

Electric Chargepoint Analysis 2017: Notes and definitions

This note provides definitions and information about the source data used in the Electric Chargepoints 2017 Analysis. As of December 2018 there are three separate publications covering the usage of chargepoints installed under three separate grant funding schemes:

Electric Chargepoint Analysis 2017: Local Authority Rapids

Electric Chargepoint Analysis 2017: Public Sector Fast

Electric Chargepoint Analysis 2017: Domestic

These notes are designed to accompany the statistical analysis in the report and aid understanding with respect to the data and statistical information within the publication. All statistics within the publication have been designated as Experimental Statistics due to this being the first time that data of this type have been published by the Department for Transport. Additionally, it has not been possible to quality assure data collection by providers, and there are differences with how the information has been recorded. As a reflection of the experimental badging being used we would welcome any feedback that readers of this publication would like to provide, via the email address provided below.

Further Information/Public Enquiries: environment.stats@dft.gov.uk

All publications, tables and underlying raw data are available on our web page:

<https://www.gov.uk/government/collections/energy-and-environment-statistics>

Data source

Local authorities, public sector bodies, train operating companies and chargepoint providers have supplied data to the Office for Low Emission Vehicles (OLEV) as a condition of receiving the grants that have part-funded the installation of electric vehicle chargepoints across the UK.

OLEV specified a number of fields to be provided for each charging event associated with a funded charger, including dates and times of plugging-in and plugging-out, the amount of charge delivered, price (where applicable) and chargepoint ID.

The various grant schemes were in operation at different times, starting in 2013. Grant recipients were required to provide usage data for a period of 3 years following the installation of a chargepoint, and OLEV has received data covering a number of calendar years. At the start of data collection in Autumn 2014, very few chargepoints had been installed. The publications and published data focus on 2017 only, as it is considered to be the most complete year available. As various grant schemes have ended and in some cases the three-year period has passed, no further data is expected for many of the funded chargepoints.

The local authorities that provided data for the rapids publication can be seen in the following list:

Aylesbury Vale District Council
Basingstoke and Deane Borough Council
Bristol City Council
Cheshire East Borough Council
City of York Council
Cornwall Council
Cotswold District Council
Cumbria County Council
Dartford Borough Council
Dudley Metropolitan Borough Council
Essex County Council
Hackney Borough Council
Hampshire County Council
Hyndburn Borough Council
King's Lynn and West Norfolk
Milton Keynes Council
Northumberland County Council
Poole Borough Council
Royal Borough of Greenwich
Slough Borough Council
South East EV (Rapid Charger) Network
South Tyneside Borough Council
Stockton-on-Tees Borough Council
West Yorkshire Combined Authority (WYCA)
Wiltshire Council
Wokingham Borough Council
Worcestershire County Council

The public sector bodies providing data for the fasts publication can be seen in the following list:

Bristol City Council
Cheshire East Borough Council
City of Bradford Metropolitan District Council
City of York Council
Cornwall Council
Croydon Council
Cumbria County Council
Defence Science and Technology Laboratory
Department for Regional Development Northern Ireland
Derbyshire Community Health Services NHS Trust
Driver and Vehicle Licensing Agency
Durham County Council
Exeter City Council
Hampshire County Council
Kent County Council
Lancashire Borough Council
Leeds City Council
London Fire and Emergency Planning Authority
Merseytravel
Milton Keynes Council
North Hertfordshire Council
Northumberland County Council
Oxford City Council
Plymouth City Council
Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust
Slough Borough Council
South East Coast Ambulance NHS Foundation Trust
South Tyneside Borough Council
Southern Health NHS Foundation Trust
Sunderland City Council
The Open University
Transport Scotland
University of Leeds
West Berkshire Council
Wiltshire Council

Domestics data was provided by a number of chargepoint providers who were able to claim the OLEV grant on behalf of the end user.

Data was recorded at the charging event level. This means that for each individual charging event, i.e. the time between a chargepoint being plugged-in and disconnected, a single row of data is supplied. Due to the Department receiving these data via a third party it was not

possible to assess the accuracy of data recording. It is important to be aware that only plug-in times, and actual charging times were available (see table below).

Though codes for User ID have also been provided in some cases, these have been eliminated from all analysis and accompanying data tables so as to ensure compliance with current data protection legislation. A particular concern here is a lack of certainty about how the data provided in this field might relate to information held and used by customers in their use of chargepoints. Consequently, to ensure anonymity, we have chosen to completely exclude this field at this time. For the same reason we have excluded address information from the domestics data.

Raw data

The data fields in the raw data files are shown below:

Data field in raw data file (units)	Description	Limitations and methodology
ChargingEvent	Each provider supplied a code for every charging event recorded. This entry can include characters, numbers or a combination of both and has no set format. Therefore in the data, these are treated as characters. These are unique identifiers.	No set format supplied, so for consistency this column is all in character format. Duplicate entries have been removed.
CPID	These are used as unique identifiers for a chargepoint, and formatted as a character.	As above
StartDate and EndDate (dd/mm/YY)	The StartDate is the date that the chargepoint registers that a customer has plugged-in their vehicle. The EndDate is the date that the chargepoint registers that the customer has disconnected from the same chargepoint. StartDate and EndDate was supplied in usual dd/mm/YY format	Charging events with either StartDate or EndDate missing have been removed, as some events lasted longer than 24 hours. Charging sessions do not end until a charging connector has been fully closed rather than when actual charging ends.
StartTime and EndTime (HH:MM:SS)	The StartTime is the time that the chargepoint registers that a customer has plugged-in their vehicle. The EndTime is the time that the chargepoint registers that the customer has disconnected from the same chargepoint.	Charging events with either StartTime or EndTime missing have been removed, as some events lasted longer than 24 hours. Charging sessions do not end until a charging connector has been fully closed rather than when actual charging ends.

		<p>Some times were accurate to the minute, and some to the second. Some local authorities had duplicate entries with two levels of accuracy, but these were identified during data cleaning and the less accurate duplicates were removed.</p> <p>Some local authorities supplied times accurate to the nearest second, while others only supplied times to the nearest minute. To improve accuracy, the values for seconds has been kept, and ones without seconds have been assigned values of HH:MM:00.</p>
Energy (kilowatt hours, kWh)	The energy supplied at each charging event was recorded in kWh. This was kept in numerical format, and no rounding was performed by DfT. Local authorities recorded the amount of energy supplied with varying degrees of accuracy, from 1 decimal place to 3 decimal places.	<p>Charging events that registered either 0 or negative charges have been removed.</p> <p>It is not clear how some entries were rounded up, and is inconsistent across the dataset.</p>
New entries in the datasets created after data collection		
Name (Rapids and Fasts)	Local authority or public sector body name, as specified by the provider.	
PluginDuration (minutes)	<p>The length of time that the chargepoint was “plugged-in” during a charging event. Note, there is no record of the length of time that charging takes place during each event.</p> <p>This has been calculated from the difference in minutes between start times and end times. Some charging events were over 24 hours in length.</p>	Datetime objects were first created and converted to UTC (Universal Time Code) format. This means when calculations are performed, daylight saving hours are taken into account. The resulting time difference was rounded up to the nearest minute.

		The way the units are designed means that charging events do not end until the charging connector has been fully closed. Users sometimes fail to close the connector properly, and while this would not draw any charge it would still register as being plugged-in. It can therefore be left open until another user closes it properly.
Additional data collected and included in the raw dataset		
Connector (Type 1, 2 & 3) (Rapids data)	<p>All rapid chargepoints come with tethered cables, and are fitted with one of three connector types. Compatibility is dependent on the manufacturer of a customer's electric vehicle.</p> <p>Typical connectors are: CHAdeMO – 50kW DC CCS – 50kW DC Type 2 – 43kW AC</p> <p>N.B: Type 2 43kW AC connectors do not correspond to what has been recorded as Type 2 at data collection.</p>	<p>Over half the data contained information about the type of connector used at the time of charge. Unfortunately, this was not consistently recorded. It was not defined how each connector type was labelled or identified. For example, labelling by type for Northumberland varied depending on the manufacturer of the chargepoint unit itself, so no analysis could be reliably performed based on this variable.</p>
Price (£) (Rapids data)	<p>Price shows the charge to the customer in £ identical to those recorded at data collection. Where a blank or dash has been supplied, the entry has been listed as NA. Where a 0 entry has been recorded, the customer has not been charged at the time of charging. Non-zero values have been recorded as numbers, to the same level of accuracy in which they have been supplied.</p>	<p>Only a minority of the data includes any entry for price. There is ambiguity whether this means customers have been billed separately, or the charging event was free or part of a subscription. Providing price data was originally a condition of the grant but this was dropped.</p>

Data cleaning

Data is taken 'as-is' with no assumptions or imputations made. As the data arrived in varying formats, a number of fields were re-formatted for consistency (e.g. the time and date fields).

A number of entries were incomplete in one way or another, and removed for analysis:

- Invalid entries, e.g. a single event recorded as almost a year in length, dates; recorded as 01/01/1970 generated by inaccurate recording at data collection;
- Charging events with zero or negative energy withdrawn (kWh);
- Charging events with plug-in events lasting 3 minutes or less (see below);
- Chargepoints that supplied energy greater than 100 kWh in one session (see below);

Rapid charging events with plug-in events lasting 3 minutes or less

The data supplied included a large number of events that were less than or equal to 3 minutes in length, and many of these had no energy drawn during plugging-in.

This may be the result of a user's lack of experience with electric vehicles, or with many instances, it may be a test event performed by those maintaining the chargepoint. Some may be a user topping up for a very short time.

The fact that a greater proportion of these events occurred in earlier years indicates that either familiarity of use or an increase in usage has reduced their incidence. However, they are enough in number to unduly influence resulting analysis if they were to be included.

Rapid chargepoints supplying energy greater than 100 kWh in a single charging event

Given that standard electric vehicles including extended range cars such as Teslas do not have battery capacities that can charge more than 100 kWh in one session, chargepoints supplying charges greater than 100 kWh are assumed to be erroneous entries, and may have been used to charge electric buses. These chargepoints registered events that supplied up to 287 kWh. Results from these chargepoints would unduly influence the analysis if included. As charging events had not been classified at the time of data collection, there is no way of separating events by vehicle type on an individual case by case basis.

Where we have excluded records from the analysis, we have published them separately as 'incomplete or anomalous raw data'.