Fully Charged (electric car charging research) **update October 2018**

Fully charged is a research project designed to see if electric car charging facilities can be introduced into the county in a cost effective and beneficial way.

Previously the often-heard mantra was that you had to install RAPID chargers as people only wanted very short stops. However RAPID chargers (typically 50 kW) have a few issues:

- They are expensive at about £30k each.
- They require a large grid connection 50 kW which is not always possible.
- They need to charge a large fee, which discourages people.

Motorway service station Rapid chargers have reliability issues and a car that has run at speed for an hour or more and been rapid charged might only be slow charged.

The 'Fully Charged' project is about finding alternative ways to provide electric car charging facilities that people can use at reasonable price, availability and high reliability.

It was decided to experiment with slow chargers that can be installed on just about any building and at much lower cost (£1,000) than the (£30,000) RAPID chargers.

It was decided to install on venues where people would typically stay for a few hours or overnight. The venues have a mix of customer offerings (honey, hotel beds, garden plants) and various price points.

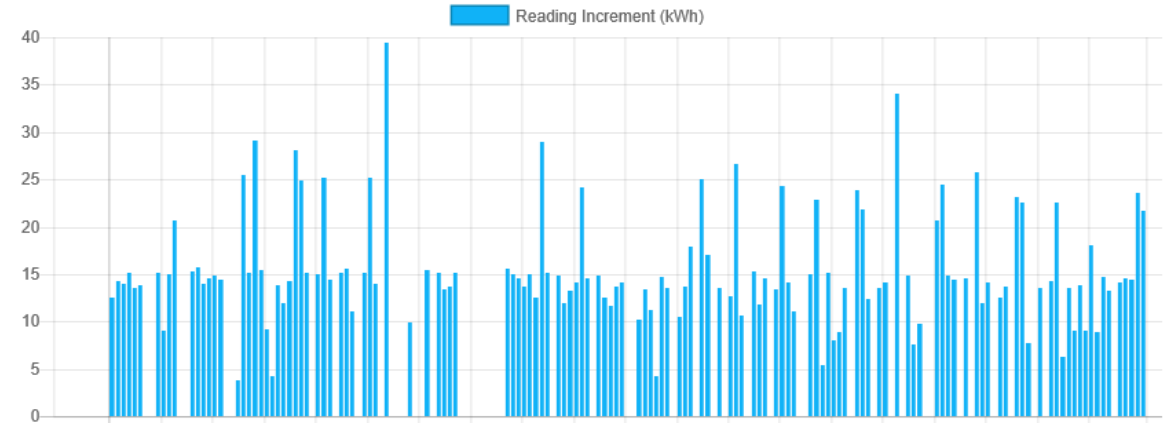
It was decided to install on a mixture of hotels, B&B's, holiday homes, garden centres, business parks, community halls and shops spread throughout the Vale of Usk region. The chargers are loaded up to ZAP map, the main EV car charging online resource.

The scheme went live in December 2017 when installation of the chargers was complete.

Venues were asked to include mention in their advertising, social media and booking system, although some venues simply said we will switch it on if someone asks to use it. **There is a small number of chargers with incomplete data as the charger is rarely switched on.**

Several charge events in Monmouth have been due to motorway rapids being out of service and no other reasonable alternative exists for people coming from the Midlands direction.

Chart from the most used charger at the Priory Hotel Caerleon



The project is coming to the end of its one-year trial and interesting findings are emerging.

1. Not surprisingly venues that promoted the charger on their website and in their booking system benefited most in an increase in sales.
2. The hotels and holiday homes that have multiple beds and longer than overnight have had a significant increase in the number of bookings.
3. Two of the hotels have regular guests (several days a week) as the hotel is often the only car charge point for miles and there are no other practical alternatives.
4. Business parks and some hotels have staff using them on a regular basis.
5. About 25% of bookings are coming via ZAP-map.

From the 20 venues the total power delivered to vehicles is 3,944 kWh.

16, 000 miles for a Nissan leaf the most popular electric car saving 3.2 tonnes of CO_2.

There were 254 charge events in the 6 months to end of June

111 of them short periods probably whilst people are in the shop or eating in the restaurant.
143 longer periods mostly overnight stays in hotels.

Provisional outcomes from the project

One other outcome from the project is the identification of more than one "market" for car charge points. We have identified 7 markets with some overlap between them:

A. There is the rapid charger's market, situated on major routes. These service long distance travellers. Rapid chargers not situated on major routes will get minimal usage and not be cost effective.

B. There is a market for chargers in tourist destinations such as castles and town car parks. These are for people who will be stopping for several hours and need a "top up" so fast chargers of 11 to 22 kW would be suitable for them as in most cases 3 hours will give a full charge.

C. There is a need for slow chargers 3 to 7 kW on destinations where people will stay overnight, typically these are hotels, B&B's and holiday homes. A hotel stay is often 12 hours or more say from 5pm to 8am and 45 kWh could be delivered in this period. A hotel could have a mixture of 3 kW for most guests and a 7 kW for larger cars like Tesla's or who are late arrivals and early departures. A 7 kW could still deliver 60 kWh in a 9 hour stop. For establishments with restaurants 7 kW and 20 kW will attract additional custom.

D. Shoppers who will spend a few hours or so in town and like to 'top up' if a charger is available. There is evidence that this encourages longer stays in town as they may also have a meal when shopping to take advantage of the time to recharge.

E. A large segment currently poorly catered for are people with hybrids and don't have a charger at home. For a Porsche hybrid electricity is much cheaper than petrol at 15 miles to the gallon.

F. Another market not yet catered for that is becoming increasingly important is people with no off-road parking. Currently they have difficulty in charging at home and a nearby car park with slow charger is a possible solution. They are effectively barred from owning and using electric vehicles. This problem needs to be sorted out, a few councils (e.g. Brighton) are allowing the use of rubber cable bridges on the pavement for the duration of the charging.

G. There is a need for chargers at places of work for visitors and workers who commute a long distance and may have less than 60% of charge remaining when arriving at work, and require the security of a charge facility to top up during the day before commuting home.

Installing chargers of higher speeds than needed increase the cost and often benefit only a minority.

There are 2 charge options for cars

1. The DC fast charger typically 50 kW although faster ones will be available soon. These are for fully electric cars often specific makes like Tesla and should not be considered as truly public. These are situated on places like motorway service stations.

2. The other option is the AC charger on all electric cars and many hybrids. These can plug into normal mains connections. There are several speeds of these. Older cars are usually 3 kW with a few 7 kW. Most new cars will be 20 kW capable and 2 or 3 hours will fully recharge them.

As a general rule all buildings can take a 3-kW charge point and many can accept a 7-kW charge point (similar to a power shower).

For 22 kW charge points 3 phase is required so they need a hotel or similar property to house them.

Stand alone chargers can be installed but they will require a dedicated grid connection at considerable added cost.

Siting of charge points

Siting of charge points needs to take these factors into account. Currently the 'mantra' has been we must only fit rapid chargers everywhere but the cost of these and very importantly the power connection needed is a major obstacle. Also, only fully electric cars can use them not hybrids and there are five times as many hybrids as fully electric on the road so there is a big market for them.

We advocate AC chargers only with a mix of connection types (1 & 2) and charging speeds.
So, for town and hotel car parks a mix of 3 kW, 7 kW and a single 20 kW would be the optimum. But in all cases the power capability of the supply is a crucial determinant to avoid unnecessary costs.

Another issue is the payment system. Currently most chargers belong to a network where you have to pre-register and pay a monthly fee or sign up by phone like some car parks. Neither are very easy nor user friendly and will discourage a lot of people.

A better option is the one we have developed that any contactless debit or credit card can use. It is fast and efficient and allows the customer to order exactly what they want and with a choice of charging speeds any electric or hybrid can use them at any time of the day or night. Simply roll up, select the charge with the connection and speed you need, then tap your card on the pad and its done.

The contactless card car charge points in Monmouth with 3kW, 7kW and 20 kW type 1 and type 2 cables

One of our pedestal units for recharging electric canal boats