

Charging Infrastructure Technology and Costs

The following is intended to provide a very brief overview of some of the standard electric vehicle charging points that are currently available. All have variations, these and further information can be found on their websites.

Participation in the Plugged in Places project will enable partners to secure up to 50% funding towards all the units shown except the rapid charger which is regarded as a more innovative technology and is only eligible for up to 25% funding.

Funding will cover the costs of the equipment and its installation.

Slow or Trickle Charging

Currently electric cars on the UK market in 2009 are capable of taking charge from an off-board 13Amp / 3kW power source. This is normally through a standard 13A plug top plugged into a mains voltage charge point. This type of charge is referred to as either 'Slow or Trickle' charging.

Trickle charging will typically recharge a discharged car battery in around 8 hours.

Fast Charging

The joined Cities charge post specification¹ has an initial 3kW charge requirement, up-rateable with minimum change to the charging post, to 7kW single phase (22A) when a standardized connector has been chosen and homologated for the purpose. The 7Kw charge rate is often referred to as 'Fast charging'

Not all cars will be able to accept the higher charge and it is assumed that retrofitted 7Kw and 3Kw with co-habit certain areas for a period of time.

Fast charging will typically recharge a discharged car battery in around 4 hours.

¹ Joined Cities or 'J Cities' as they are sometimes referred to are a group of nine Cities throughout the UK that are installing a limited network, starting 2009 and funded by the Energy Technology Institute(ETI)



Rapid Charging

Rapid Charging is a term generally used for a charge rate in excess of 50kW. A number of mainstream automotive manufacturers are cooperating on a solution to this technology. Nissan, Mitsubishi Motors, Citroen and Subaru have worked closely with the Tokyo Electric Power Company to develop a stand-alone Direct current fast charger. This product will be able to charge Mitsubishi iMiev's, Citroen C-Zero's, Nissan Leaf's and Subaru R1e's.

It is currently unclear where this infrastructure will be placed, Nissan suggest UK main dealerships, but there are obvious commercial applications for EV fuel filling stations, Motorway service centres, retail parks etc. Introduction of production vehicles from the Japanese consortium able to use the Rapid charge system could be as early as Q3 2010 for the Mitsubishi product as an advanced trial using iMiev's has been taking place in Japan for a number of years.

Rapid charging will typically recharge a discharged car battery in around 30 mins.



Mitsubishi iMIEV connected to a TEPCO Rapid charge station

(Image courtesy of Mitsubishi motors UK)



Conventional charging posts

Elektromotive, 365 Coulomb and Infracharge have charging stations installed and in use either in the U.K or overseas.

In addition, all three have been chosen to sit on the steering group, chaired by the Energy Technology Institute, to look at communizing interoperability between systems (expected Q2 2010). In addition, all three have a backroom communication operating system, which links data remotely from the charging posts to a data management and billing engines.

This mechanism will then allow direct customer billing for either:

- Energy used
- Parking Fees
- Combined Energy and Parking costs

Elektromotive (Elektrobay)

www.elektromotive.com

Currently around 200 units installed in the U.K

UK sites in most London Boroughs, Stoke, Glasgow, Norwich, Nottingham, Newcastle and Brighton. Overseas installations in Denmark, Belgium, Luxembourg, Saudi Arabia and the Netherlands.

Products include Elektrobay EB001 charging post capable of supplying 3,7,11 and 22kW loads. Wall-mount versions also available with collision protection barriers suitable for multi-storey car park installations.



RFI key tag to access lockable charging socket. Key tag identifies user and hence vehicle type. The use of electronic keys enables all of the usage data to be stored. This includes who, when and how much power has been supplied. This information can then be used for billing, statistical analysis, efficiency and maintenance calculations.

The keys can be programmed to have a finite life e.g. 6 or 12 months, or can be programmed to meter the usage in a "pay-as-you-go" credits method. The payment



methods have been designed to be “cash-less” for efficiency. Payments can also be taken directly from back office process and via billing engine.

The main visual feature of the Elektrobay is the indicator lamp at the top of the unit; this indicator enables the state of the Elektrobay to be easily seen at anytime. The indicator lamp shows three main states:

- Blue: Ready for charging
- Green: Charging
- Red: Disabled/ Out of service/ Fault

Unit fixed to ground via an anchor post. Design incorporates a sheer point in case of accidental damage. Blank off plate allows post to be removed and relocated within network.

365 Coulomb (ChargePoint)

www.coulombtech.com

The company produces various products under the name ‘ChargePoint’.

Internationally there are installations in Belgium, Netherlands, Germany and the U.S.

In May 2007, 365 Energy announced that 45 charging stations would be installed in Amsterdam as part of a two year trial. (This is out of a total of 200 charging posts in total that will be installed by the City before 2012).

Access to the system is via a swipe card mechanism. Although currently free, Coulomb anticipate the use of pre-paid swipe cards or even ATM card transactions will be possible longer term.



Pod point – Infracharge

www.pod-point.com

UK based company. Recent limited introductions in a number of London Boroughs. Recent boost by well publicized introduction in a small number of Tesco stores.

Access tag compatible with Elektromotive products.

Blue, Green and Red status indicators as Elektrobay.

Integral tilt sensor detects if unit has been knocked over, and disable unit. Sturdy Steel and Aluminum Construction.

Graffiti Resistant Powder Coat Finish. Tough Aluminum Doors, with Shear Point in Hinge.

Difficult to break off, but publicity from the company suggests 'cheap and easy to repair if abused'.

When mounted in a car park, POD Point is placed in between two car parking spaces minimizing the chance of a vehicle user reversed into it. However Tesco installations have been enclosed in a secondary protection cage to minimize accidental damage. Measurable parameters are similar to those recorded by the Elektrobay products.



Charging Street-side post cost comparison based on 24 Units

Cost per Unit	Elektromotive	Infracharge	365 Energy	Tegral
3kW	£3,000.00	£3,500.00	£3,584.53	£2,620.00
INSTALLATION PER UNIT	£2,500	£2,500	£2,500	£2,500
TRO LEGAL ORDER	£500.00	£500.00	£500.00	£500.00
TOTAL	£6,000.00	£6,500.00	£6,584.53	£5,620.00

The above indicative costs are for single charge points similar to those illustrated. Cost will vary depending on the nature of the installation since trenching and cabling are a significant component. Since installation is such a major component, costs can be almost halved by using units with two plug sockets.

