



EV for Sustainable Future

電動車應用及充電配套設施
EV adoption and charging infrastructure

30 September 2011

電驅運輸拓展
Electric Mobility Development



氣候變化 Climate Change

香港政府建議的減排目標
HKSAR Government's Proposed Reduction Target

- 目的是減少香港的溫室氣體排放及使香港逐步發展為低碳社會
Aiming at reducing Hong Kong's GHG emissions and transform our city to be low-carbon and green

- 共同目標及願景：對比2005年，在2020年及以後，碳強度下降50%至60%

A common goal and vision : carbon intensity reduced 50% - 60% by 2020 as compared with 2005 level

- 如建議的減排目標能夠達到...
If the proposed target is achieved...



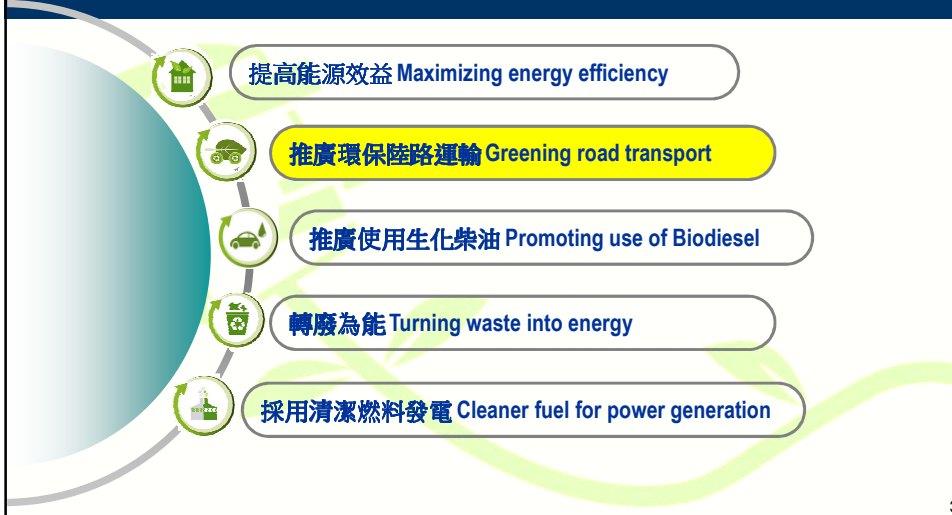
碳強度下降目標 - 在2020年及以後下降50%至60%

Carbon Intensity Reduction Target 50% - 60% by 2020

	2005	2020	Reduction
碳強度 Carbon intensity (kg CO _{2,e} /HK)	0.025	0.012 - 0.015	50% - 60%
溫室氣體排放 GHG emissions (million tonnes)	42	28-34	19% - 33%

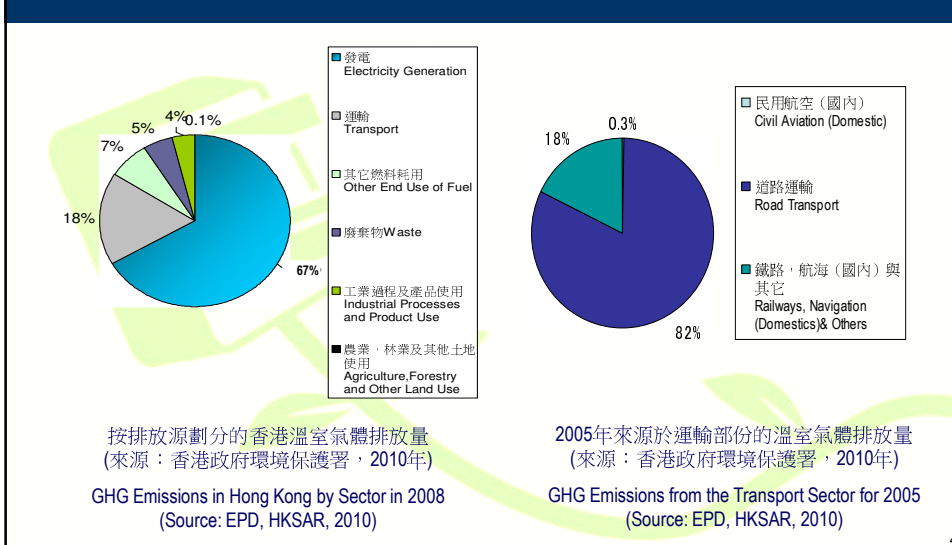
氣候變化 Climate Change

香港政府應對氣候變化的議程
Hong Kong Government's Agenda to Combat the Climate Change



溫室氣體排放 Greenhouse Gas Emissions

香港各業界的溫室氣體排放 Greenhouse Gas Emissions in Hong Kong by Sector



溫室氣體排放 Greenhouse Gas Emissions

陸路交通碳排放減少目標 Road Transport Carbon Emission Reduction Target

- 假設私家車和專用車將每年增長1%
Assuming private cars and special purpose vehicles to grow by 1% per annum
- 減碳排放潛力≈1000千噸（來源：香港特區政府顧問）
The carbon abatement potential ≈1,000 kt (from HKSAR Government's consultant)
- 假設公路運輸溫室氣體排放量的份額與2005年保持相同 82%
Assuming road transport's share of GHG emissions remaining constant at 82% as in 2005

Vehicle Type	2005 (actual)	2010 (actual)	2020 (estimated)
Motor Cycles	34,025	38,008	38,008
Private Cars	350,753	414,966	457,500
Taxis	18,010	18,131	18,131
Buses	13,272	13,210	13,210
Light Buses	6,204	6,425	6,425
Light Goods Vehicles	68,610	69,177	69,177
Heavy Goods vehicles	42,379	40,239	40,239
Special Purpose Vehicles	994	1,325	1,458
Government Vehicles	6,394	6,315	6,315
Total	540,641	607,796	650,463

2020年道路交通的減排目標：
Reduction Target from the Road Transport for 2020:
1000kt * 82% = 820kt千噸

環保運輸 Green Transportation

環保運輸措施 Approaches to Green Transportation



環保運輸 Green Transportation

2020年環保運輸之選擇 Options for Green Transportation for 2020

不同方案下的減碳估計 Estimated carbon reduction in different scenarios

措施 Measures	基本方案 Base Case	方案1 Scenario 1	方案2 Scenario 2	方案3 Scenario 3
電動車滲透率 Penetration rates of EV	0%	30% of private cars, 15% of buses, HGV & LGV	-	5% of motor cycles, private cars, taxis and HGV, 10% of buses & LGV, 15% of Special Purpose Vehicle and Government Vehicle
使用生化燃料 Application of biofuels	0%	-	Petrol blended with 5% ethanol and diesel blended with 5% Biodiesel	Petrol blended with 10% ethanol and diesel blended with 10% Biodiesel Petrol blended with 5% ethanol and diesel blended with 5% Biodiesel
提高汽車效率 Enhancement on vehicle efficiency	0%	-	New vehicles will be 10% more energy efficient than the 2005 market average	New vehicles will be 20% more energy efficient than the 2005 market average New vehicles will be 10% more energy efficient than the 2005 market average
碳排放減少量 Reduction of Carbon Emission (kt)	0	656	775	1,516 976

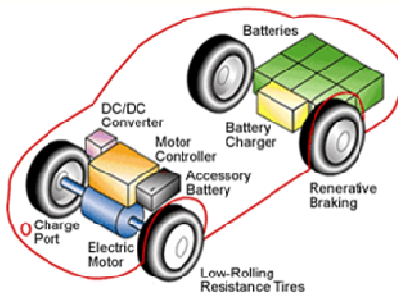
■ 減少量 Reduction < 820kt
■ 減少量 Reduction > 820kt

電動車應用 Adoption of Electric Vehicles

挑戰 Challenges

電動車的挑戰 Challenges in Adoption of Electric Vehicles

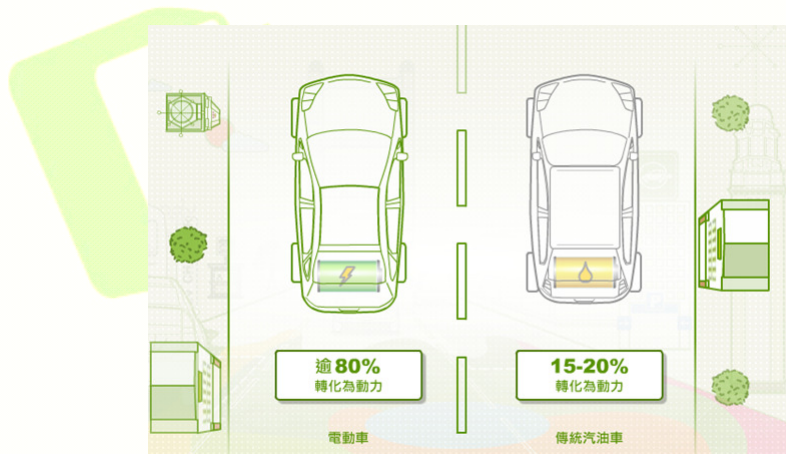




ELECTRIC VEHICLES 電動車

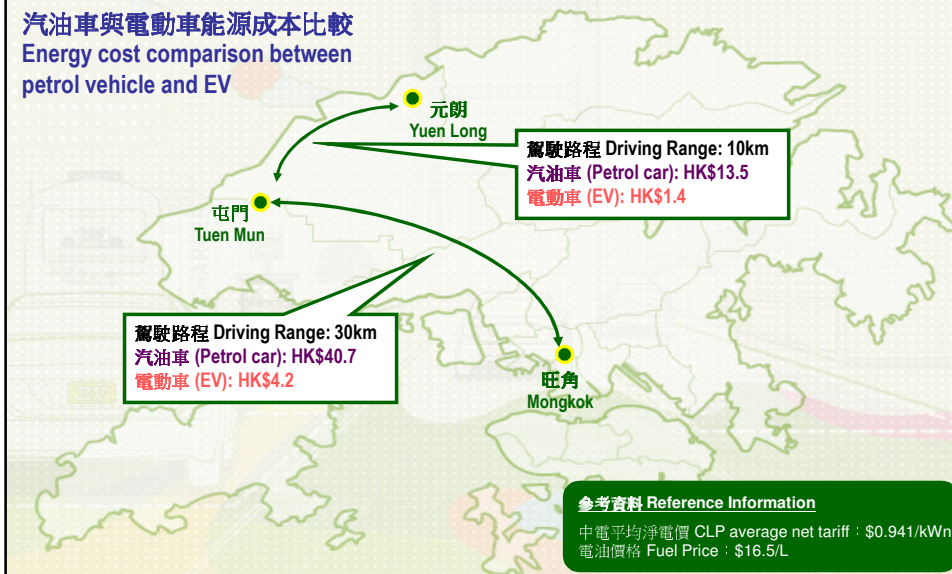
電動車的優點 - 高能源效益 Benefits of Electric Vehicles - Energy Efficiency

- 相對於普通電油車15-20%的轉換效率，電動車可將超過80%的能源轉換為動力
EV converts over 80% of their input energy into usable power, compared to 15-20% for conventional petrol vehicles



電動車的優點 - 經濟
Benefits of Electric Vehicles – Economical

汽油車與電動車能源成本比較
Energy cost comparison between petrol vehicle and EV

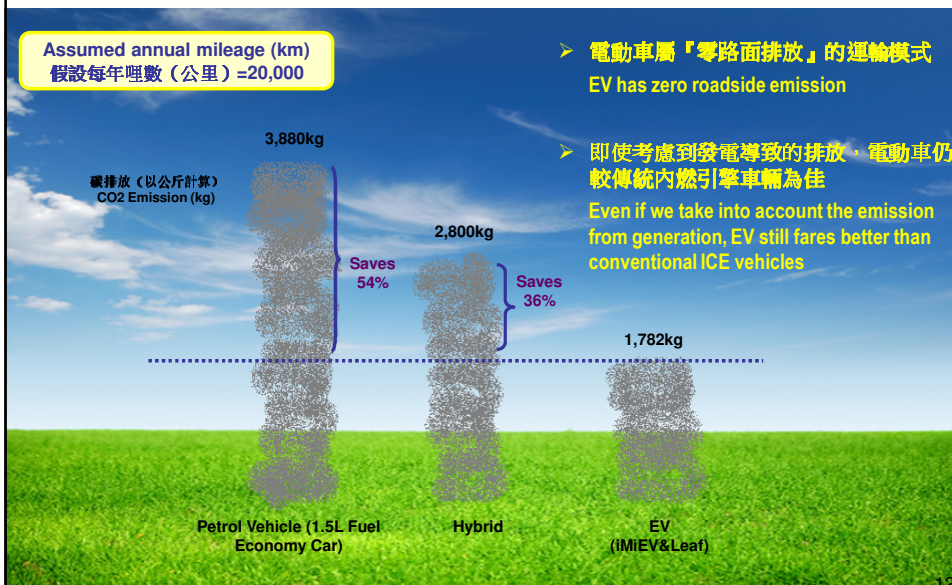


電動車的優點 - 零路面排放
Benefits of Electric Vehicles – Zero Roadside Emission

Assumed annual mileage (km)
假設每年哩數 (公里) = 20,000

➢ 電動車屬「零路面排放」的運輸模式
EV has zero roadside emission

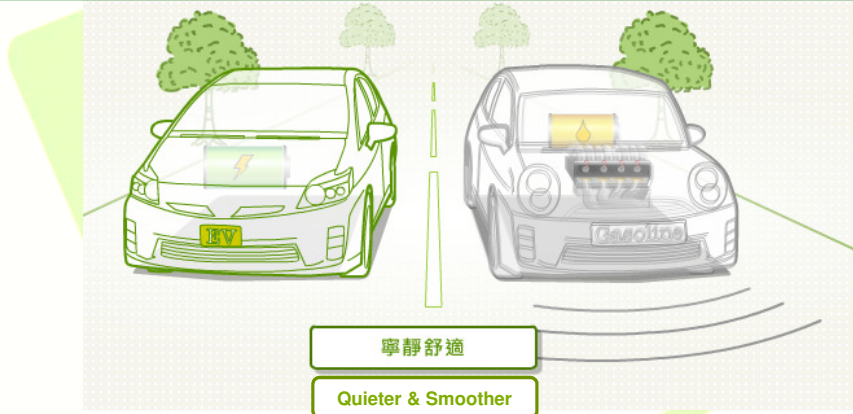
➢ 即使考慮到發電導致的排放，電動車仍較傳統內燃引擎車輛為佳
Even if we take into account the emission from generation, EV still fares better than conventional ICE vehicles



電動車的優點 - 寧靜舒適
Benefits of Electric Vehicles – Quiet

電動車的馬達無須經化學燃燒推動，故其產生的震盪及嘈音比傳統汽油引擎輕微得多。

Electric Motor do not rely on a chemical combustion process, they produce almost no vibration and noise compared to a conventional combustion engine.



CLP EV Fleet
中電的電動車

中電的電動車使用情況
CLP's EV Fleet

- 早於1984年已首度於中電工作車隊引入電動車
CLP first usage of EV can be dated back as early as 1984
- 現有電動車隊包括 Current EV Fleet includes :



Nissan Leaf



- ☞ 純電動Citroen Berlingo貨車 Pure Electric Panel Van - Citroen Berlingo
- ☞ 改裝的充電式油電混合動力汽車 Converted Plug-in Hybrid Prius
- ☞ 純電動私家車 iMiEV及Leaf Pure Electric Sedan Car - iMiEV & Leaf
- ☞ 純電動 Smith貨車、小巴、及大型貨車 Pure Electric Truck, mini-bus, and panel van - Smith



- 日後仍會陸續引入不同電動車類別，身體力行向公眾作推廣。
We will continue to introduce more EV to our fleet and prove its performance & versatility to the society.

中電電動車工作車隊：2011年計劃會引入的零排放車輛
CLP EV Fleet : The Zero Emission Vehicles plan to arrive in 2011

Already arrived - Pending road license	Already arrived	Already arrived Pending inspection by TD		
Converted VW Golf Variant	Nissan Leaf	Smith Truck	Great Dragon Single-deck Bus	Great Dragon Double-deck Bus
Range: 200km	Range: 160km	Range: 200km	Range: 250km	Range: 200km
Top speed: 150km/h	Top speed: 140km/h	Top speed: 80km/h	Top speed: 80km/h	Top speed: 80km/h
Motor Max. Power: 150kW	Motor Max. Power: 80kW	Motor Max. Power: 120kW	Motor Max. Power: 150kW	Motor Max. Power: 225kW
Battery Capacity: 37kWh	Battery Capacity: 24kWh	Battery Capacity: 80kWh	Battery Capacity: 360kWh	Battery Capacity: 360kWh

未來1-2年有機會到香港的右軚電動車
 Right Hand Drive (RHD) Electric Vehicles may available in HK in coming 1-2 years

私家車 Private Car

Mercedes-benz:
Smart fortwo



BMW



Renault: Fluence



Roadster:
Tesla Model S



BYD: e6



Detroit Electric:
E-Persona



輕型貨車 Van

Renault: KANGOO



Fiat: Electric Doblo



Toyota:
Plug-in Hybrid Prius



巴士 Bus

BYD: K9C



CHARGING
INFRASTRUCTURE

充電配套設施

香港電動車充電配套設施的發展
EV Charging Infrastructure Development in Hong Kong

充電的類別：根據充電所需的時間 / 頻密性來計劃
Types of Charging: Shaped by how much time for / frequency of charging

充電的類別 Charging Type	程度 Level	地點 Where	使用率 Utilization
基礎 Base	標準的交流電 Std AC	家/辦公室 Homes/ Offices	  
機會 Opportunity	標準的交流電 Std AC	商場/公眾停車場 Malls/ Public carpark	  
緊急 Urgent	快速的直流電 Quick DC	邊遠地區，市區策略性地點，邊境，增值服務 Outlying areas, strategic urban areas, borders, value added service	 

香港電動車充電配套設施的發展
EV Charging Infrastructure Development in Hong Kong

香港獨有的環境需要有一套不同的處理手法...
Hong Kong Environment is unique which calls for a slightly different approach...

人們泊車的地方 Where People Park...



其他國家
Other Countries



香港
Hong Kong

- 車房 / 車棚
Garages / Carports
- 街邊 / 路邊
Roadside / Curbside
- 很少私人車房
Minimal personal garages
- 很少路邊泊位
Very few Curbside (~17,800 spots)
- 大部分泊位位於多層停車場
Vast majority of parking is in car parks (~605,000 spots)



香港電動車充電配套設施的發展 EV Charging Infrastructure Development in Hong Kong

香港獨有的環境需要有一套不同的處理手法...
Hong Kong Environment is unique which calls for a slightly different approach...

你有多少地方可以利用 How much space do you have to work with?



其他國家
Other Countries

- 可利用的實則地方通常不是主要問題
Availability of physical space is typically not a major issue
- 可容納現有充電器之體積
Size of currently available chargers is fine



香港
Hong Kong

- 可利用的實則地方通常是主要問題
Availability of physical space is typically a major issue
- 需要細小及堅固耐用的充電器
Need unobtrusive, small and robust chargers



香港電動車充電配套設施的發展 EV Charging Infrastructure Development in Hong Kong

在香港，一套可行的充電配套設施需要...
For Hong Kong, a viable charging infrastructure will have to be....

- 以在停車場為方向 – 包括公眾及私人停車場
Oriented towards car parks – both public and private
- 小巧及有效率運用空間
Compact and space-efficient
- 容易及花費不多的安裝
Easy and inexpensive to install
- 容易於日後擴展
Scalable
- “恰當”的充電器配合“恰當”的地點及應用性
“Right” type of charging for the “right” places and applications
- 容易使用及容易理解



建造電動車充電站的挑戰 Challenge in setting up EV Charging Stations

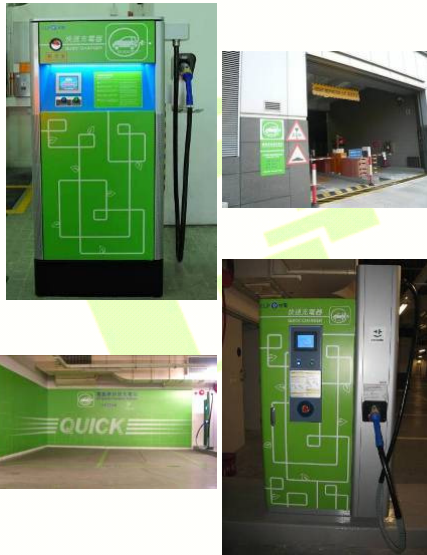
- **電源供應 Power supply**
 - 沒有立刻可應用的後備電源去為電動車充電
No spare capacity is immediately available for extension for charging of EV
 - 在適合的泊車位可能需要超過100米長的電源伸延
Extension could be in excess of 100m from the selected park bays
 - 進行低壓系統配電改善工程時需要暫停電力供應
Shut down and outage is required for retrofitting LV distribution system
- **充電點的選擇 Selection of charging point**
 - 停車場管理人傾向選擇限制電動車專用泊位的數量在一些低流量的位置，以便預留高用量的車位給其他月租用家
Carpark management opts to limit the number of dedicated parking bays where low traffic area whilst reserve high occupancy area for monthly rental user
- **操作上的安全 Operational safety**
 - 用閉路電視監察附有充電設備的泊車位
CCTV monitoring the park bays with Charging facilities
 - 在充電設備旁邊要放置滅火設備
Fire extinguisher to be arranged next to charging facilities
 - 設有緊急暫停掣以便可需要時中斷電力供應
Emergency stop for interrupting the power supply

電電動車充電 標準充電 EV Charging – Standard Charging

- 13A, 220V 供電
13A, 220 V Power Supply
- 於6–8小時為電動車電池注滿電量
Takes 6-8 hours to charge from zero to full
- “日常主要” 充電用途
“Base” charging purpose
- 直至2011年9月，中電已於九龍和新界共設立了28個電動車公眾充電站，提供了113個充電點
CLP has set up 28 public EV charging stations with 113 charging points in Kowloon & NT till September 2011
- 中電會繼續研究及提升現有標準充電設備的功能
CLP will continuous to research and upgrade the function of our existing standard charging facilities



電動車充電 快速充電
EV Charging – Electric Vehicle Quick Charger



- 高功率供電 (50kW)
High power supply (50kW)
- 只需30分鐘便可充滿行走120公里路程的電力
Takes 30 min to power an EV to run 120km
- 用於“緊急”充電。正常使用不應該影響電池壽命
“Emergency” charging purpose. Normal usage should not have impact on battery’s lifespan
- 佔用空間較大
Takes up space
- 目前，無“普遍適用”的快速充電標準
Currently, no “universally applicable” quick charging standard
- 現有的2個快速充電站只可供日本三菱、日產、及富士生產的電動車充電
The 2 quick chargers are only compatible for the EVs manufactured by Mistubishi, Nissan or Subaru.

電動車充電 快速充電
EV Charging – Electric Vehicle Quick Charger

快速充電的網絡部署
Quick Charger Network Deployment

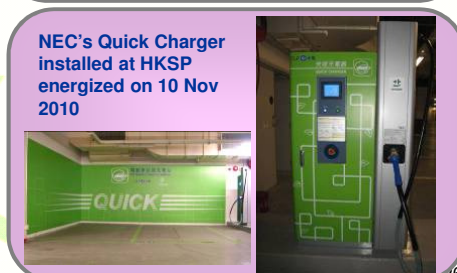
- 中電的供電範圍內已安裝了兩個快速充電站
Currently 2 Quick Chargers in CLP Supply Area
- 計劃於未來6-9個月再加裝四個
4 more Quick Chargers to be built in coming 6-9 months
- 已選定了一些策略性的地點
Strategic sites identified

Planned Sites	Lantau
	Kowloon-East
	New Territories West
	New Territories North

- 若6個快速充電站投入服務，電動車車主可於15公里範圍內尋找到快速充電器
With 6 Quick Chargers installed, can get quick charging anywhere within 15km



1st Quick Charger in HK installed in Cent. Bldg – energized in Feb 2010



NEC's Quick Charger installed at HKSP energized on 10 Nov 2010

現時在香港，九龍及新界的電動車充電站

Existing EV Charging Locations across Hong Kong, Kowloon & New Territories

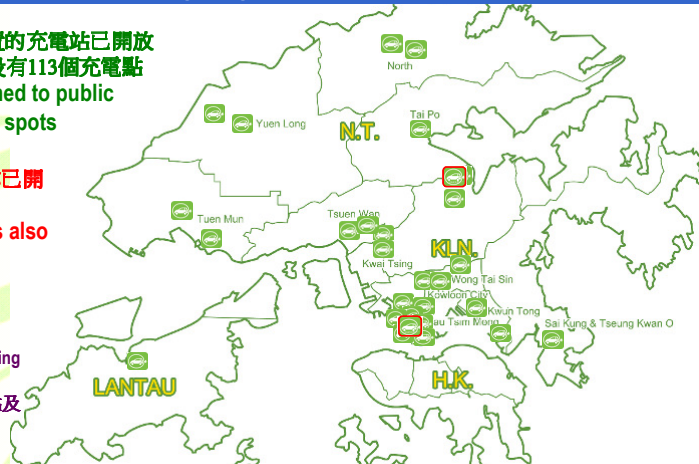


28個由中電所設置的充電站已開放給公眾使用，共設有113個充電點
28 CLP sites opened to public with 113 charging spots



2個快速充電站亦已開放給公眾使用
2 Quick Chargers also opened to public

香港島 HK Island:
1 Quick Charger & 7 Standard charging stations with 12 charging spots installed by HEC
港燈已設置了1個快速充電站及7個標準充電站共12個充電點



現時除了兩間電力公司，“香港地產建設商會”已有12個發展商及物業管理公司在旗下64個地點安裝了共179個充電設施。

Beside the 2 power companies, 12 big developers under “The Real Estates Developers Association of HK” have also installed EV charging facilities in 64 sites with 179 charging spots.

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充電配套設施方面最新發展

Charging Infrastructure Development

不同的連接器：國際標準

Different Physical Connectors : International Standards



British Standard 1363

- 3 pins 3個插腳
- Common & Ubiquitous 通用且普遍使用
- Currently used for standard charging 目前用於標準充電
- Ingress protection 入口保護
- As interim usage to support early EV charging 過渡性的使用以支持早期的電動車充電



SAE J1772-2009

- 5 contacts 5個插腳
- Single phase 單相
- 120-240 VAC 交流 120-240V
- 70A rating 額定70安培
- 16.8 kW 16.8千瓦



IEC 62196

- 7 contacts 7個插腳
- Suitable for 1 phase AC, 3 phase AC 適合單相及三相交流
- Safe lock during charge 充電時有保護鎖
- 63A rating 額定63安培
- 43kW 43千瓦

CLP joined EMSD Working Group for

“Technical Guidelines for charging infrastructure Enabling for car parks in New Development”

✓ EMSD adopted 32A(not 13A) as final circuit rating and mentioned international standard

✓ CLP commented and made further suggestions to the draft Guidelines

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充電標準最新發展

Latest Update on Charging Standard

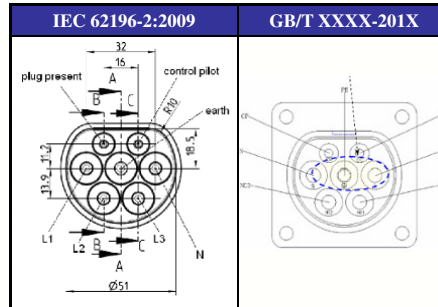
交流電充電標準 AC Charging Standard

- 國標在傳導性的電動車充電連接可兼用IEC的標準
GB/T xxxx-201x Connection set for conductive charging of electric vehicles is compatible with IEC standards,
- 在香港採用32安培為最終電路及IEC插口是適當的做法，因可與國標兼容
The 32A final circuit rating is a right approach and adoption of IEC in Hong Kong will allow alignment with the AC charging standard in Mainland

直流電充電標準 DC Charging Standard

- 中國暫不考慮採用CHAdeMO標準，因認為50kW不足夠
Mainland not following CHAdeMO standard, consider 50kW not adequate
- 中國國標正在發展100kW或以上的直流電充電
Mainland GB is developing 100kW and higher DC charging
- 需要密切監控
Need to keep closely monitoring

國標及IEC的交流電充電插口設計 AC Charging Socket Layout Defined in IEC & GB



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Promotion
&
Education

宣傳及教育

中電的電動車推廣工作 EV Promotion



- ▶ 與市民分享第一手的電動車駕駛經驗及提供符合能源效益的駕駛貼士，藉以加強社會人士對電動車運作及環保表現的認識。
Share its firsthand EV driving experience and energy-efficient driving tips with the community to raise public awareness about EV performance, both operational and environmental.

有關措施包括

Initiatives include:

- 電動車巡遊、展覽
EV Parade, Car shows and Exhibitions
- 電動車試乘試駕活動
EV Ride and Dive
- 員工周末駕駛計劃
Staff weekend driving program
- 公開發言機會
Speaking Opportunities

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中電的電動車推廣工作 EV Promotion



- ▶ 落實電動車租賃計劃，進一步支持香港政府，致力促進廣泛採用電動車
Launched the EV leasing Scheme, to expanding our support of the HK Government's efforts to promote the use of electric vehicles.
- ▶ 與政策制定者及持份者，如機電工程處、房屋署、停車場管理公司、國際電動車協會等加強溝通
Engagement with Regulator and other Stakeholders, e.g. EMSD, Housing Department, car park operators, international EV associations, etc.
- ▶ 與政府及電動車供應商合作教育推廣
Collaborate with the Government and EV suppliers on public education and promotion activities

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電動車的發展及推廣：是中電的“能源願景”中重要的一環
 Our Effort on EV Development & Promotion: An important element in CLP's "Energy Vision"

CLP's Energy Vision 中電 “能源願景”
Strengthening energy infrastructure integration with PRD

-  Strengthening Infrastructure Integration 加強基建融合
-  Adopting a Cleaner Fuel Mix 採用更潔淨的燃料組合
-  Using more gas for local power generation 增加本地燃氣發電比例
-  Importing more nuclear energy 輸入更多核電
-  Reduce reliance on coal to further cut emissions 減少依賴燃煤發電
-  Promoting local renewable energy sources 推廣本地使用可再生能源
-  Promoting energy efficiency 推廣能源效益



Contributing to the national efforts toward a low-carbon economy

THANK YOU!

謝謝！

