



Department for Transport

Electric Chargepoint Analysis 2017: Domestic

About this release

This release presents experimental statistics on the usage of domestic electric vehicle chargepoints funded by the Office for Low Emission Vehicles (OLEV). Several providers of chargepoints provided data to OLEV as a condition of the grant scheme. Complete data is only available for 2017.

The Local Authority Grant Fund was set up in 2013 by the Office for Low Emission Vehicles (OLEV) to deliver recharging infrastructure in the UK. This analysis has been produced to help support and inform the strategy for ultra low emission vehicles in the UK.

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Standard chargers
3kW



Fast chargers
7kW – 22kW



Rapid chargers
Above 22kW

Key findings:

- Energy supplied** The median average energy supplied by domestic charging events was 7.5 kWh. The mean average energy supplied was higher at 9.1 kWh, as a result of a relatively small number of high charge events from vehicles with larger-capacity batteries.
- Plug-in duration** There are two main types of charging event for domestic chargers; overnight charges of between 9 and 20 hours, and shorter events of less than 5 hours which tend to start earlier in the day. The median plug-in duration was 10 hours 48 minutes.
- Time and day of plugging-in** Domestic charging events were slightly more frequent on weekdays. There was a fairly consistent pattern across the days of the week, in that domestic charging events tend to start in the late afternoon and evening.

Data represents the time that the vehicle was plugged in. It is not possible to identify when the vehicle was actually drawing charge.

All analyses are restricted to those charging events that actually drew some positive charge. Plug-in events that registered no electric charge or were less than or equal to 3 minutes in length were excluded. Please see the notes and limitations section for more details.

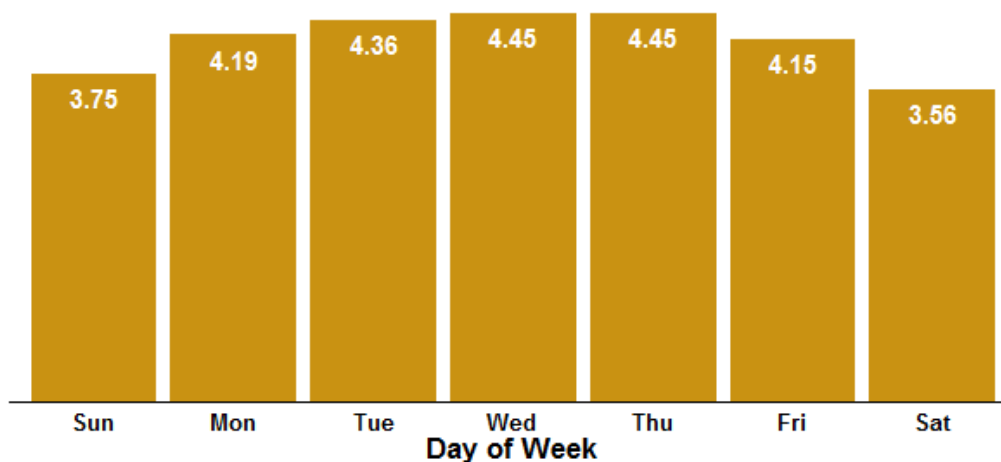
What is a domestic chargepoint?

The Office for Low Emission Vehicles has provided funding for the installation of chargepoints via a number of grant schemes, including funding of up to 75% towards the cost of installing electric vehicle chargepoints at domestic properties across the UK. Funding is available for a range of chargepoint models with rated power of 3 kW to 22 kW, however it is expected that the majority of domestic chargepoints will be 3 kW or 7 kW. **For more details see p8.**

It is not expected that the data included in this analysis will cover all domestic chargepoints as users may have obtained a home charger without funding. It is also possible to charge a plug-in car with a standard 3-pin plug and users may choose that option.

There were 3.2 million charging events recorded across approximately 25,000 funded domestic chargepoints. The total energy supplied during 2017 was 28 million kilowatt hours (kWh).

Total energy supplied in domestic charging events in 2017 (million kWh)



Energy Supplied

The median average energy drawn from domestic chargepoints was 7.5 kWh per charge in 2017, whilst the mean average was 9.1 kWh. This difference is caused by the 4% of charging events that were greater than 25 kWh, which influence the mean value more than the median.

70% of charging events drew less than 10 kWh. There is a peak at 8-9 kWh, with a sharp decline afterwards. Given the battery capacity of popular plug-in vehicles, such as the Mitsubishi Outlander (a plug-in hybrid with a battery capacity of 12.0 kWh at the time of publication), and that in practice, vehicles will rarely need to charge from zero, this finding is consistent with expectations.

Charging events drawing greater than 30 kWh could be attributed to fully electric vehicles with larger capacity batteries such as the latest Nissan Leaf, while smaller amounts can represent charges for a wide range of vehicles including plug-in hybrids.

51 charging events drew between 70 kWh and 100 kWh of energy. Events drawing more than 100 kWh are considered likely to be data anomalies and excluded from the analysis.

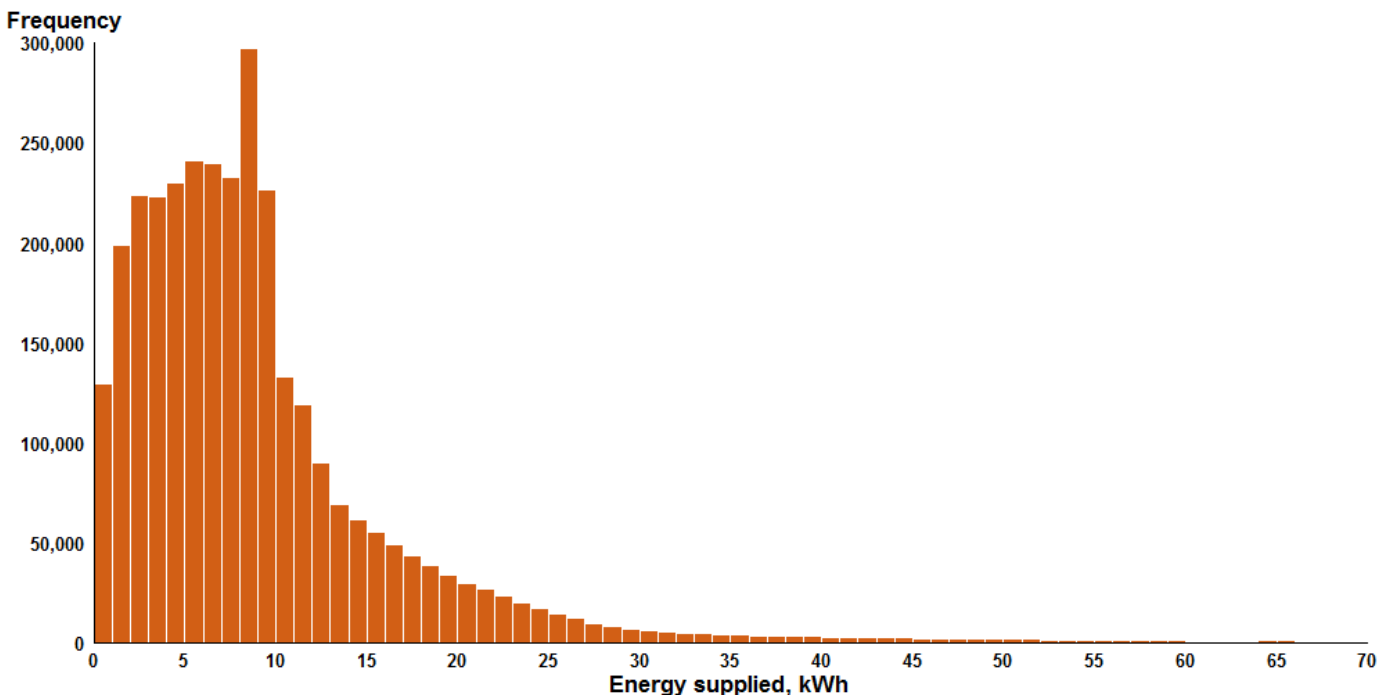
Why do we use median averages to examine chargepoint data?

The mean and median are both measurements that attempt to capture the centre point in a data set.

The mean is usually called the “average” and takes into account every number in the dataset. The median is the middle value, so that half of the values are below it, and half are above.

Chargepoint data follows a skewed pattern with a large number of short charging events and a long tail of longer events. The mean is more influenced by very long events so this publication typically uses the median average to describe the data.

Distribution of energy drawn for domestic charging events in 2017



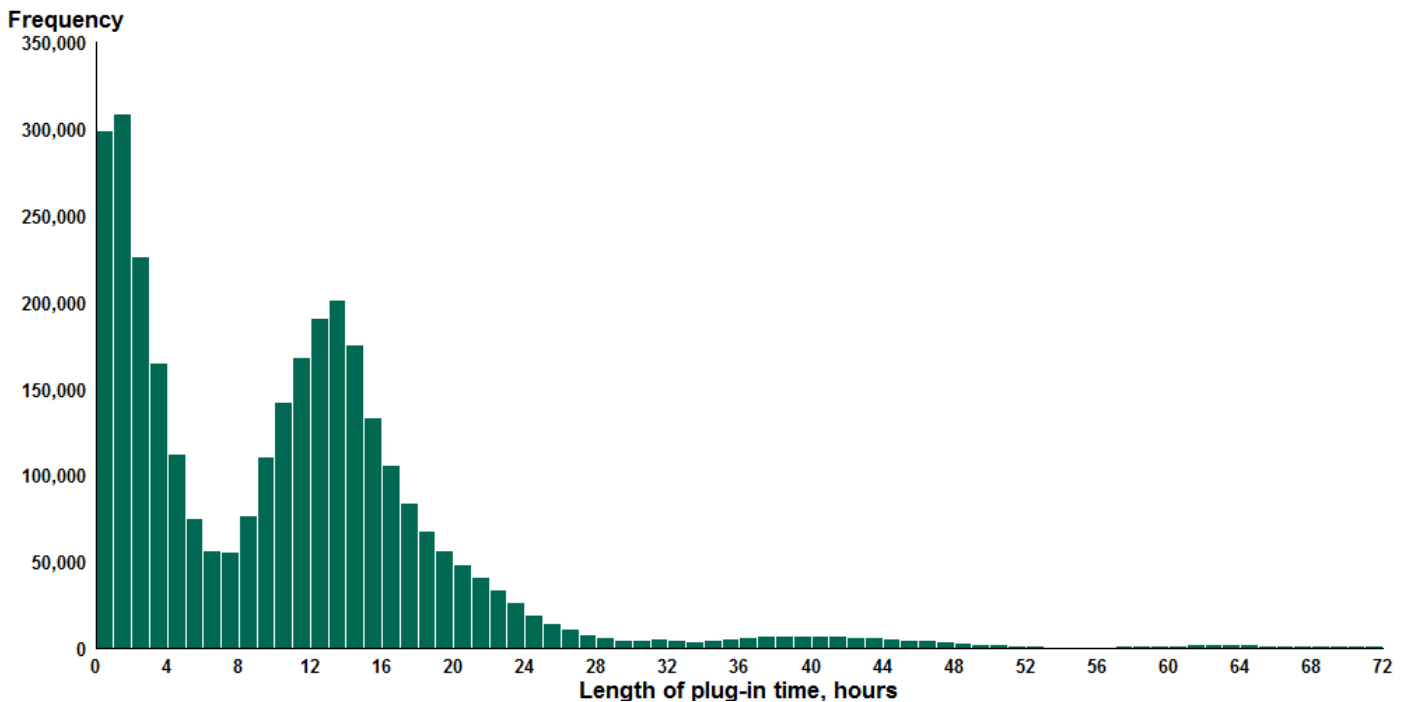
Charging events supplying more than 70 kWh are not shown here.

Plug-In Duration

There are two types of charging event evident in the data, with one cluster of short events less than 5 hours in duration, and a further cluster of events around 9 - 15 hours which may be associated with overnight charging. 35% of plug-in times were less than 5 hours, with events of this length tending to start before mid-afternoon. A further 31% of plug-in times were 9-15 hours in length. 7% of plug-in times exceeded 24 hours, with 7,000 events recorded as lasting longer than a week.

The mean plug-in time was 12 hours 41 minutes, though the median plug-in time was shorter at 10 hours 48 minutes.

Plug-in duration for domestic charging events in 2017



Data was only available on the duration the vehicle was plugged-in rather than the actual charging duration. Less than 1% of charging events were longer than 72 hours, and are not shown in this chart.

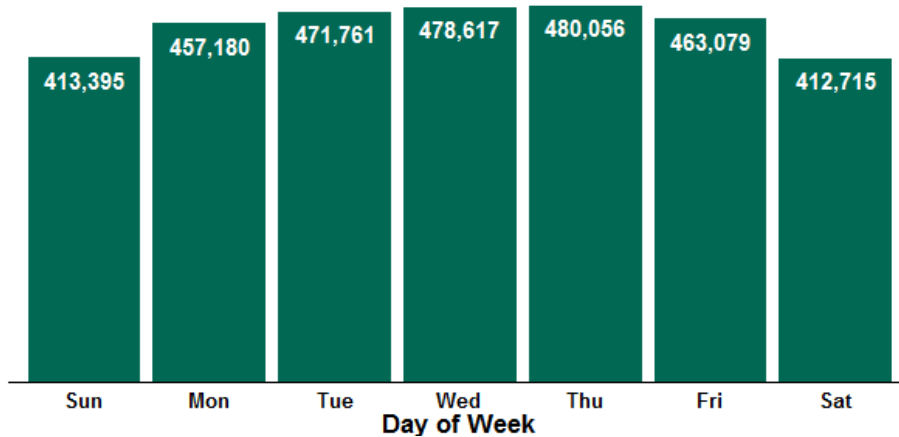
Day of Plugging-In

Number of charging events

Charging events were fairly evenly distributed across the week, with the proportion of charging events recorded per day ranging between 13% and 15%.

Saturdays and Sundays were slightly less popular than weekdays, with the proportion of charging events being 13% on each day. This might suggest that plug-in cars are used for work-related journeys and charged after work with less usage and need for charging on the weekend.

Number of charging events on each day of the week, 2017



Energy supplied

There is little variation in the average energy supplied across the days of the week, with the exception of Saturday charges which tend to have smaller amounts drawn, as shown in the table below. Caution is advised when interpreting small differences, as some of the charging data is accurate to only one decimal place.

Day of the week	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Median energy supplied, kWh	7.4	7.6	7.7	7.8	7.7	7.3	6.9
Mean energy supplied, kWh	9.1	9.2	9.2	9.3	9.3	9.0	8.6

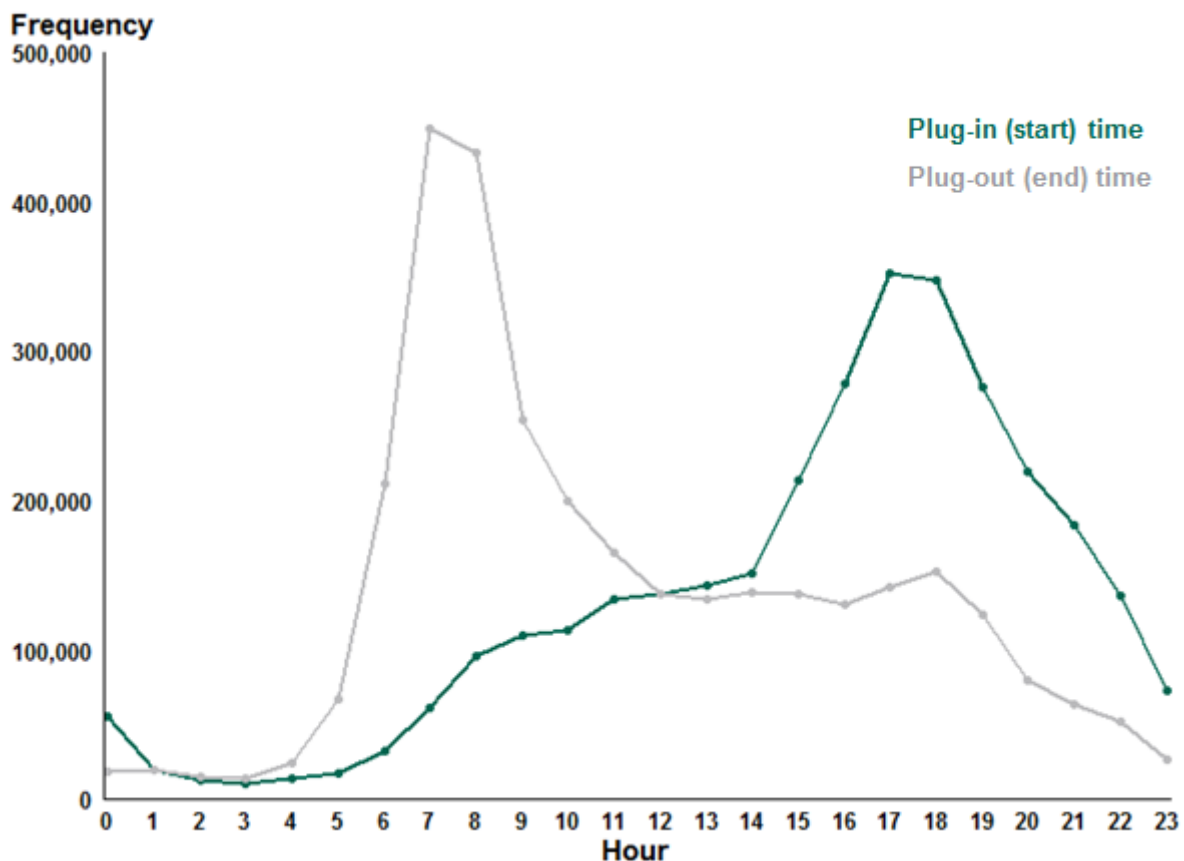
Plug-in duration

The mean plug-in duration for each day of the week ranged between approximately 12 and 14 hours. The mean plug-in duration was larger than the median, which was fairly consistent throughout the week, except for Saturday which had a lower median duration of just over 10 hours, and Sunday which had a slightly higher median at 11 hours 26 minutes.

Day of the week	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Median plug-in time	11h 26m	10h 55m	10h 42m	10h 38m	10h 29m	10h 50m	10h 6m
Mean plug-in time	13h 31m	12h 4m	11h 57m	11h 57m	12h 02m	13h 51m	13h 42m

Time of Plugging-In

Number of charging events by plug-in start and end time, domestic chargepoints 2017



Frequencies are shown in 'top-of-the-hour' format, so that the point at 12 hours represents events occurring between 12:00 and 13:00.

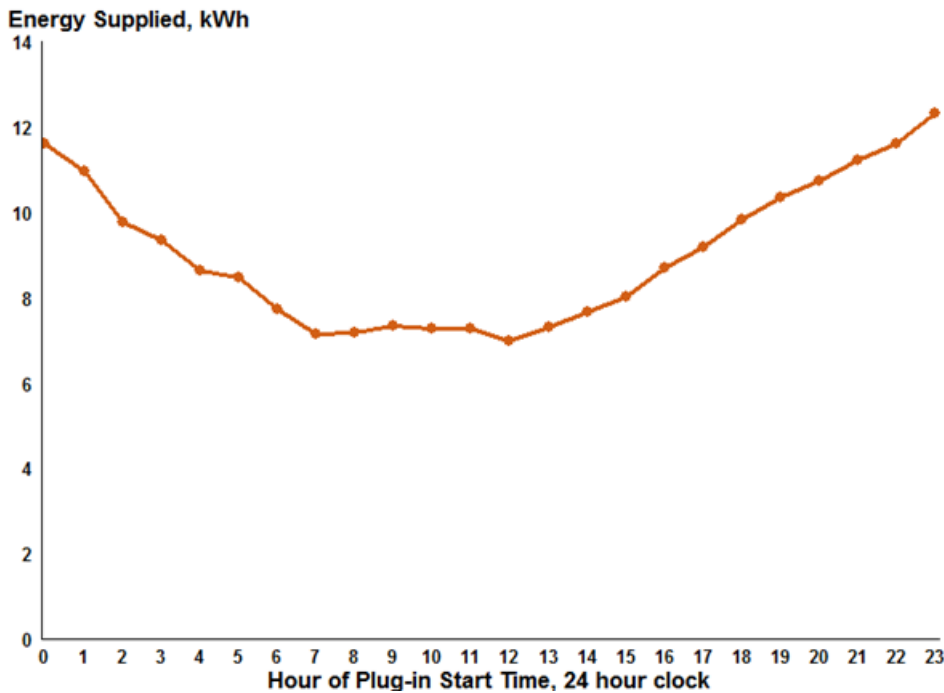
Domestic charging events tend to start in the late afternoon and evening. The most popular time for plugging in was between 17:00 and 18:59, with 22% of all charging events starting in this window. Only 21% of domestic events started between midnight and midday. Conversely, the most common plug-out time was between 07:00 and 09:00, suggesting that domestic charging tends to fit around a work day, as might be expected.

The pattern for plug-in times on Saturdays and Sundays was slightly different, with charging events more evenly spread throughout the daylight hours, and a less pronounced peak in the evening.

Domestic charging has a noticeably different profile to charging patterns for chargepoints in public places, as can be seen in our other chargepoint publications on Local Authority Rapids and Public Sector Fasts. It suggests that it is common for plug-in vehicle owners to charge overnight at home, and perhaps use the more powerful public chargepoints to top up during the day.

Time of Plugging-In (continued)

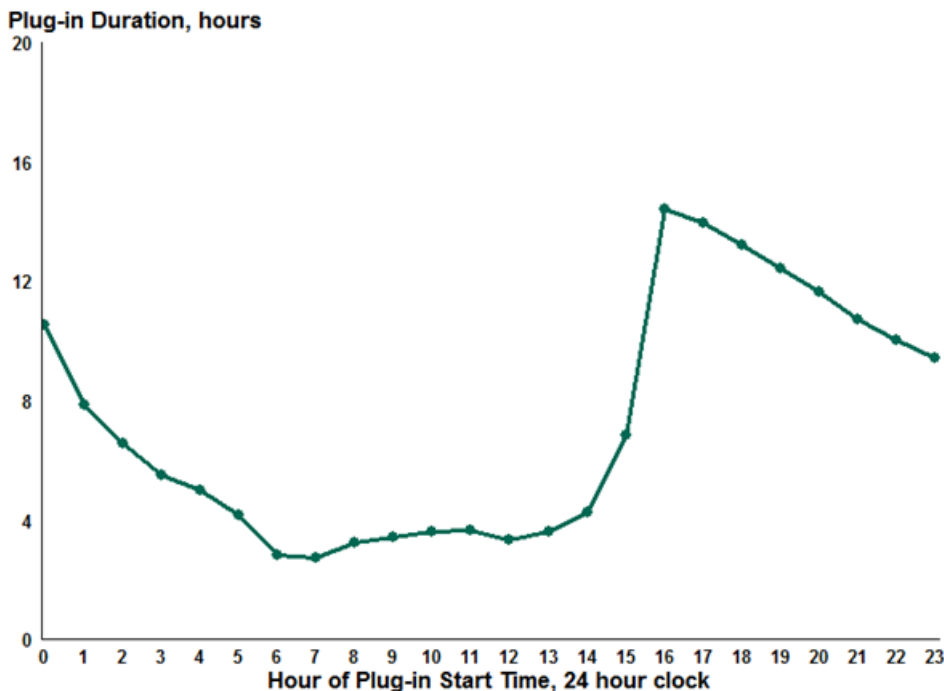
Median average energy supplied by hour of start time, domestic chargepoints 2017



There is some variation in the average energy supplied by events starting at different times of the day, with events starting between 06:00 and 13:00 delivering less energy than those starting at other times.

This suggests that morning events tend to be top-ups, with evening events delivering fuller charges.

Median average duration of plug-in by hour of start time, domestic chargepoints 2017



Plug-in durations vary depending on the start time. The peak duration comes at 16:00 with a consistent decline in duration through the evening hours. This corresponds with the peak plug-out times of 07:00 to 09:00.

Plug-in durations at other times are much shorter, which is consistent with the lower average energy supplied at these times.

Frequencies are shown in 'top-of-the-hour' format.

Background Notes and Limitations of the Data

In February 2013 the Secretary of State for Transport announced a series of grant schemes for plug-in vehicle chargepoints. There were various National Infrastructure Schemes (Public Sector Estate, Train Stations and Local Authority Rapids), which funded charging infrastructure (over 580 fast chargepoints and 250 rapids) between 2013 and 2015. All three national infrastructure schemes ended in 2015.

Domestic chargepoints have been funded under the Domestic Recharging Scheme which ended on 31 August 2014, and the Electric Vehicle Homecharge Scheme which was launched on 1 September 2014 and is still active at the time of publication. Data for this publication could come from chargepoints installed under either scheme.

As part of their project to fund both public and private chargepoints, the Office for Low Emission Vehicles (OLEV) has collated usage data from plug-in vehicle chargepoints that have been installed using Government funding. The purpose of this is to provide detail on patterns in chargepoint usage thereby informing future installations of charging infrastructure as well as wider policy.

A condition of the grant was that usage data from the chargepoints was to be provided to OLEV for a period of three years following installation. This data and analysis is being made available to help the industry grow.

This publication is one of three published by the DfT in 2018. The other publications are:

- Electric Chargepoint Analysis 2017: Local Authority Rapids, published 21 June 2018
- Electric Chargepoint Analysis 2017: Public Sector Fasts, published 13 December 2018

All publications cover the calendar year 2017. 2017 is considered to be the most complete year of data and it is not expected that there will be any domestic data published covering later dates.

Usage data from OLEV funded chargepoints is currently set to finish 3 years after each scheme's chargepoints have been installed. As chargepoints were installed at different dates, data collection will end at different times for each installation. As of 1 July 2016, the provision of data is no longer a condition of the grant for domestic installations.

Background Notes and Limitations of the Data (continued)

- All analysis is based on data as provided to OLEV. Whilst it is possible to perform some data cleaning for analysis, we have no knowledge of the robustness of the underlying data, and for this reason the statistics are badged as experimental.
- Depending on the source of the data, there can be marked differences in how the individual charging events have been recorded. With the example of charge time, some data providers have rounded their start and end time to the nearest half hour while others have provided the exact hours, minutes and seconds.
- The data from all providers had clear drops in frequency of events at cut-off dates, for example on the last day of the quarter, when data was provided on a quarterly basis. This means that any events starting in one period and ending in the next are either not recorded or not included for analysis due to our data cleaning rules. This is particularly evident on 31 December 2017 when any events starting on or before that day but finishing later will be excluded from the data.
- Some data has been excluded because it is incomplete, for example no start time or start day, end day or end time.
- There are also a number of extremely long events, and short charging events with zero energy supplied. The way that the charging units are designed means that charging sessions do not end until the charging connector has been fully closed. Users sometimes fail to close sockets properly which would lead to the plug-in duration to continue to be recorded until a new charging event starts. Though plug-in times less than or equal to 3 minutes have been removed, extremely long charging events have driven up the mean average plug-in duration considerably. Therefore care must be taken when looking at the longest plug-in times, which considered alone are potentially misleading.
- Finally, the data does not include chargepoints wholly funded by private companies or individuals as OLEV can only collect data where it has provided grant funding. Therefore when interpreting the data it is important to note that this analysis will not include every domestic chargepoint in the UK.

Background Notes and Limitations of the Data (continued)

This is part of a series of ad-hoc statistical releases on electric chargepoint data. We would welcome feedback from users of the statistics. This can be provided via environment.stats@dft.gov.uk.

Data tables. This release is a summary of the 2017 domestic chargepoint data that is available together with data tables accompanying this publication from GOV.UK: <https://www.gov.uk/government/collections/energy-and-environment-statistics>.

Notes and definitions. A technical note describing the data sources, definitions and data issues in more detail can be found alongside the publication on GOV.UK.

Experimental Statistics. These statistics are badged as Experimental Statistics. Users should exercise caution when using them or interpreting findings. The data has been provided by third parties and we do not have a full picture of how it is collected and collated. The statistics are therefore still subject to testing in terms of their validity and ability to meet customer needs. They do not meet the rigorous quality standards of National Statistics, for example with respect to partial coverage. If any issues are identified which would have a substantial impact on the findings, we will consider releasing a revised publication and data set.

Further details on the limitations of Experimental Statistics can be found at: <https://www.ons.gov.uk/methodology/methodologytopicsandstatisticalconcepts/guidetoexperimentalstatistics>.

Details of Ministers and officials who receive pre-release access to these statistics up to 24 hours before release are published on GOV.UK.



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