



The Emergence of EV Charging & How can it work for you?

Danny Winn
Sales Director - EV

Electric vehicle basics

1. The motor

- Total power: from 15 and 500 kW

2. The battery set

- Where energy is stored
- Capacity: between 5 to 100 kWh at a voltage of 300 to 500 V

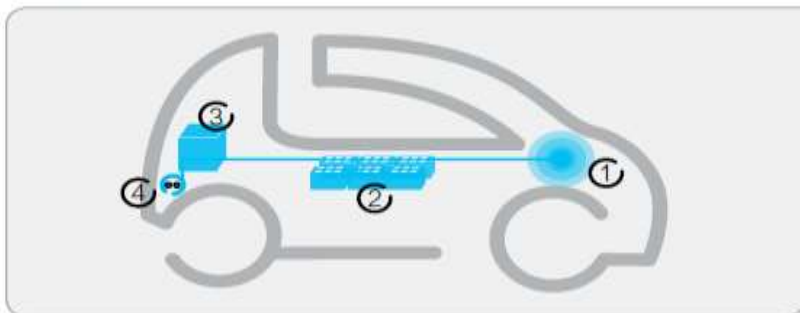
3. The on-board charger

- converting alternating current from charging station into direct current stored in the battery

4. The charging inlet

- At least one for normal (AC) charging
- Possibly a second/combined for fast (DC) charging

4 major items:



EV	Motor	Battery Set	On-board charger	Charging inlet
Renault Zoe	65 kW	41 kWh	22 kW	T2 / NA
BMW i3	125 kW	22 or 33 kWh	7 kW	T2 / Combo
Tesla Model S	Up to 440 kW	100 kWh	10 or 20 kW	T2 / Adaptor required
Nissan Leaf	80 kW	30 kWh	7 kW	T1 / CHAdeMO

Example: for a vehicle with a 24 kWh battery:

Source used	Domestic power socket	Dedicated AC power socket	Dedicated DC power socket
Power	Single-phase: 2.3 kW	Single-phase: 7.4 kW	Three-phase: 43 kW
Time to "fill up"	12h	5h	30 min
% of charge reached in 30 min	4%	10%	100%

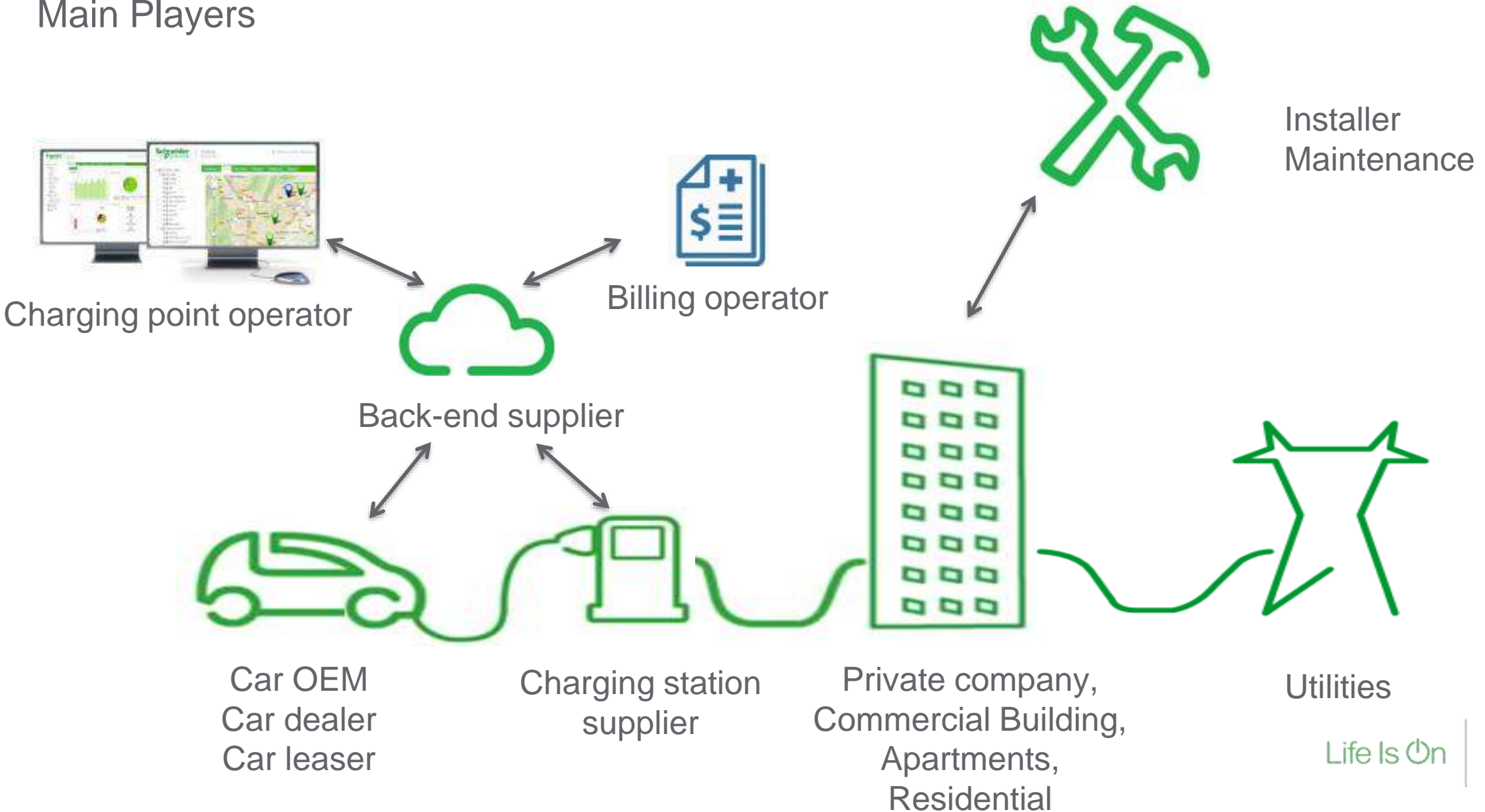
* Subject to the use of a suitable cable.

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Electric vehicle market

Main Players



The Revolution is Coming!

Projected Sales in 2000 = 900,000

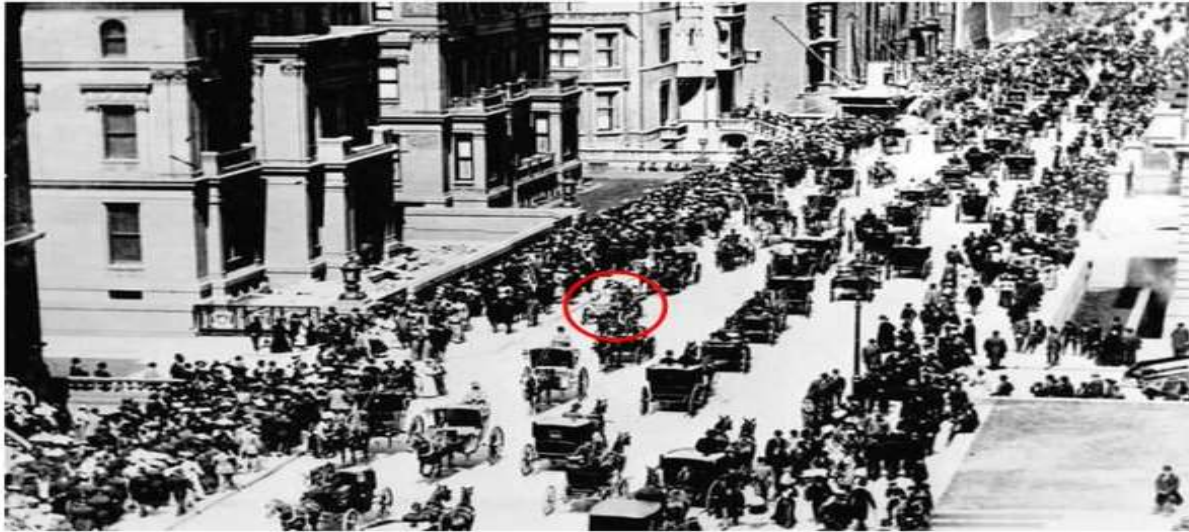
Actual Sales = 412m



AT&T



November 2007



Independent Market Assessment



Strong industry consensus that the mass-uptake of electric vehicles is approaching fast; annual sales of pure battery electric vehicles (BEV) will have increased ten-fold by 2025, resulting in **4.6M BEV** cars on the road by 2030, **13% of total car stock**. Our best view is that **£8.5bn** of Capex will be deployed in GB to 2030 across the following sectors:



Home off-street
At home or on residential street, typically overnight

CPs – 5.7m
 # CPs per site – 1
 CP type – 7kW AC

Local Fast
At station equivalent to petrol station, visited for recharge

CPs – 190k
 # CPs per site – TBC
 CP type – 50-150kW AC/DC

Destination
Whilst parked at a venue such as work, shop, hotel, etc

CPs – 330k
 # CPs per site – TBC
 CP type – 7-14kW AC

Fleet
At depot/hub for fleets including autonomous fleets

CPs – 18k
 # CPs per site – TBC
 CP type – 7-50kW AC/DC

Motorway
At station, on driver routes enabling long journeys

CPs – 1.6k
 # CPs per site – 10
 CP type – 150-350kW DC

More than News!

Star Business Journal · Technology

Ionity pushes roll-out of European charging network for electric cars

Shell to open electric vehicle charging points at UK petrol stations

Oil firm's first step into UK electric car sector allows drivers to rapid charge battery at handful of forecourts from this week



London to have Europe's largest double-decker electric bus fleet

20 June 2018

- 68 new zero-emission double-decker buses will join London's fleet next summer
- London is leading the way in cleaning up its transport network



The U.K.'s Department of Transport is pushing for greater investment in EV infrastructure in anticipation of a 2040 ban on gasoline and diesel vehicle sales.

EV CHARGE POINTS WILL BE REQUIRED IN NEW U.K. HOMES

Government aims to boost demand for electric vehicles by bolstering charging infrastructure

Britain to ban sale of all diesel and petrol cars and vans from 2040

Plans follow French commitment to take polluting vehicles off the road owing to effect of poor air quality on people's health



The Telegraph HOME NEWS

Business

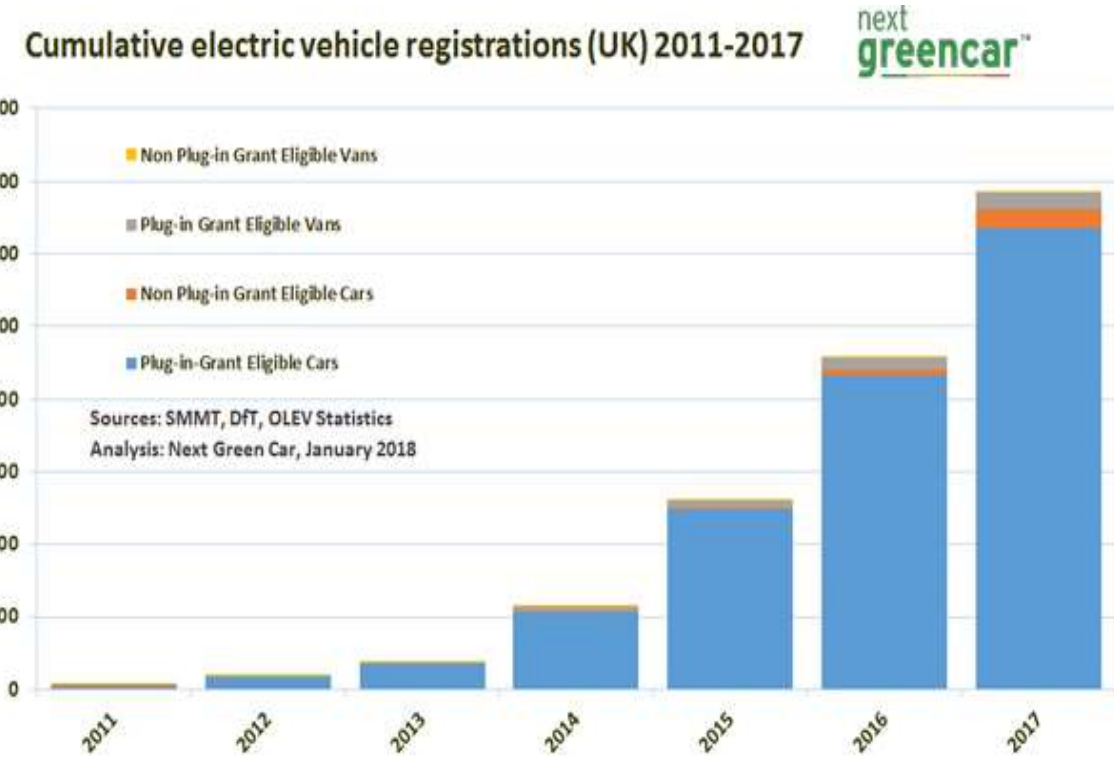
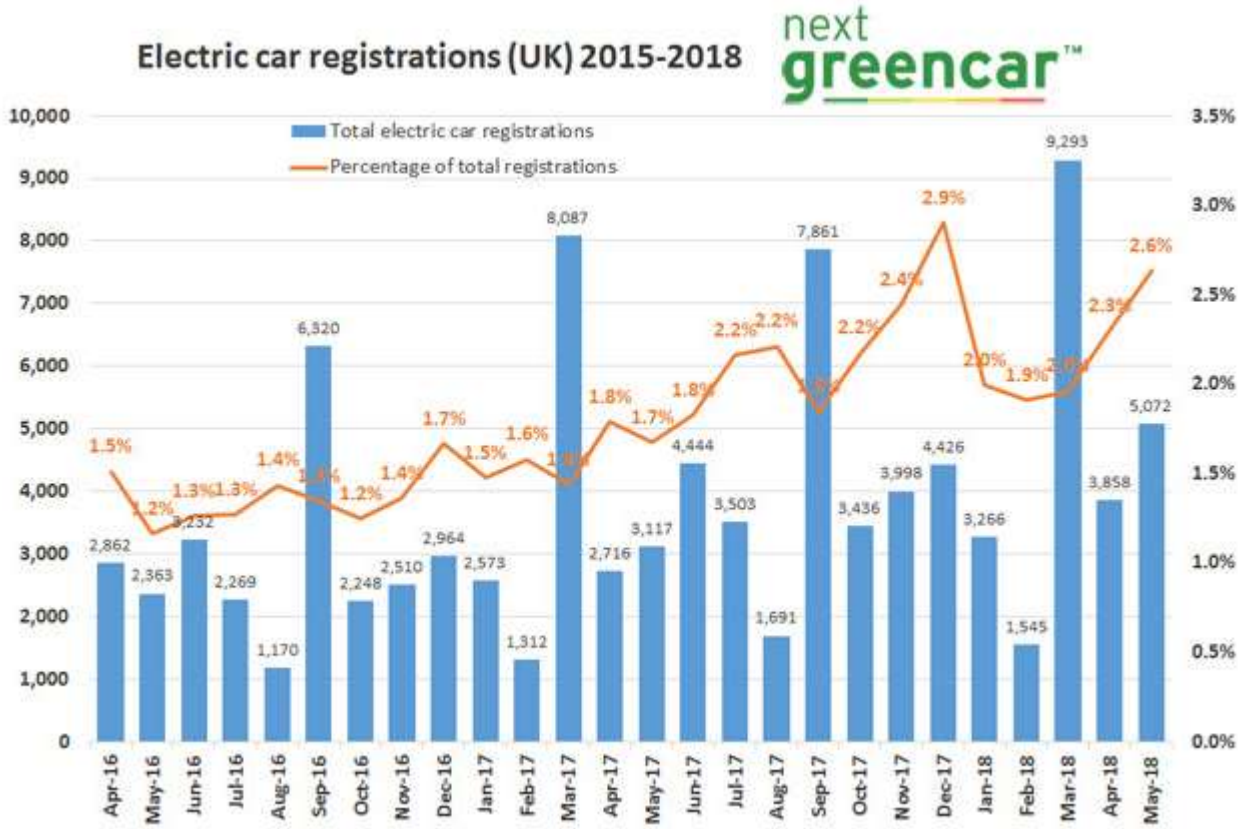
Economy · Companies · Opinion · Open economy · Markets · Alex · Telegraph Con

World's largest battery and car-charging network planned for UK

60,000

Estimated number of charging outlets needed in the U.K. by 2021

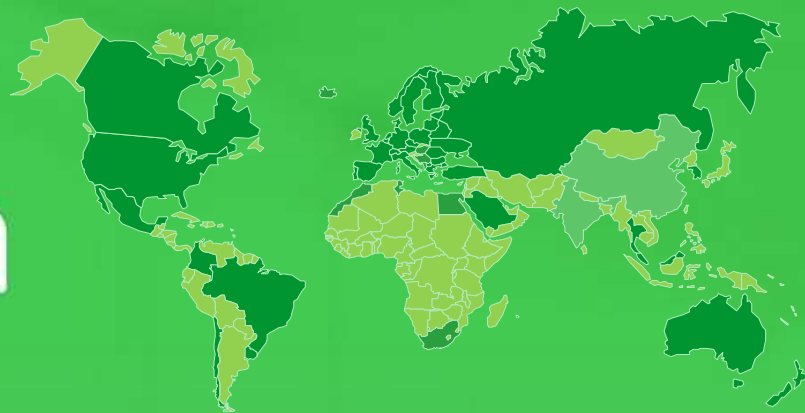
UK EV Market



EVlink is the Worldwide market leader with > 120,000 points of charge in 40+ countries

Expected to exceed 400,000 in 3 years

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EV charger is just the tip of an iceberg in EV charging value chain

What we see...

Chargers

Level1, Level2 & DC Fast

Energy Strategy

fleet analysis, facility audits,
energy market selection

Energy Sourcing

energy procurement, demand
charge mitigation, clear energy
sourcing, incentives

Microgrid & financing

PPAs, asset financing solutions,
on-site generation, storage &
resiliency

Software & Grid

data, predictive analytics, asset
mgmt, grid integration

HW infrastructure

medium & low-voltage
switchgear, metering

Services

on-demand & preventative
maintenance

edge computing

EV-AV data collection, analytics

*What could
also be needed...*



Scale will bring a set of challenges and opportunities that go beyond the charger

EV Charging as a solution

Residential Development

- Electric Vehicle Chargers x 57
- Residual Circuit Breakers x 57
- Miniature Circuit Breakers x 57
- MID Approved Meters x 57
- NSX Breakers x 4
- Panel Board Enclosures x 4
- Switch x 1
- KNX/PLC Controller x 1
- 4G Modem x 2
- Energy Management Software
- Commissioning & Set Up
- **Pull through Revenue = 65%**



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EV Charging as a solution

Residential Development

- Power Cables
- CAT5 Data Cables
- Signage & Paint
- Barriers
- Trunking & Cable Management
- Back End Software
- Tools
- PPE
- Testing Equipment
- Installation Materials
- Cluster Boards
- **Pull through Revenue =**



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Interested in EV – Not sure where to start?

Our Top Tips.....

- Understand the market and where you want to play
- Build some expertise – Invest in your people
- Strategic & Organisational focus
- Build a complete offer
- Be consultative
- Don't make it just about price!



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