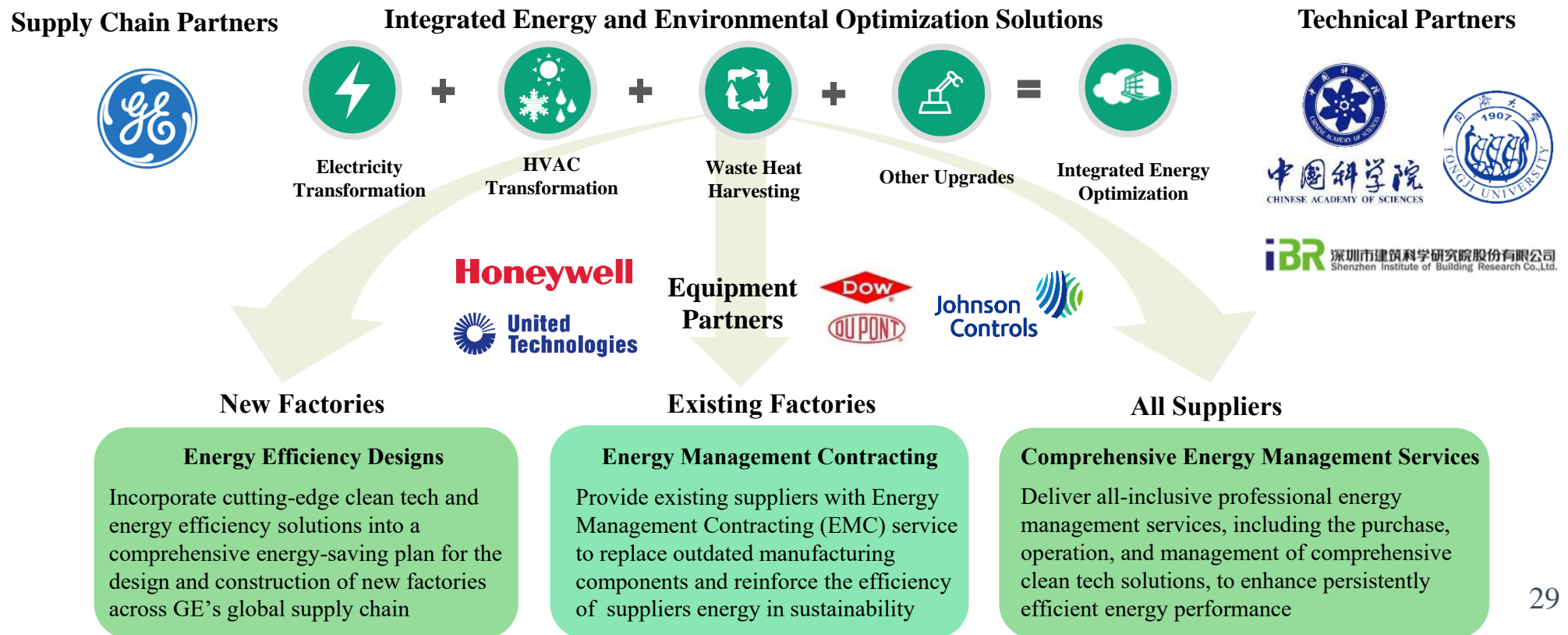
U.S-China Green Fund has become the majority shareholder of East Low Carbon.
我们怎么参与到绿色供应链。

Achievement



Green Manufacturing: Green Supply Chain – ELC

By collaborating with GE on formulating comprehensive energy efficiency solutions, East Low Carbon executes on energy efficiency and environmental upgrades to achieve optimal solutions and sustainable growth for our supply chain partners.





Address: Suite 4908, China World Tower B
No. 1 Jian Guo Men Wai Avenue
Chaoyang District, Beijing 100004
Tel: +86 10 8540-6200
Website: www.uschinagreenfund.com





安悦节能



安悦充电
ANYO CHARGING

上汽安悦

悦你 悦我 悦世界 创新创业 创未来



安悦节能



安悦充电
ANYO CHARGING

成立背景



世界500强企业第41名



上汽集团-服贸板块重点企业

上海上汽安悦充电科技有限公司

充电设施、光储充系统、
智能停车系统、广告传媒

成立时间

2015.10.28

注册资金

¥ 300,000,000



上海安悦节能技术有限公司

新能源、节能、环境、
智能、运维

成立时间

2010.10.18

注册资金

¥ 50,000,000



安悦节能



安悦充电
ANYO CHARGING

自安悦节能公司2010年成立以来：

- 已实施各类节能环保项目近 **1000** 个
- 建成光伏电站超 **200** 兆瓦
- 每年发电量超过 **2.2** 亿 度
- 减少二氧化碳等有害气体排放约 **70** 万 吨
- 累计为业主节约各类能源费数 **亿** 元



安悦节能

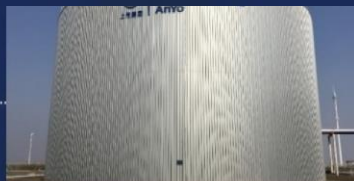


安悦充电
ANYO CHARGING

自安悦充电公司2015年成立以来：

- 累计投放充电桩逾 11万 根
- 累计投放总功率约 80万 KW
- 上海地区公共桩投建占比达 40%
- 全国充电运营商位列 前五

节能



为各种工业生产及民用建筑提供蓄冷蓄热、余热余压回收利用、高温热泵、电力蓄能、压缩空气系统节能等一系列的节能解决方案

智能



提供能源管理平台、光伏运管平台、环境监测平台的定制化服务

新能源



致力于成为提供光伏电站融资、开发、设计、建设、运维一站式解决方案的绿色能源供应商

运营



提供光伏智能运维服务、站房智能化管理与设备智能化维保的整体运维解决方案

环境



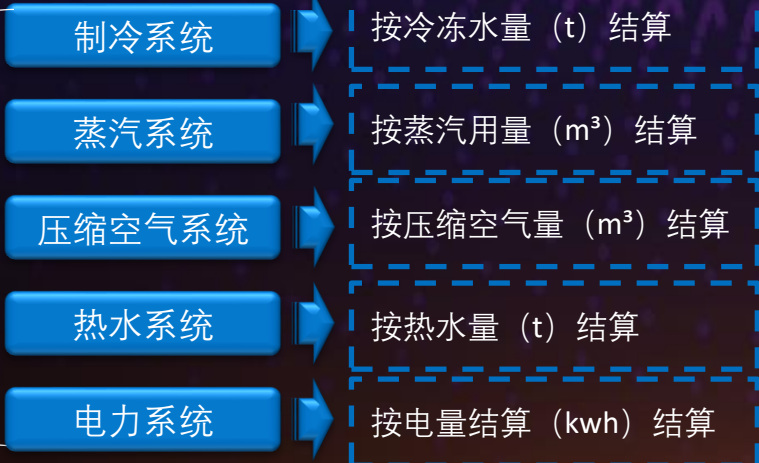
致力于为企业提供环境咨询、环境监测、三废处理等完整的闭环服务

能源中心

储能电站



综合能源供应系统



军工路超级充电站 上海工业设计中心储能 花园坊储能电站



一座箱式变电站；两座设备集装箱（智能柔性充电堆、光伏42kW、储能100KWh）；一座光伏车棚；一座立体车库（3×7+1×8,）；3根60KW双枪直流充电桩；1根120kW大巴直流充电桩、5根7kW回形针交流充电桩。

整个系统采用251KWh的三元锂电池，3.7V94AH，180串4并，主要用于园区削峰填谷。系统按照实现分布式发电利用储能系统可最大限度的就地消纳并可以离网独立运行的原则进行了设计，有两种运行方式：并网运行和孤岛运行两种模式。

1. 由分布式电源（微风发电1KW*2/光伏屋顶21.6kw）、储能装置（汽车退役动力电池标称容量105KWh）组成的光储充系统。
2. 花园坊1000KWh削峰填谷储能电站，根据园区稳定用电负荷情况，结合控制策略为园区削减MD值。

削峰填谷

调峰调频

后备电源

电池梯度利用

电池资源化再利用

- 4S店
- 修理厂
- 报废厂
- 其他集中回收站点

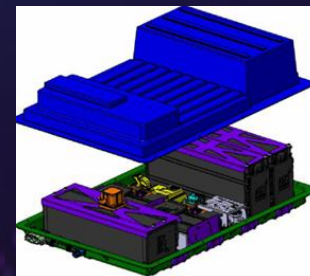
电池回收

梯度利用处理

- 检测分选
- 重组重包
- 梯度利用产品生产

- 集中式储能电站
- 分布式储能电站
- 叉车、高尔夫球车等
- 通讯基站

产品应用及销售



确定回收频次、职责分工、回收费用等

制成梯度利用电池产品

直接销售的需要与经销商进一步确认回收处理方案





定位 与 目标

- 贯彻上汽集团“新四化”战略思想
- 研发生产、投资建设、运维管理为一体的充电服务供应商
- 助力出行服务的绿色生态产业链

- 运营目标：2020年，在全国投放**66万**根充电桩
- 平台目标：最佳客户体验的充电服务平台
- 产品目标：最具竞争力的充电产品供应商

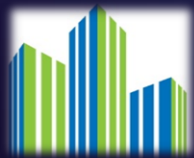


充电服务板块 -- 分散式公共桩



生活小区

美罗家园
旭辉锦庭
民乐城



商业综合体

金茂大厦
上海中心
明天广场



酒店

建业里嘉佩乐酒店
万豪酒店
外滩中心

目标
市场

政府机关

上海市第一妇婴保健院
上海地矿院
城投水务



学校

复旦管院
华东师范大学
上海立信会计学院



交通枢纽

浦东国际机场
虹桥机场
奉贤客运



充电智能平台

13:20

01 / 24 星期日

至今累计充电总量 Cumulative battery charging

54,067,392 KW

至今累计数据 Cumulative data

累计充电时长 6,904,591 小时	累计减少碳排放量 4,591 吨
累计充电车次 504,307 辆	累计站桩总数 104,394 个
累计注册用户 47,133 人	累计充电桩总数 826,033 个

日累计数据 Daily cumulative data

日充电总量

2,871 KW

日充电车次

2,071 辆

注册充电用户数

318 人

新增建设充电桩数量

973 个



站点数据 Site data

站点状态



站点类型

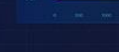


站点利用率

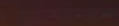
75%

用户数据 User data

用户充电方式



订单充电时间分布



订单充电次数分布



用户活跃度

认证用户数量

42,871

充电服务板块 -- 专用场站建设

临港大道枢纽站

- 上海第一座采用240kw双枪直流快充的公交充电场站
- 总装机功率 1440 KW



东门充电站

- 将配备35根直流桩
- 总装机功率 3060 KW
- 可同时为70辆新能源公交车提供充电服务



大众出租车场站

- 本期规划建设场站2座
- 本期预计总装机功率 2800KW
- 规划建设63个充电车位



成山路充电场站

- 占地100300平方米
- 本期总装机功率 9300 KW
- 可服务至少248辆公交车
- 亚洲最大室内公交停车场



露虹充电站

- 总装机功率 6420 KW，配备8000kVA变电站及800kVA箱式变压器各一个，充电终端111个。
- 可同时为160辆大巴车提供充电服务
- 专用场站，社会共享



产品制造板块

• 荣威 II 系列



最大输出功率：7KW

最大输出电流：32A



荣威 eRX5 混动



荣威 ERX5 纯电动



交流慢充桩

最大输出功率：7KW

最大输出电流：32A



直流快充桩

最大输出功率：375KW

最大输出电流：500A

平湖生产基地

- 占地36亩，建筑面积35,000平米
- 按照 **IATF16949/VDA6.3** 质量管控体系打造
- 规划10条交流、6条直流智能自动化产线
- 科创中心拥有各类实验/测试设备43台套
- 当前年产量10万台套，目标年产量**100万台套**



安悦节能



安悦充电
ANYO CHARGING

THANKS

谢谢观看



**GREEN BANK
NETWORK**



**Green
Investment
Group**

Green Banks and Financing Mobility, Storage and other Emerging Technologies

Questions & Discussion

Sixth Annual Green Bank Congress