Open LV Your local electricity data

Community

OpenLV Method 2 Community Trials

Web application user guidance

Version 2.1

24th September 2019

ea technology

centre for sustainable energy

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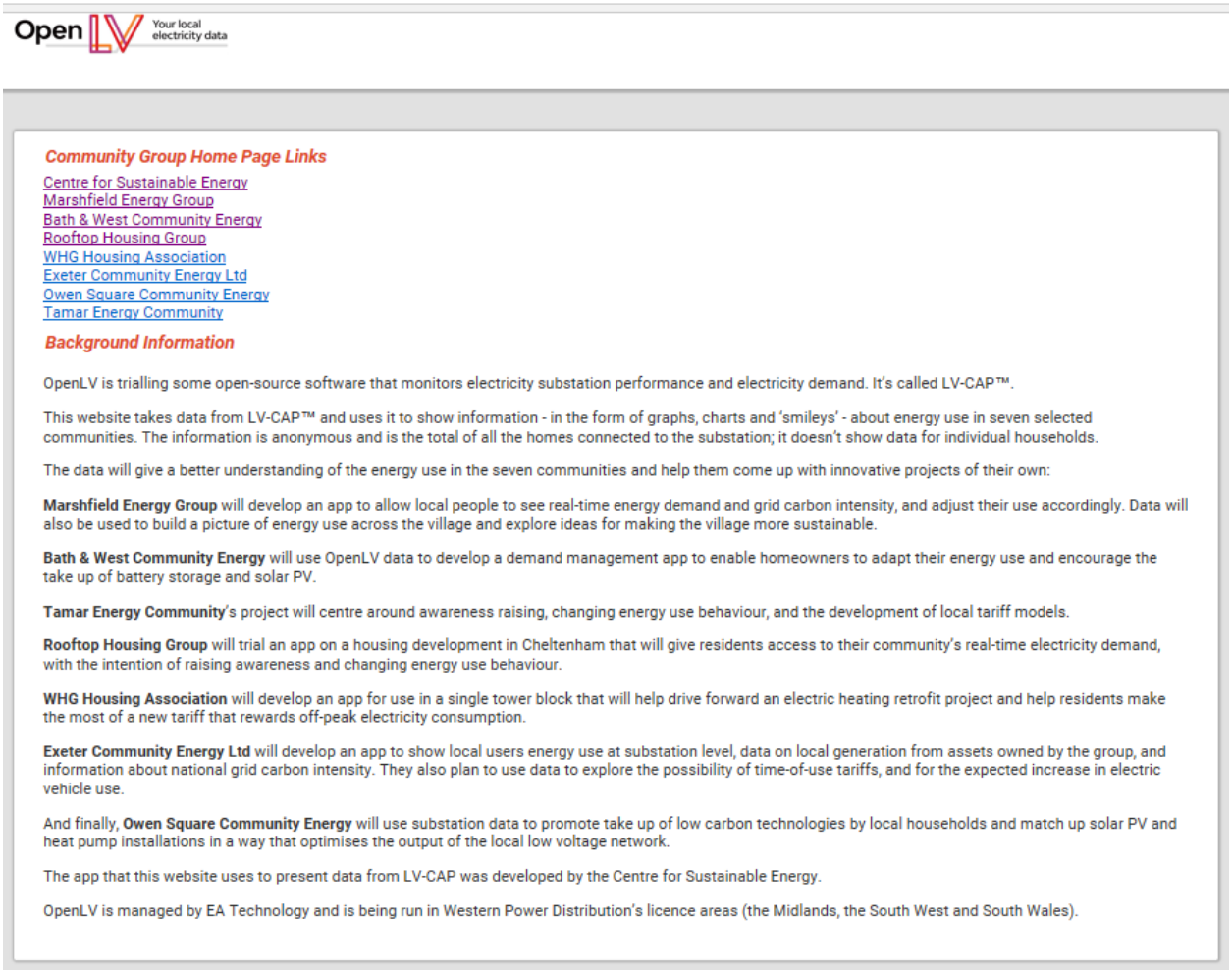
Contents

Logging in....3
Tabs in the web app....4
Graph configuration....4
How to add graphs to a graph set....5
Understanding the data categories....6
Understanding the data sub-categories....8
Displaying Graphs....9
Displaying graphs....9
Some notes on displaying graphs....9
How to change existing graphs....14
Example graphs....14
Alert Configuration....23
Reverse Alerts....26
Tariff configuration....27
Single Rate Tariff....28
Time of Use Tariff....29
Agile Octopus Tariff....30
Data almalgamation....32
How to create an amalgamated data source....32
Examples....33
Analysing data in Excel....35
Using the API to access data....38
API Notes....38
The “Readings” Interface....38
Embedding graphs using i-frames....41
Undecorated graph notes....41
Examples:....41
Displaying data from solar PV array....43
Estimating Solar PV output....43
Displaying actual and estimated Solar PV output....45
More information about the OpenLV project....49
Data sources, calculations and assumptions....48

Opening the web app

To access the OpenLV web app, go to: https://openlv-cse.uk



- This will take you to the web app, with some background information about the project. Visitors to the website can click on each group's pages to see graphs that have been set up, but without logging in as a group member, website users (i.e. members of the public, or members of other groups) will not be able to make changes to the graphs.

Logging in

- To choose what graphs you display on your page, configure graph settings, setup alerts or tariffs, you will need to click on the link for your group, and click the **login link** on the top right hand corner of the home page**.**
- To **login**, enter a username and password which is unique to your group. CSE will send you your individual login details (NOTE: You will have ONE login per group).

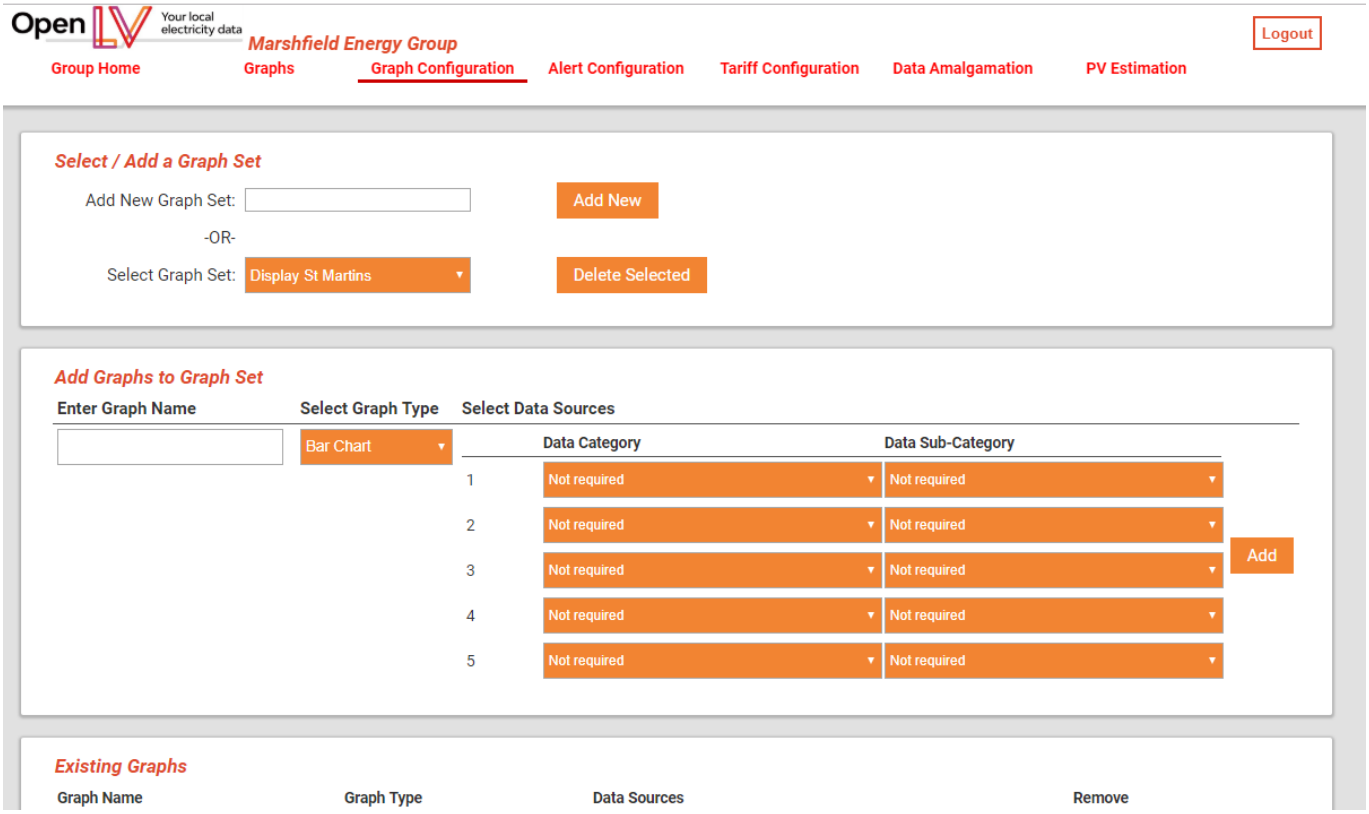
Tabs in the web app

Once logged in, you will see a number of tabs at the top of the page (see image below):

Graphs	displays the graphs, or graph sets that you have chosen.
Graph configuration	allows you to set up new graph sets, or change existing ones.
Alert configuration	allows you to set up email alerts to members of your community.
Tariff configuration	allows you to set up different modelled tariffs.
Data amalgamation	allows you to combine the values from one or more data sources into a single data source.
PV estimation	allows you to estimate the output of any PV array in your community.

Graph configuration

The tab called **"Graph Configuration"** will take you to a page where you can create new graph sets, or edit existing ones (by adding/removing graphs from the graph set).



HOW TO ADD GRAPHS TO A GRAPH SET

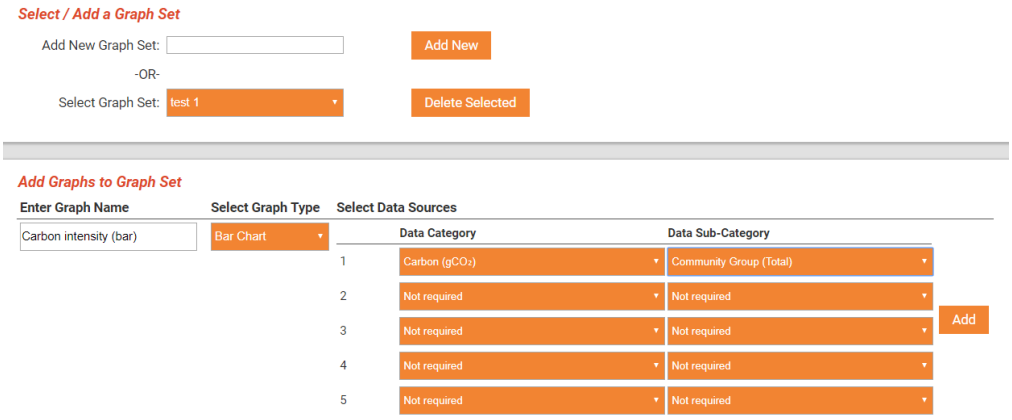
- Go to the “Graph Configuration” tab
- Enter a name for the graph you’re creating
- To choose what to display, select from the dropdown options (described below). Each graph set can contain up to 5 graphs (i.e. line graph / bar chart / smiley).

Enter Graph Name: Chose a name that represents what the graph / barchart / smiley represents, for example: “Main Street Voltage” or “Carbon intensity, all feeders).

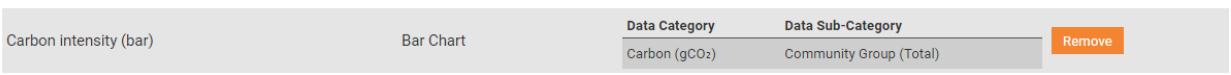
Select Graph Type: You can choose how to display your data - as a Line Graph, a Bar Chart, Stacked Bar Chart or Smiley (see note on Smileys below).

Data Category: This is the data you want to display (and the units which are used). It is advisable to display similar data for the 3 graphs, e.g. all three “Voltage (V) (average)” or “Voltage (V) (average)”, “Voltage (V) (min)” & “Voltage (V) (max)”.

Data Sub-Category: This is where the data comes from, or the ‘level’ your data is being shown at – i.e. whole group, substation, feeder, or phase.



Click ‘Add’ to save this graph or graph set. Your graph will appear in an ‘existing graphs’ box at the bottom of the page.



UNDERSTANDING THE DATA CATEGORIES

As mentioned above, the **"data category"** is the data you want to display and the units which they are displayed in. There are a number of data categories that are being monitored by the LV-Cap unit in the substation and each shows different things. Here are all the types of data categories you can chose from:

The headings below outline the key data categories that we think will be of most use. If you would like to know about others then get in contact with us.

Carbon (gCO2)

This is based on "energy active" and measures the carbon intensity of energy being used from the grid at a given time compared to a past period (which you set). In other words, it shows for every Wh used, the amount of grams of CO2 created. The carbon intensity data is taken from the national grid's regional averages.

NOTE: You can also plot the regional and national carbon intensity data by selecting the data category "Carbon Intensity (gCO2/kWh)" to see how your community compares with the regional or national carbon intensity values.

Cost (£)

This shows how much the community is spending on energy used. It is measured by multiplying the "energy active" by the unit rates set when configuring tariffs.

Please note that this can show how much a number of houses (at community, substation or feeder level) are spending but it does not show the costs per individual household. To show this, you could divide the unit rate by the number of households when setting your tariff – when creating your cost graph according to this tariff then this would show the average bill for individual houses.

NOTE: The cost is calculated using historical data and as such you cannot apply a new tariff to old data. If you want to create a new tariff, you will need to wait a bit to be able to apply it to create a cost graph.

NOTE: You can also plot the tariff rate (p/kWh) now by selecting "Tariff Rate" in the data category list.

Energy Active (Wh) (total)

This shows the net amount of electricity being used by a community, and is used to calculate how much the community is spending on electricity and how much CO2 is being generated by the electricity being used. It is "net" because local generation has been subtracted from how much energy is being used to create this value.

NOTE: If you set it to (number) instead of (total), this would show all the readings taken in the last half hour – if not 30 then there is an issue.

Power, Active (W)

This is the average power* being used.

** NOTE: Power is the rate of energy transfer at a moment in time, it is instantaneous and is calculated by Voltage x (Active) Current.*

NOTE: When looking at a Power, Active (W) (average) graph compared to an Energy Active (Wh) (total) graph, they will look very similar. The only difference is that the value for Energy will be half of what it is for Power, and in different units – this is because Power is multiplied by time used to give Energy. In the case of these graphs, this is always in 30 minute bundles. For example, if in a half hour the average Power being used is 70,000 W, then the Energy being used will be 70,000 W x 0.5 (half an hour) = 35,000 Wh.

NOTE: If you select (max) instead of (average) this would show what the maximum amount of power that was used in the last half hour.

Current (A), (average) & (max)

The average current value for a substation shows the transformer load. It includes both active and reactive power. When combined with a temperature graph, this is a useful indicator of whether substations are being overloaded – this is important to see whether the substation has capacity to take on extra load (from local generation…).

The max current value for a substation or feeder is useful to see if the substation or feeder protection (fuses or circuit breakers) is likely to trip turning off the supply.

Temperature

This is the temperature of the substation and can show when the substation is under pressure. The most useful data sub-category to choose for this is "Transformer" under substation name – this shows the temperature of the oil inside the transformer. "Inside" and "Outside" can be selected to show the air temperature inside/outside the substation.

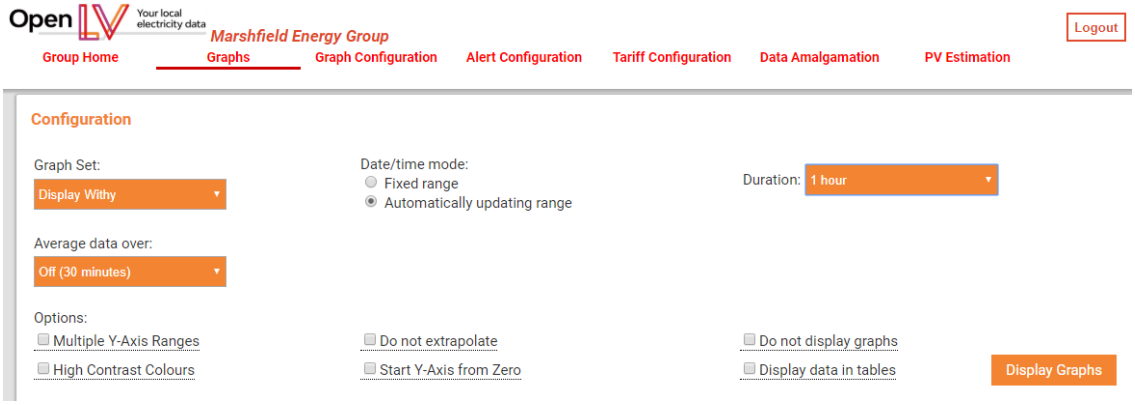
UNDERSTANDING THE DATA SUB-CATEGORIES

- The **"data sub-category"** is where the data comes from, or the 'level' your data is being shown at – i.e. whole group, substation, feeder, or phase – you will get to choose this once you have decided what data category you are going to show on a graph.
- On the list of data sub-categories, you can choose which **substation** to display data for (if you are having more than one substation monitored).
- By selecting the option "**community group total**" you will be able to see total data for all the substations being monitored if several substations are being monitored
- *OR* if one substation is being monitored, if you select "**substation feeder total"** this would show the total for the whole substation.
- If you want more granularity in your data, you can narrow down your data to **feeder**, by selecting **"[name of feeder](Total)"** or even **phase level** by selecting **"([name of feeder] (L1), [name of feeder](L2)…)"**.

Displaying Graphs

DISPLAYING GRAPHS

- On your home page, by clicking **"Graphs"** at the top, you will be taken to a page where you can chose what graph sets to display and adjust the time period the graphs cover (see below).



NOTE: You can see under options there are four tick boxes. See below in "Some Notes on Displaying Graphs" about what each option means.

- Click on the 'Graphs' tab and select the graph you want to display.
- Set the date/time mode, and the date range

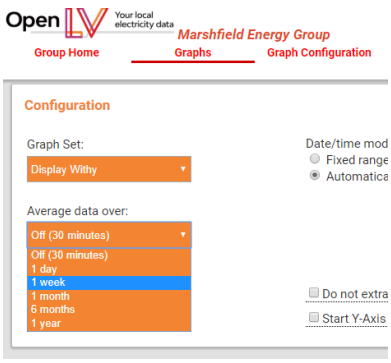
NOTE: See in "Some Notes on Displaying Graphs" for what the "Average data over" means.

- Select your options (see below for what they are)
- Click 'display graphs'

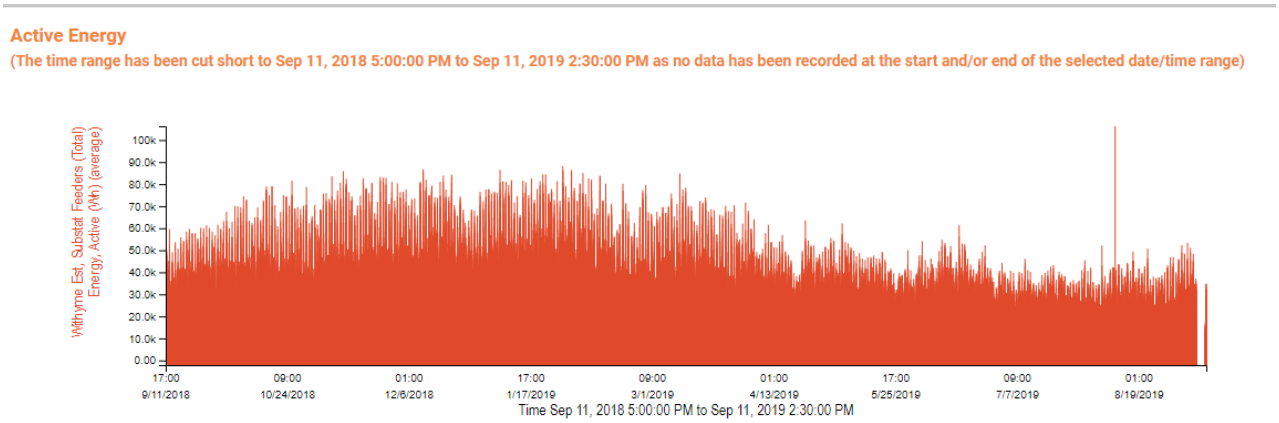
SOME NOTES ON DISPLAYING GRAPHS

Average data over:

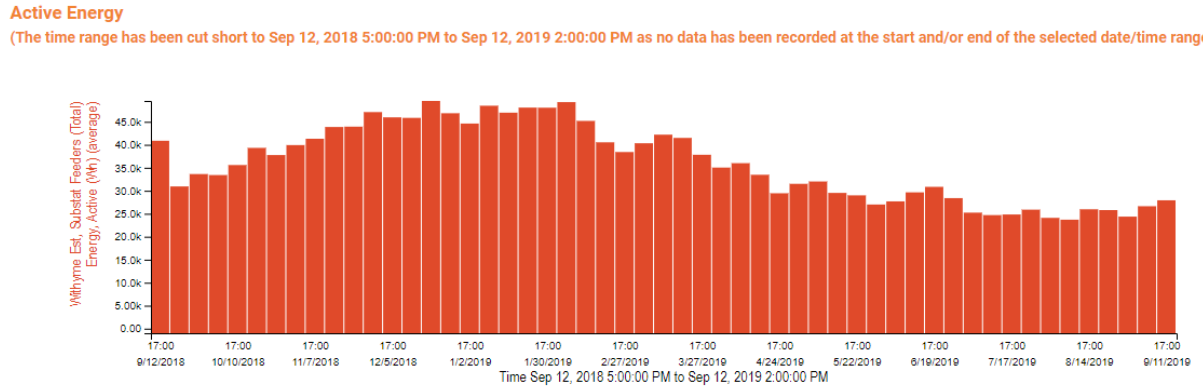
Underneath where you chose what graph set you want to display, you can also chose what your time intervals will be on your x-axis by selecting this in the "Average data over" axis. As it is normally, the data will be shown for however long you've chosen when you set the duration, but in intervals of 30 minutes. You can change this using this drop down if, for example, you want to show data for 1 year but in intervals of 1 week rather than 30 minutes.



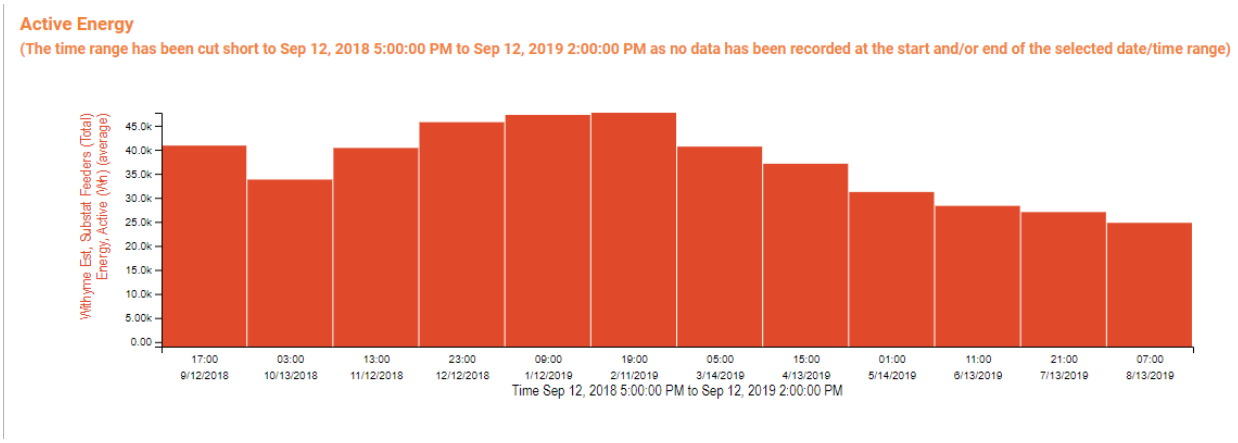
This graph below shows the electricity being used by one feeder for a whole year by 30 minute time intervals.



The graph below shows the same data but in 1 week time intervals.

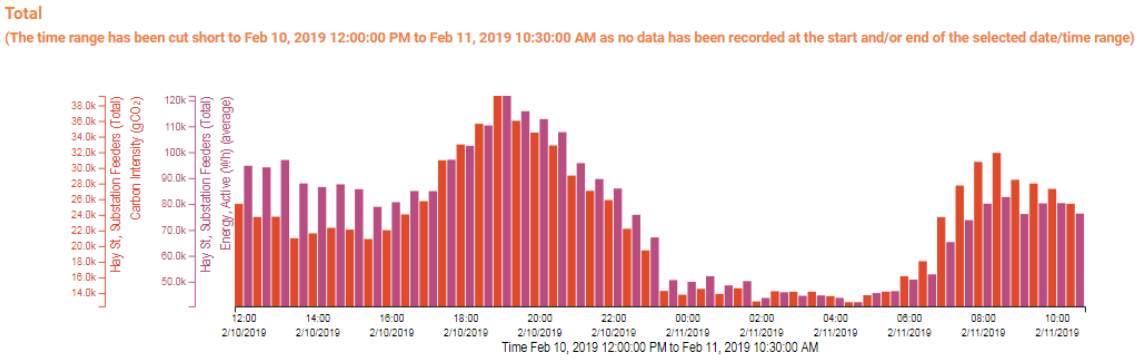


The graph below shows the same data but in 1 month time intervals.

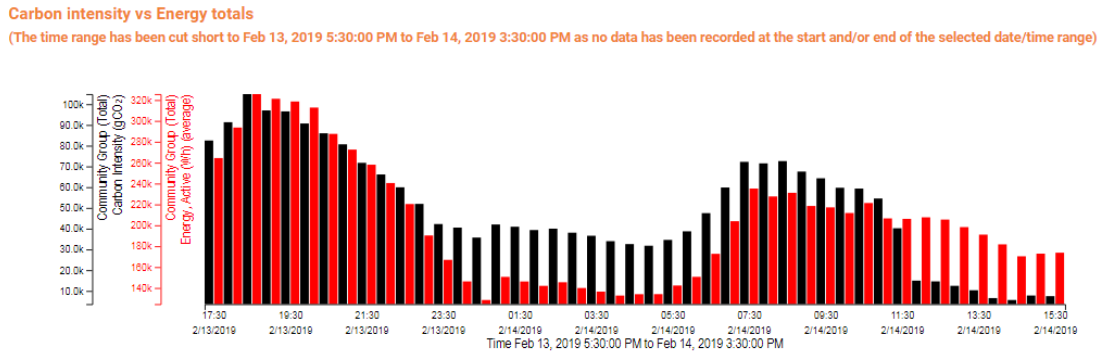


There are 4 option tick boxes you can see in the above screenshot:

- **"Multiple Y-Axis Ranges":** This would mean that you can display multiple <u>different</u> data categories that have different units and values on independent y-axes. This is useful if you want to display multiple data sets with different value ranges and units, so you can now compare multiple different data categories on the same graph instead of separate ones. If ticked your graph would look like this:



- **High Contrast Colours":** This option has to do with the colours your graphs are displayed in. You might want to select this option if you wish to make your different data sets more visible. If ticked your graphs would look like this:

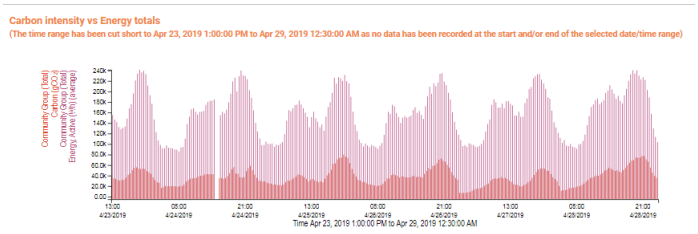


- **“Do not extrapolate”:** The extrapolate function fills in one missing value with the average of the values either side - – this is useful for hourly data or if there are gaps in the data so that the graph shows something rather than nothing. This function is a default option which you can now turn off using this tick box.

- **“Start Y-axis from Zero”:** Instead of the y-axis starting from the minimum value, if this box is ticked then the y-axis will start from 0.

- **“Do not display graphs”:** If selected together with the “display data in tables” function (below) then this would only display the data in HTML table format.

- **“Display data in tables”:** By selecting this option, you can display the data behind graphs as HTML tables.



Carbon intensity vs Energy totals	Community Group (Total) Carbon (gCO_2)	Missing	Community Group (Total) Energy, Active (Wh) (average)	Missing
2019-04-23T12:00:00Z	37720.387475999996	false	155227.93199999997	false
2019-04-23T12:30:00Z	34994.13645900001	false	146418.98100000003	false
2019-04-23T13:00:00Z	33792.683946000005	false	141986.067	false
2019-04-23T13:30:00Z	31501.440096000006	false	132358.99200000003	false
2019-04-23T14:00:00Z	30675.172956000002	false	128348.004	false
2019-04-23T14:30:00Z	31447.209599999995	false	131030.03999999998	false
2019-04-23T15:00:00Z	32275.776918	false	133370.979	false
2019-04-23T15:30:00Z	36185.686536	false	148301.994	false
2019-04-23T16:00:00Z	41282.980523999984	false	167816.99399999995	false
2019-04-23T16:30:00Z	44024.23725	false	176096.949	false
2019-04-23T17:00:00Z	50280.208896000004	false	196407.06600000002	false
2019-04-23T17:30:00Z	54779.473056	false	220884.972	false
2019-04-23T18:00:00Z	55749.593382	false	234241.989	false
2019-04-23T18:30:00Z	53785.822467	false	241192.02899999998	false
2019-04-23T19:00:00Z	52470.141336	false	236351.988	false
2019-04-23T19:30:00Z	53320.19043899998	false	239103.99299999993	false
2019-04-23T20:00:00Z	52610.987028	false	232791.978	false
2019-04-23T20:30:00Z	48789.739152	false	211210.992	false
2019-04-23T21:00:00Z	45889.96881000001	false	192814.99500000005	false
2019-04-23T21:30:00Z	43308.159510000005	false	176767.99800000002	false
2019-04-23T22:00:00Z	36822.956004	false	146705.00400000002	false
2019-04-23T22:30:00Z	31284.423315	false	122684.01299999999	false
2019-04-23T23:00:00Z	27478.180173	false	106918.989	false
2019-04-23T23:30:00Z	26484.666690000002	false	98456.01000000001	false
2019-04-24T00:00:00Z	16562.703419999998	false	92015.01899999999	false
2019-04-24T00:30:00Z	18382.194000000003	false	91910.97000000002	false
2019-04-24T01:00:00Z	20447.691390000004	false	97369.95900000002	false
2019-04-24T01:30:00Z	19785.572982	false	92890.01400000001	false
2019-04-24T02:00:00Z	20034.860760000003	false	92753.98500000002	false
2019-04-24T02:30:00Z	20019.230847	false	91412.013	false
2019-04-24T03:00:00Z	19823.48121	false	89699.01	false
2019-04-24T03:30:00Z	19850.571557999992	false	89416.98899999997	false

Date/time mode:

‘Fixed range’ means you specify the exact time or date range you want to display (each time you open the graph / graph set).

‘Automatically updating range’ means that when you open the graph, it will automatically update the data it contains to show data up to the current time for the period you have selected (e.g. the previous week). As new data is received it will be displayed. Note, in this mode, the selection options are hidden when the graphs are displayed. This is so the graphs can be used on a display screen.

Using the data ranges:

When you create a graph, the **x-axis** shows the overall start and end date/time and individual times and dates. If the date / time range you selected has been shortened, due to data being unavailable, a message saying this will be displayed.

The **y-axis** range is from the minimum value in the data being displayed to the maximum unless you tick the option box **"Start Y-axis from Zero"** in the graph display page.

Displaying multiple data types in one graph:

You can plot multiple datasets on one graph if they have the same units You can display multiple data types (up to 5) in one graph by ticking the **"Multiple Y-Axis Ranges"** option tick box. This allows different units and ranges of values to be displayed on one graph meaning you can display different types of data to compare.

You do not need to use this function if you are displaying the same data type but for different areas – for instance, you could plot the energy use for 3 different feeders on one graph for comparison using the same Y-axis as different colours will represent different feeders.

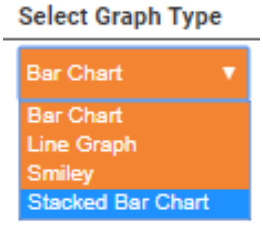
It is impossible to have more than one data type on one smiley.

Displaying smileys:

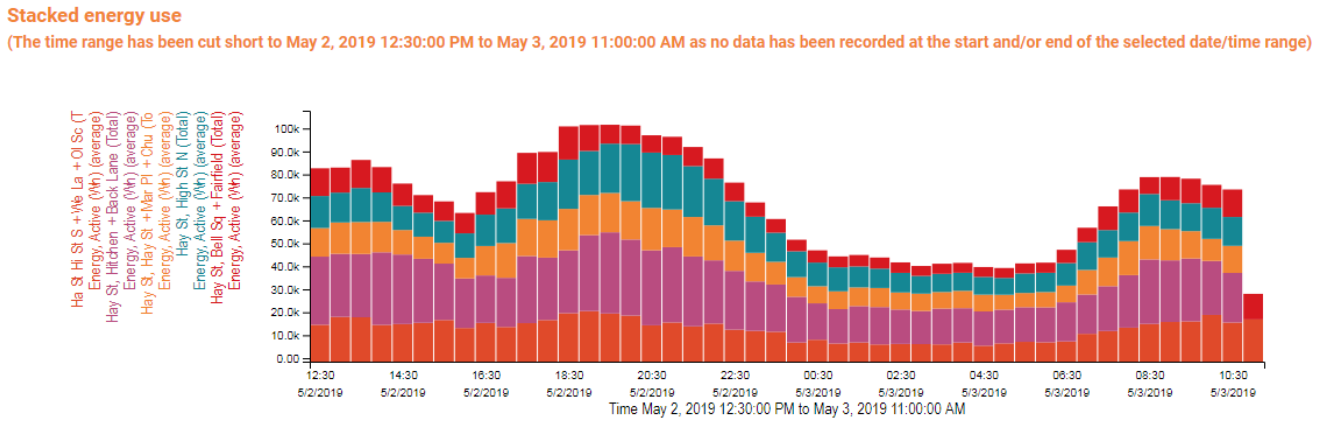
The smiley which is displayed shows a range of 'smiles', going from very happy to very sad, for the point in time you're looking at the graph, **compared to the average for the period of time you select in the dropdown**.

Stacked bar charts:

You can select "stacked bar chart" as a graph type when configuring graphs for multiple data sources.



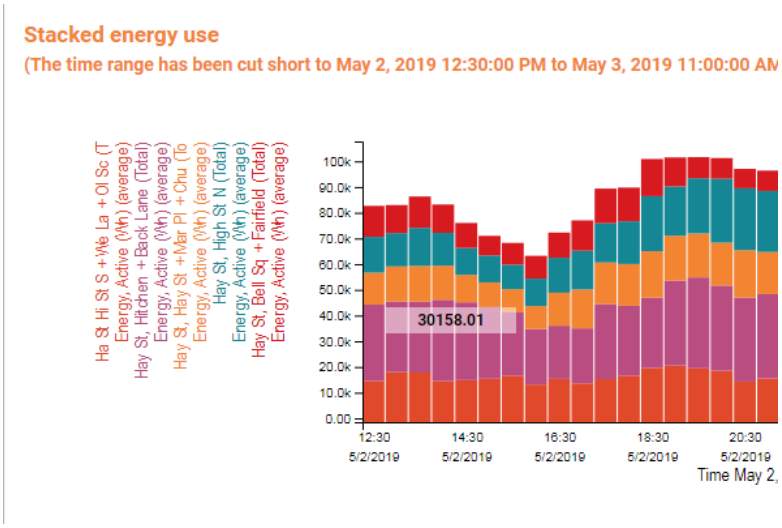
Here is what a stacked bar chart would look like:



NOTE: You could use this graph type to show the individual feeder values and the feeder total at the same time, i.e. by creating a stacked chart with all the feeders on for a substation, the top of each bar would be the substation total and the individual feeder values would also be visible. The same applies for phases and feeder totals, and for substations and group totals.

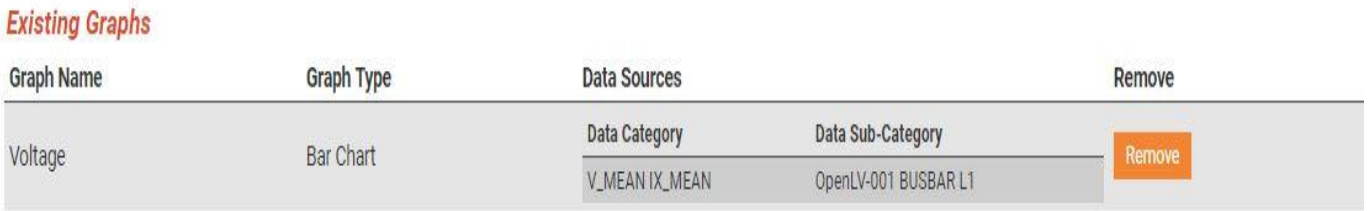
Values behind bar charts:

For data displayed as bar charts (both stacked and non-stacked), you can see the data behind the bars by hovering the cursor over them.



HOW TO CHANGE EXISTING GRAPHS

At the bottom of the "Graph Configuration" page, you will see a button to remove the existing graphs in your graph set. This is where the graphs that you create will appear as well.



EXAMPLE GRAPHS

In this section, we will present some example graph sets you may find useful with some instructions on how to create them. Instead of focusing on one type of data-category, we have tried to create meaningful bundles of graphs showing different data-categories.

NOTE: The "Existing Graphs" screenshots are taken from the "Graph Configuration" page, whilst the graph screenshots are taken from the "Graphs" tab once graphs have been displayed for a specified time period.

Changing energy behaviours (community)

This shows the energy use, carbon intensity and cost data for **all houses on the substation.** The last "Energy, CO2 and Cost" smileys is a more user-friendly way of viewing how a community is doing in terms of their energy use, carbon intensity and cost of energy used at the present time compared to the set time period.

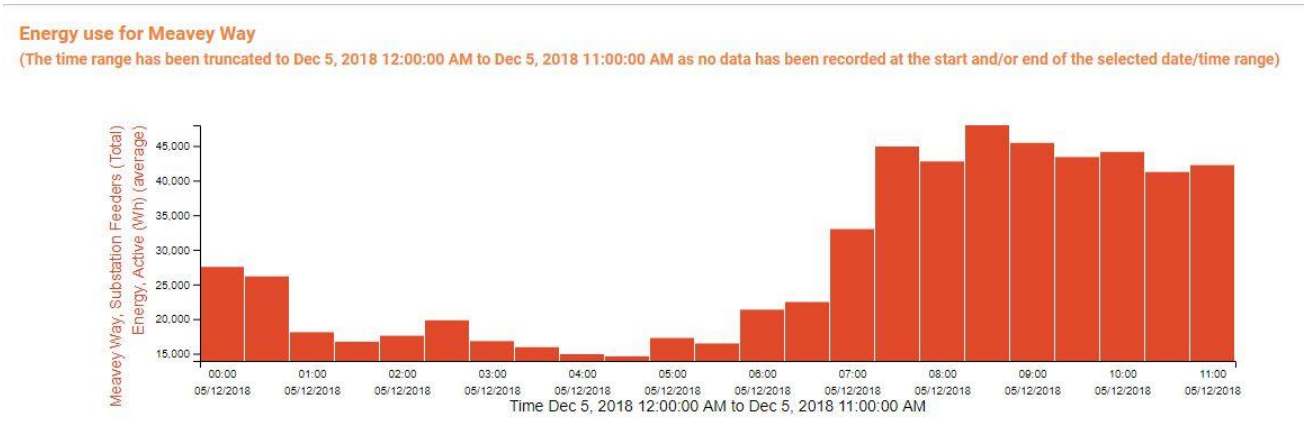
This specific graph set is showing energy patterns for all houses on the Meavey Way substation (this was done in Tamar Energy Community's web platform).

Existing Graphs

Graph Name	Graph Type	Data Sources		Remove
Energy use for Meavey Way	Bar Chart	Data Category	Data Sub-Category	Remove
		Energy, Active (Wh) (total)	Meavey Way, Substation feeder total	
Carbon Intensity for Meavey Way	Bar Chart	Data Category	Data Sub-Category	Remove
		Carbon Intensity (gCO_2)	Meavey Way, Substation feeder total	
Cost for Meavey Way	Bar Chart	Data Category	Data Sub-Category	Remove
		Cost (£)	Standard tariff : Meavey Way, Substation feeder total	
Energy, CO2 and Cost for Meavey Way	Smiley	Data Category	Data Sub-Category	Remove
		Energy, Active (Wh) (total)	Meavey Way, Substation feeder total	
		Carbon Intensity (gCO_2)	Meavey Way, Substation feeder total	
		Cost (£)	Standard tariff : Meavey Way, Substation feeder total	

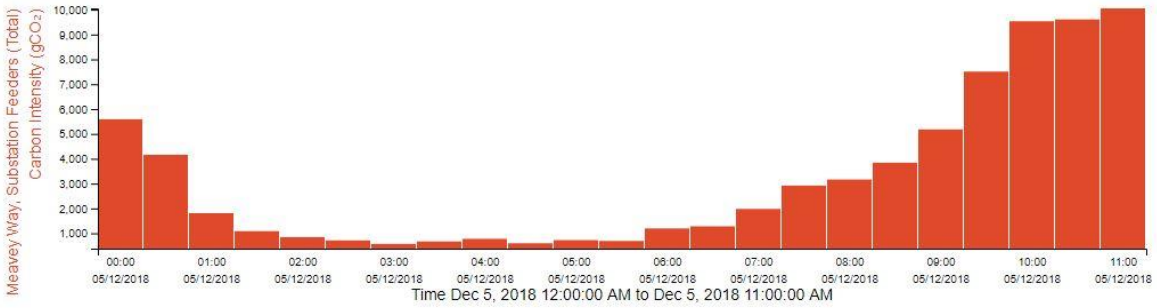
*NOTE: By selecting **"substation feeder total"** when selecting a data sub-category, this shows the data for the whole substation. If you were monitoring more than one substation and wanted to show all of the community you would select **"community group total".***

NOTE: Here, the tariff we have chosen is called "standard tariff" – yours may have a different name depending on how you configured your tariff in the "tariff configuration" tab.



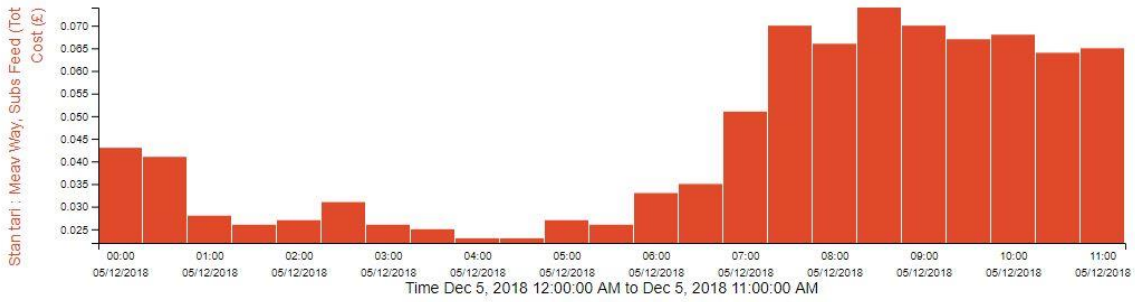
Carbon Intensity for Meavey Way

(The time range has been truncated to Dec 5, 2018 12:00:00 AM to Dec 5, 2018 11:00:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Cost for Meavey Way

(The time range has been truncated to Dec 5, 2018 12:00:00 AM to Dec 5, 2018 11:00:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Energy, CO2 and Cost for Deer Park Meavey Way

(The time range has been truncated to Dec 5, 2018 12:00:00 AM to Dec 5, 2018 11:00:00 AM as no data has been recorded at the start and/or end of the selected date/time range)

Meavey Way, Substation Feeders (Total) Carbon Intensity (gCO_2) Dec 5, 2018 11:00:00 AM

Meavey Way, Substation Feeders (Total) Energy, Active (Wh) (average) Dec 5, 2018 11:00:00 AM

Stan tari : Meav Way, Subs Feed (Tot Cost (£) Dec 5, 2018 11:00:00 AM

Changing energy behaviours (one feeder)

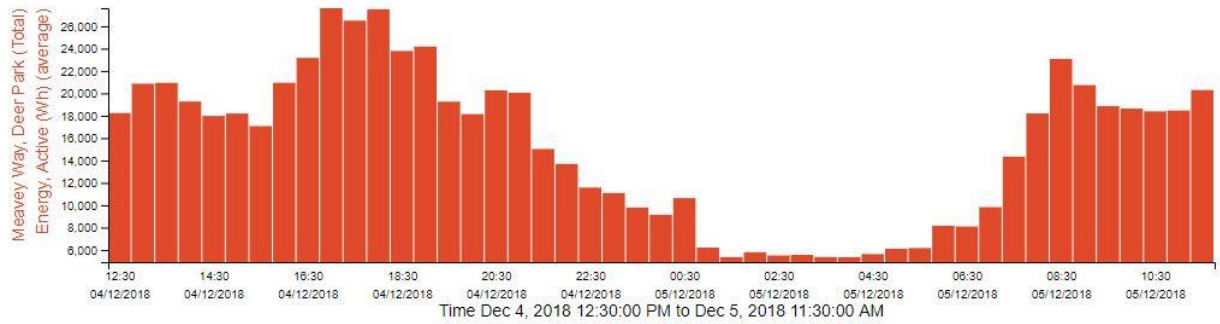
As with the previous graph set, this shows the same data but in more detail, focusing on one feeder (here, Deer Park). This is useful if you want to focus your energy reduction initiatives on one street.

Existing Graphs

Graph Name	Graph Type	Data Sources		Remove
Energy use for Deer Park	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Energy, Active (Wh) (total)	Meavey Way, Deer Park (Total)	
Carbon intensity for Deer Park	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Carbon Intensity (gCO_2)	Meavey Way, Deer Park (Total)	
Cost for Deer Park	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Cost (£)	Standard tariff : Meavey Way, Deer Park (Total)	
Energy, CO2 and Cost for Deer Park	Smiley	**Data Category**	**Data Sub-Category**	Remove
		Energy, Active (Wh) (total)	Meavey Way, Deer Park (Total)	
		Carbon Intensity (gCO_2)	Meavey Way, Deer Park (Total)	
		Cost (£)	Standard tariff : Meavey Way, Deer Park (Total)	

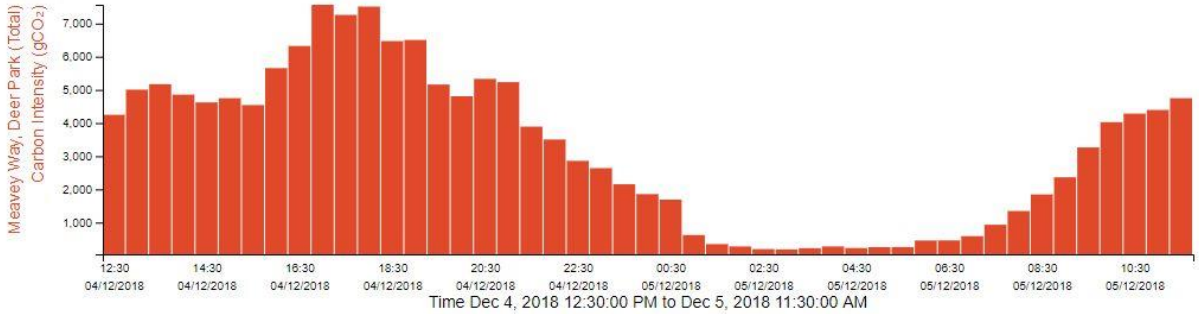
Energy use for Deer Park

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



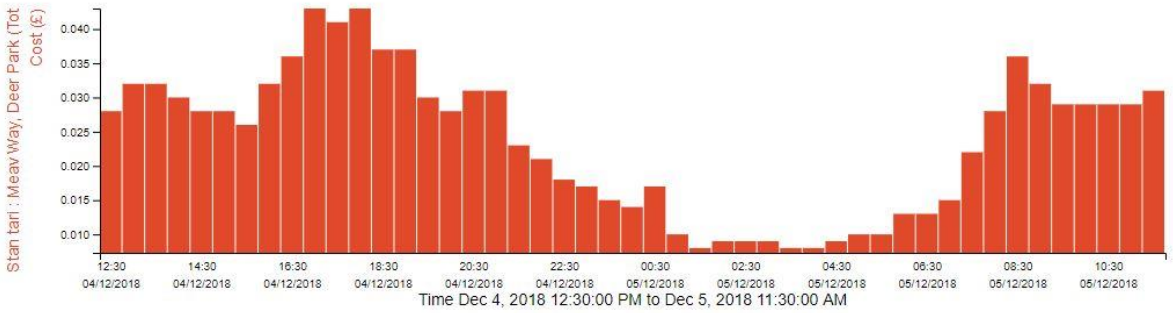
Carbon intensity for Deer Park

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Cost for Deer Park

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Energy, CO2 and Cost for Deer Park

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)

Meavey Way, Deer Park (Total) Carbon Intensity (gCO_2) Dec 5, 2018 11:30:00 AM

Meavey Way, Deer Park (Total) Energy, Active (Wh) (average) Dec 5, 2018 11:30:00 AM

Stan tari : Meav Way, Deer Park (Tot Cost (£) Dec 5, 2018 11:30:00 AM

Changing energy behaviours (comparative)

- This graph set shows the same data as the other two but for all of the feeders on this particular substation. This means that the graphs can be used to compare energy use, carbon intensity and cost between streets*.

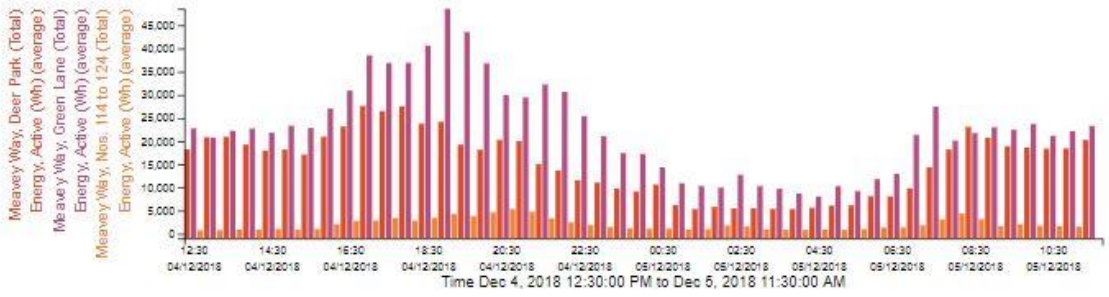
**NOTE: Remember this can only be done if the streets are similar in style, i.e. number and size of houses.*

Existing Graphs

Graph Name	Graph Type	Data Sources		Remove
Comparitive Energy Use	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Energy, Active (Wh) (average)	Meavey Way, Deer Park (Total)	
		Energy, Active (Wh) (average)	Meavey Way, Green Lane (Total)	
		Energy, Active (Wh) (average)	Meavey Way, Nos. 114 to 124 (Total)	
Comparitive Carbon Intensity	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Carbon Intensity (gCO_2)	Meavey Way, Deer Park (Total)	
		Carbon Intensity (gCO_2)	Meavey Way, Green Lane (Total)	
		Carbon Intensity (gCO_2)	Meavey Way, Nos. 114 to 124 (Total)	
Comparitive Cost	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Cost (£)	Standard tariff : Meavey Way, Deer Park (Total)	
		Cost (£)	Standard tariff : Meavey Way, Green Lane (Total)	
		Cost (£)	Standard tariff : Meavey Way, Nos. 114 to 124 (Total)	
Comparitive Energy Use	Smiley	**Data Category**	**Data Sub-Category**	Remove
		Current (A) (average)	Meavey Way, Nos. 114 to 124 (Total)	
		Energy, Active (Wh) (average)	Meavey Way, Deer Park (Total)	
		Energy, Active (Wh) (average)	Meavey Way, Green Lane (Total)	
Comparitive Carbon Intensity	Smiley	**Data Category**	**Data Sub-Category**	Remove
		Carbon Intensity (gCO_2)	Meavey Way, Deer Park (Total)	
		Carbon Intensity (gCO_2)	Meavey Way, Green Lane (Total)	
		Carbon Intensity (gCO_2)	Meavey Way, Nos. 114 to 124 (Total)	
Comparitive Cost	Smiley	**Data Category**	**Data Sub-Category**	Remove
		Cost (£)	Standard tariff : Meavey Way, Deer Park (Total)	
		Cost (£)	Standard tariff : Meavey Way, Green Lane (Total)	
		Cost (£)	Standard tariff : Meavey Way, Nos. 114 to 124 (Total)	

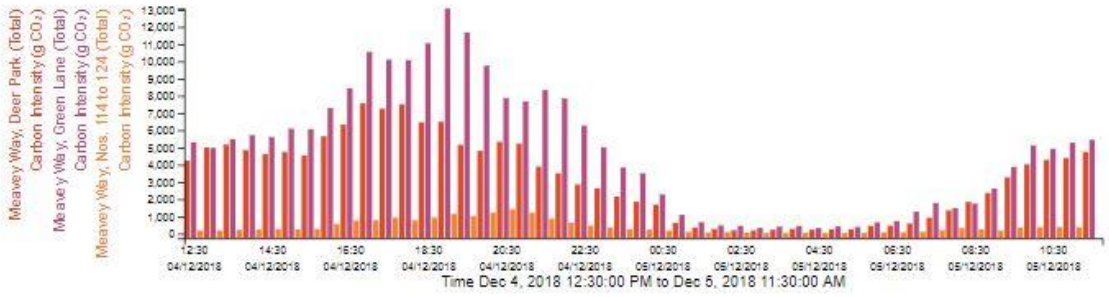
Comparitive Energy Use

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



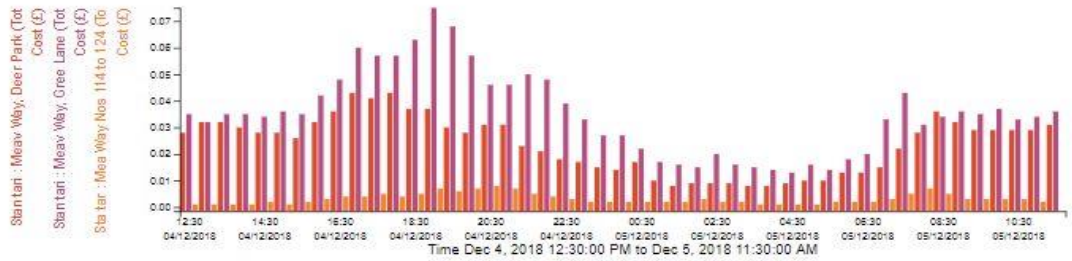
Comparitive Carbon Intensity

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Comparitive Cost

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Comparitive Energy Use

(The time range has been truncated to Dec 4, 2018 12:30:00 PM to Dec 5, 2018 11:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)

Meavey Way, Nos. 114 to 124 (Total)
Current (A) (average)
Dec 5, 2018 11:30:00 AM

Meavey Way, Deer Park (Total)
Energy, Active (Wh) (average)
Dec 5, 2018 11:30:00 AM

Meavey Way, Green Lane (Total)
Energy, Active (Wh) (average)
Dec 5, 2018 11:30:00 AM

Transformer Monitoring

This particular graph set is useful for groups to use to monitor the substation's health. The criteria of health that we've chosen here is the temperature of the transformer (measures the temperature of the oil in the transformer). We've chosen to present this alongside the average current which includes both active and reactive power. This combination of graphs is a useful indicator of whether a substation is being overloaded. If this is very high and coincides with high energy use, then it is likely that the substation is being overloaded, making it at risk of overheating.

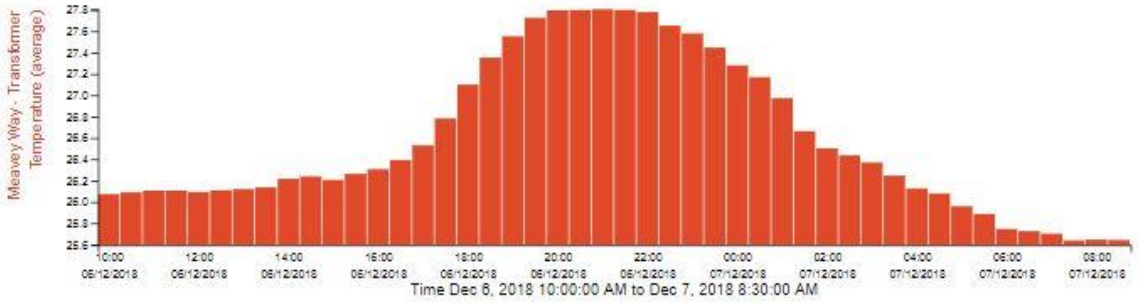
We have included current for the total substation as well as for each feeder – this is useful to see which street is causing the most stress on the substation health.

Existing Graphs

Graph Name	Graph Type	Data Sources		Remove
Temperature	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Temperature (average)	Meavey Way - Transformer	
Current (total)	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Current (A) (average)	Meavey Way, Substation Feeders (Total)	
Current (comparitive)	Bar Chart	**Data Category**	**Data Sub-Category**	Remove
		Current (A) (average)	Meavey Way, Deer Park (Total)	
		Current (A) (average)	Meavey Way, Green Lane (Total)	
		Current (A) (average)	Meavey Way, Nos. 114 to 124 (Total)	

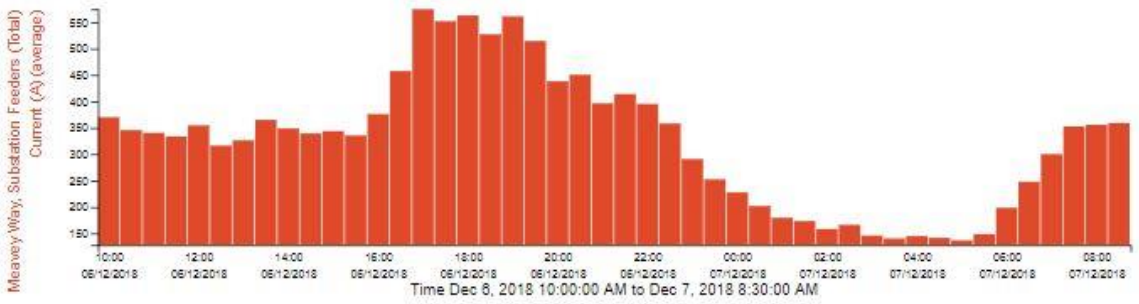
Temperature

(The time range has been truncated to Dec 6, 2018 10:00:00 AM to Dec 7, 2018 8:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



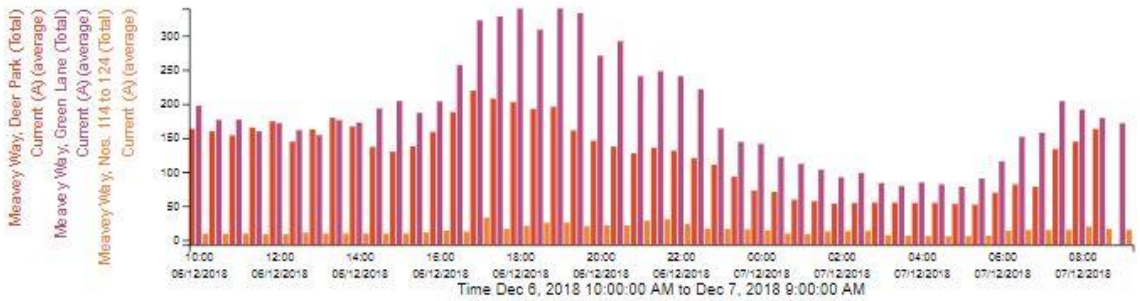
Current (total)

(The time range has been truncated to Dec 6, 2018 10:00:00 AM to Dec 7, 2018 8:30:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Current (comparitive)

(The time range has been truncated to Dec 6, 2018 10:00:00 AM to Dec 7, 2018 9:00:00 AM as no data has been recorded at the start and/or end of the selected date/time range)



Alert Configuration

You can set up alerts in the "Alert Configuration" tab. This means that a text or email can be sent out to people who sign up to alerts when a value exceeds or drops below a specified threshold. This could be useful to notify people for example when the community is using a lot of energy or when the temperature of the transformer is too high so that they can take action and reduce their usage. Below is a step-by-step guide on how to create an alert.

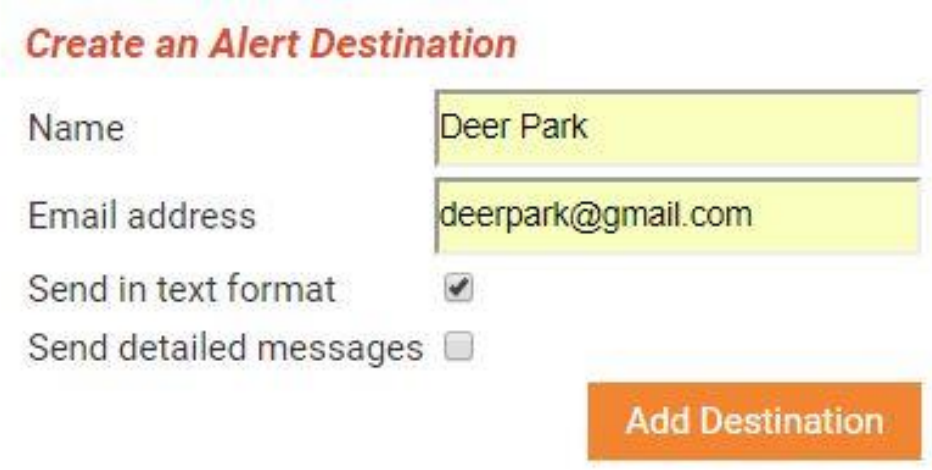
- Click on 'Alert Configuration' tab
- First you must create an **Alert Destination** (who your alert will be sent to). If you get a series of houses on a substation/feeder to sign up to alerts, our recommendation would be to set up a group email address that everyone can have access to. Here we decided to call it Deer Park (the alert will be sent to the houses on the Deer Park feeder) and used deerpark@gmail.com as an example group email.

NOTE: Some email service providers have a function whereby you can set a filter to automatically forward emails with a specified subject line to other email addresses. You could use this function if you wanted to automatically forward all alert emails (so emails with a 'OpenLV alert' subject line) to be forwarded to a number of people who have signed up to receiving alerts. By using an Email-to-SMS gateway software, you can set this so that these emails are forwarded in the form of texts. The following links offer more information on this:

- Automatically forwarding group emails to specified individual email recipients https://www.makeuseof.com/tag/how-to-auto-forward-emails-to-multiple-addresses-in-gmail/

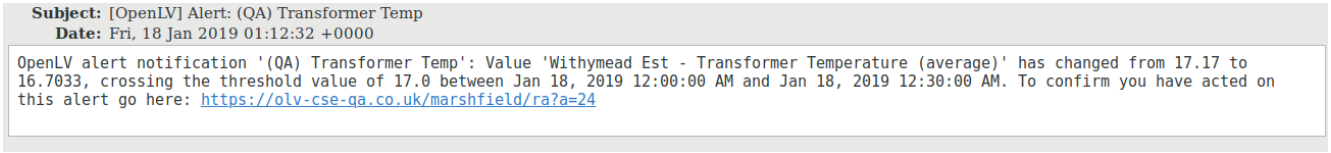
- Automatically forwarding email to a number - https://www.youtube.com/watch?v=quqAIapMoWI

- Email-to-SMS gateway service offered by TextLocal: https://www.textlocal.com/integrations/email-to-sms/

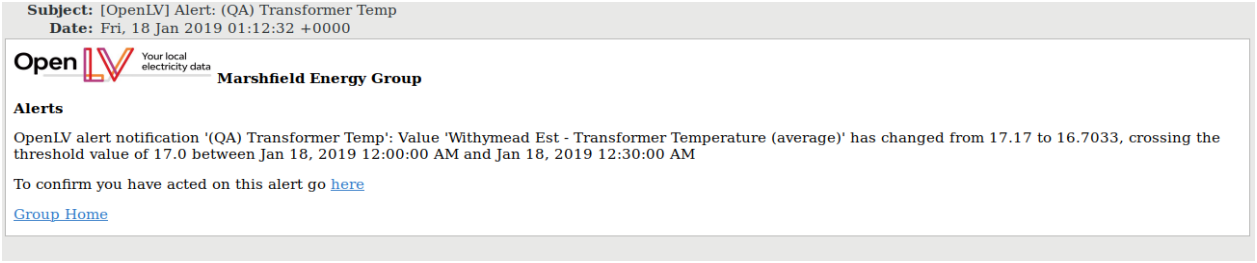


- In the above screenshot you can see two tick boxes – “Send in text format” and “Send detailed message” – this is the level of detail you want within the message to be sent out. The screenshots below show how these options differ.

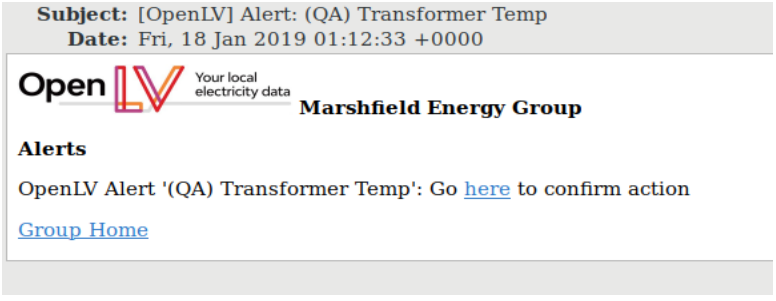
The above message is in simple text format – you can set this by only ticking “Send in text format”



The above message is in detailed text format – you can set this by first ticking “Send in text format” then clicking “Send detailed messages”.



The above message is in detailed HTML format – you can set this by only ticking “Send detailed messages”.



The above message is in simple HTML format – you can set this by not ticking either box.

- Once you have created an Alert Destination, you can **create your alert**. The screenshots below show this for two types of alerts – :

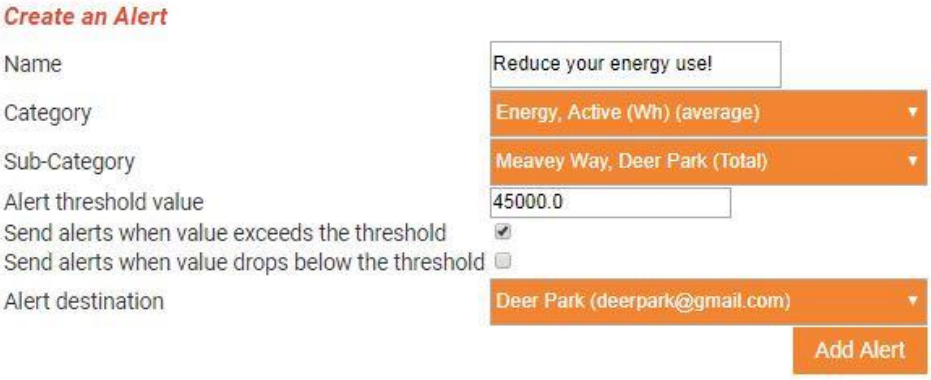
  - Alert people when combined energy used by households on the Deer Park feeder exceeds 45,000 Wh

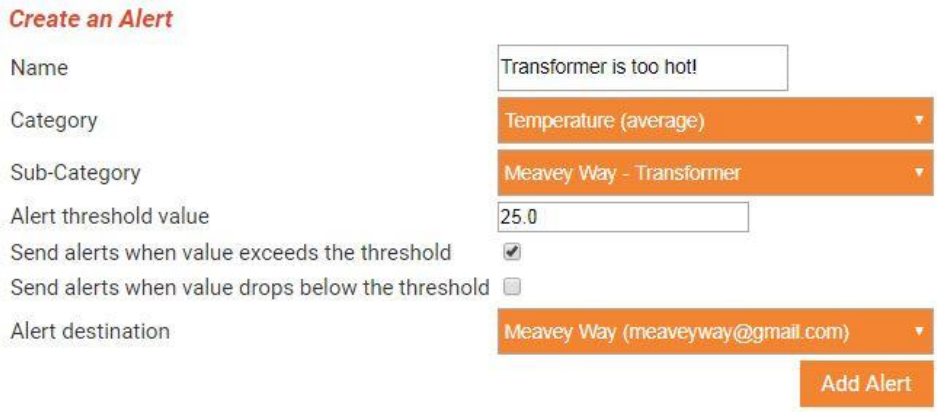
  - Alert people when the temperature of the transformer on the Meavey Way substation exceeds 25°

- Similar to configuring graphs, you will have to choose a data category and sub-category depending on what you want to send alerts for and for which feeder/substation. Once you have decided this, you will need to provide a threshold value. Once the data exceeds or drops below this value, an alert will be sent.

  NOTE: You can create an alert using an amalgamated data source.

- Finally, you must chose an alert destination. from those you have already added (likely to be a group email address)





- Once you have set up your alerts, you will be able to see them in **"Existing Graphs"** (below)

Existing Alerts

Name	Category	Sub-Category	Alert Threshold Value	Send on exceeds	Send on below	Destination	Cancel
Reduce your energy use!	Energy, Active (Wh) (average)	Meavey Way, Deer Park (Total)	45000.0	Yes	No	Deer Park	Cancel
Transformer is too hot!	Temperature (average)	Meavey Way - Transformer	25.0	Yes	No	Meavey Way	Cancel

REVERSE ALERTS

- Once you're alerts have been set, people signed up to the alerts will receive an email (or text) with a link they should click on to confirm they have taken action. When they click on the link they will be re-directed to the web-app page (see screenshot below).

- You can then see how many people have acted on the alerts by creating a **Reverse Alert Count** graph in the "Graph Configuration" tab. Select the options indicated in the screenshot below:

Add Graphs to Graph Set

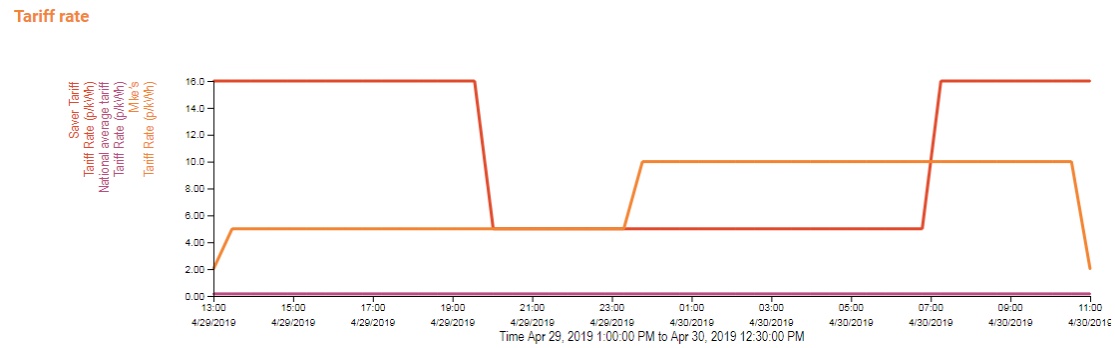
Enter Graph Name	Select Graph Type	Select Data Sources	Data Category	Data Sub-Category	
Reverse Alerts Deer Park	Bar Chart	1	Reverse Alert Count	Reduce your energy use!	Add
		2	Not required	Not required	
		3	Not required	Not required	

Tariff configuration

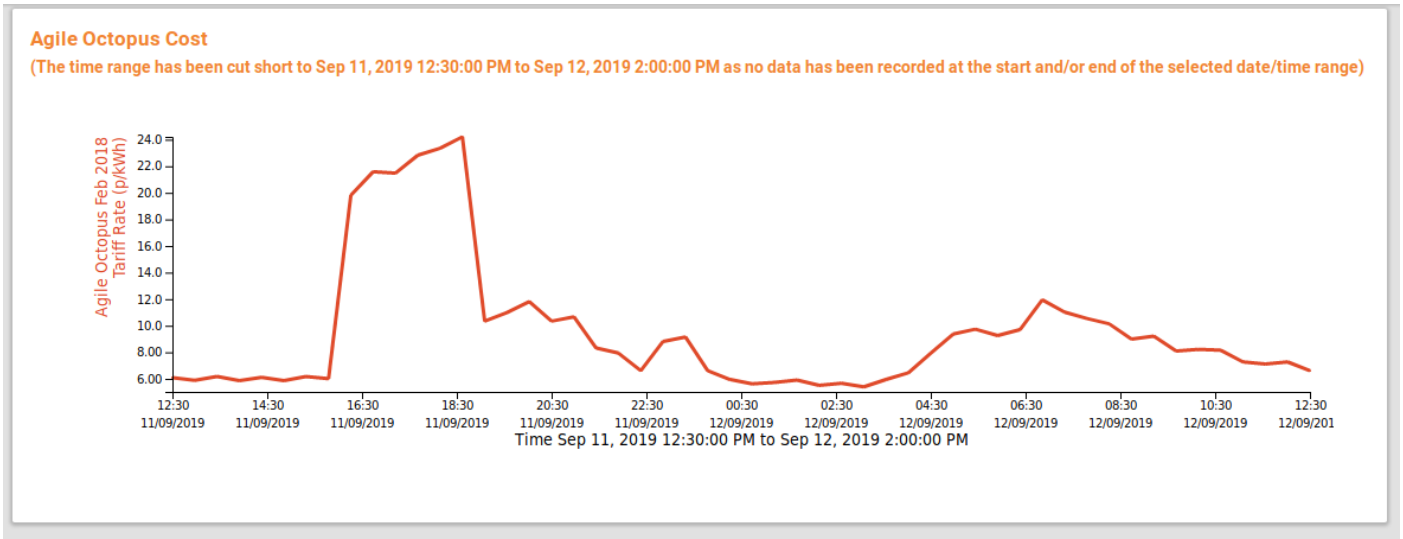
You can set a tariff to show cost graphs in your graph sets. These can be used to see how much your community is collectively paying for their energy use.

NOTE: The cost is calculated using historical data and as such you cannot apply a new tariff to old data. If you want to create a new tariff, you will need to wait a bit to be able to apply it to create a cost graph.

You can also plot the tariff rate itself on a graph by using the "Tariff Rate" in the "Data Category" list when configuring graphs. This is what it would look like:



If you were to plot the Octopus Energy's "Agile Octopus" flexible time-of-use tariff (see page 30), it would look like this:



SINGLE RATE TARIFF

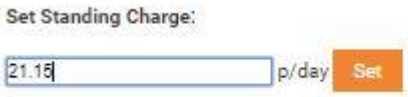
Below is an example of how to configure a basic tariff for the week:

- Go to the "Tariff Configuration" tab

  Add a new tariff – here we've decided to call it "standard tariff". But you can chose whatever name you want. Once you've added a new tariff, you can select it to start configuring.

  Add your unit rate for your tariff. Here, we've gone with 15.49 p/kWh. You can select your start and end times and the days the rates apply. This is a more useful function when you have a dual, or multi rate tariff (i.e.- time of use tariff). Remember to press "Add".

  You can also set your standing charge. Here, we've set it at 21.15 p/day. Remember to press "Set"



NOTE: The above unit cost (15.49 p/kWh), which includes VAT, is based on DBEIS Quarterly Energy Prices June 2017 pg 44-46
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/622608/QEP_Q117.pdf
The standing charge of 21.15p/day is based on £77 a year – a figure taken from the Energy Saving Trust.

- Once you've set both your unit rate(s), and your standing charge, the full tariff details will be displayed:

TIME OF USE TARIFF

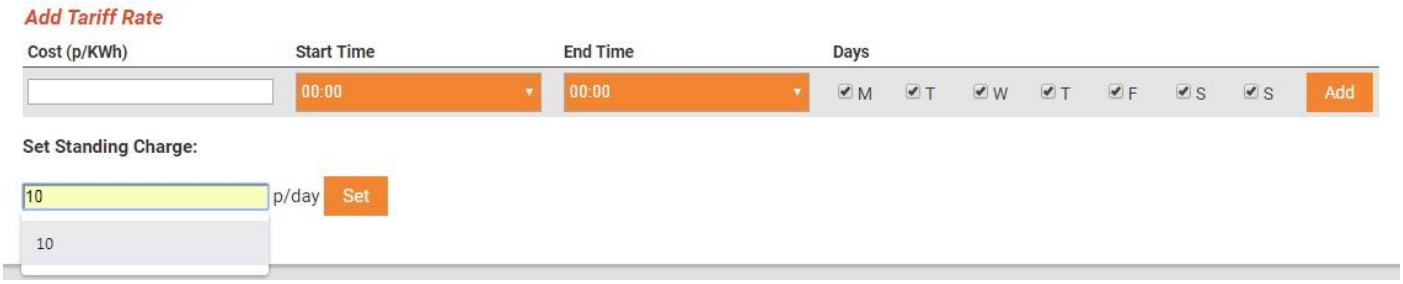
You can use the web platform to model a time of use tariff by configuring a multi-rate tariff or to show how much your community is spending on their energy use if you already have a time-of-use tariff in place. Below is an example of how to set a tariff that has a cheaper night rate compared to the day rate (like an Economy 7 tariff). The tariff is called the "Saver Tariff" and has a day rate of 16p/kWh from 8am to 8pm and a night rate of 5p/kWh from 8pm to 8am.

- Go to the "Tariff Configuration" tab
- Add a new tariff – here we've decided to call it the "Saver Tariff". Once you've added it, you can select it to start configuring.

- Start by adding your different unit rates for your tariff. Set your day/night rate by inputting a cost in p/kWh, choosing a start and end time, and selecting what days in the week this rate will apply to. You will have to set your different rates separately – once you are happy with your rate, you can click "Add". *The above screenshot shows the day rate of 16p/kWh from 8am to 8pm.*

The screenshots above show the cheaper night rate of 5p/kWh between 8pm and 8am. It is important to note that you can only set rates in ranges for a day that span from midnight to midnight. In other words, if you wanted a cheap night rate to run from 8pm to 8am, you would have to set it as two rates: 20:00-00:00, 00:00-08:00. It would not work to set it from 20:00-08:00

- You can also set your standing charge. Here, we've set it at 10 p/day

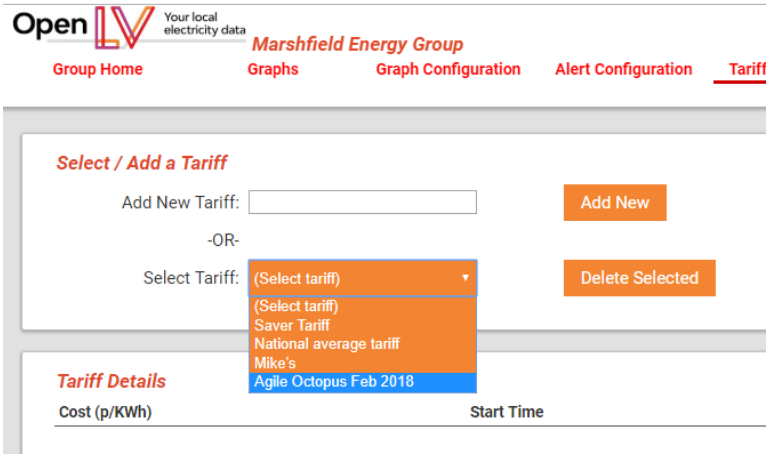


- Once all of your different rates have been set and added, your final tariff is displayed like this:

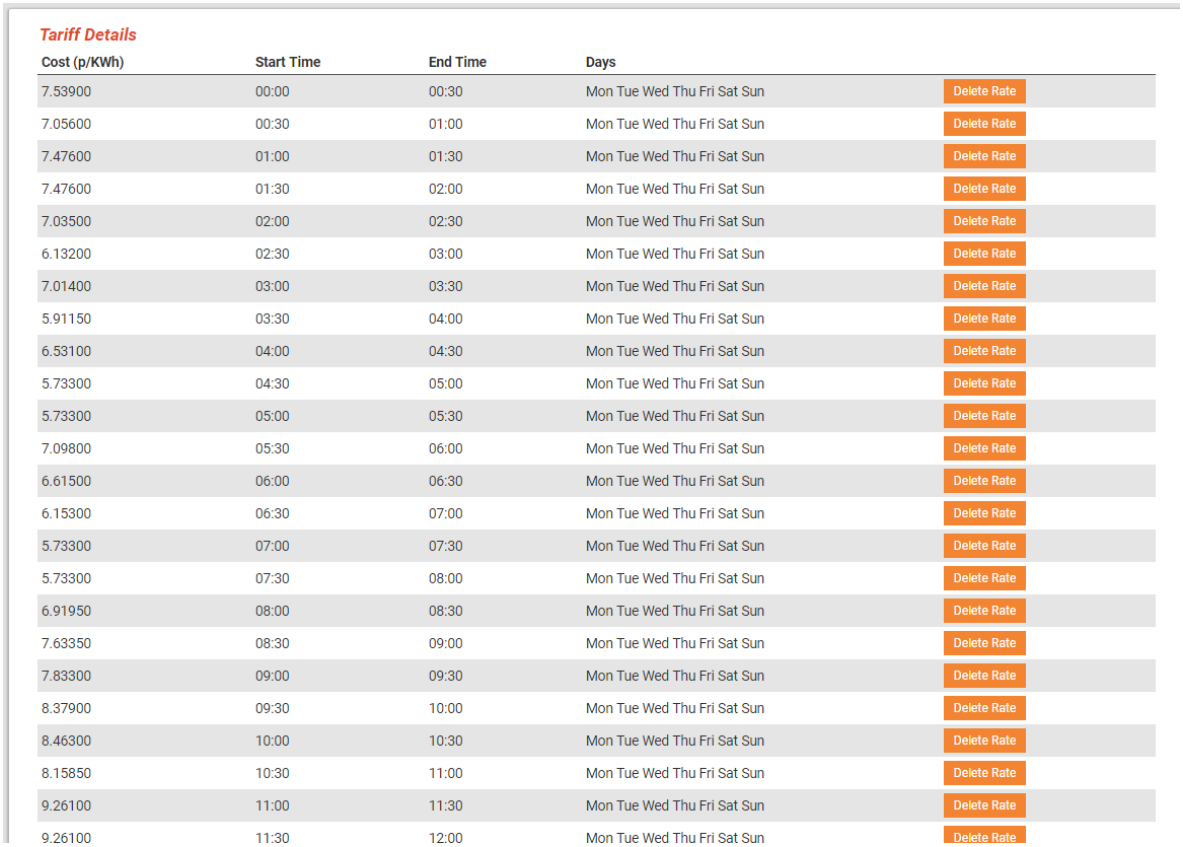
NOTE: The above figures for unit rates and standing charge have been arbitrarily chosen, and are completely hypothetical.

AGILE OCTOPUS TARIFF

All groups now have an automatically updated tariff called "Agile Octopus Feb 2018" based off a flexible time-of-use tariff supplied by Octopus Energy. The rates for this tariff are per ½ hour and change every day. By modelling how much a community's energy use would cost according to this tariff, this function will be useful to start conversations around the benefits and costs savings to be made if signed up to this kind of flexible time of use tariff.



Once you've selected this tariff, a lot of different unit rates will appear in the Tariff Details:



Tariff Details

Cost (p/KWh)	Start Time	End Time	Days	
7.53900	00:00	00:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.05600	00:30	01:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.47600	01:00	01:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.47600	01:30	02:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.03500	02:00	02:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
6.13200	02:30	03:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.01400	03:00	03:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
5.91150	03:30	04:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
6.53100	04:00	04:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
5.73300	04:30	05:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
5.73300	05:00	05:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.09800	05:30	06:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
6.61500	06:00	06:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
6.15300	06:30	07:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
5.73300	07:00	07:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
5.73300	07:30	08:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
6.91950	08:00	08:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.63350	08:30	09:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
7.83300	09:00	09:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
8.37900	09:30	10:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
8.46300	10:00	10:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
8.15850	10:30	11:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
9.26100	11:00	11:30	Mon Tue Wed Thu Fri Sat Sun	Delete Rate
9.26100	11:30	12:00	Mon Tue Wed Thu Fri Sat Sun	Delete Rate

NOTE: The rates displayed when the tariff is viewed are in general for the 12 hours before and 12 hours after the current time. The exception to this are the rates between 11pm and 4am, these are not updated until around 4pm, when the wholesale electricity rate data for the next day (using Central European Time, hence 11pm) is published.

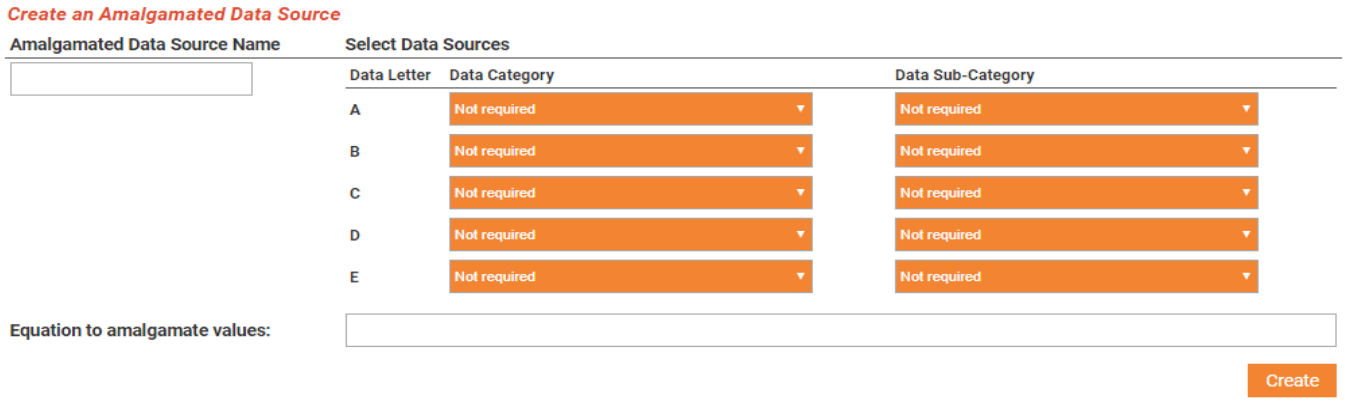
Data amalgamation

This function allows you to combine multiple values from different data sources into one single data source through setting up simple equations. This new amalgamated data source can then be displayed on graphs through the configuration tab and can be used when configuring alerts. There are a number of uses for this including:

- Displaying the total local generation
- Converting a data set into a different unit, for example kW
- Combine data sources from different feeders
- Estimating solar PV output based on a reference solar PV array.

HOW TO CREATE AN AMALGAMATED DATA SOURCE

- Enter a name for the amalgamated data source. This name will appear on graphs and charts containing the amalgamated data.
- Select the standard data source category and sub-category values for up to 5 data sources. These are each allocated a data source letter, A – E.
- Enter an equation using the data source letters and mathematical symbols: add: +, subtract: -, multiply: *, divide: /, brackets: ( ) and constant values, e.g.: 52.5. There is also a special data source letter, “H”, which corresponds to the hour of the day to the nearest 1/2 hour.
- Click on “Create” to create the amalgamated source. It will then appear under the data category “Amalgamation” and be available when creating graphs, alerts and further amalgamations.

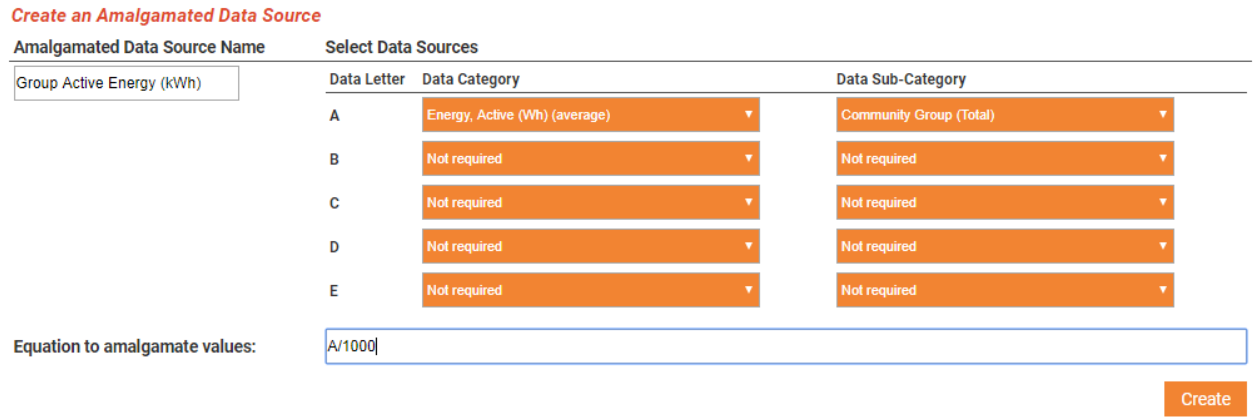


EXAMPLES

CONVERT "ENERGY, ACTIVE (WH) (AVERAGE)" FOR THE COMMUNITY GROUP TO KWH.

This means dividing the community group total average active energy use by 1000 to convert Wh to KWh:

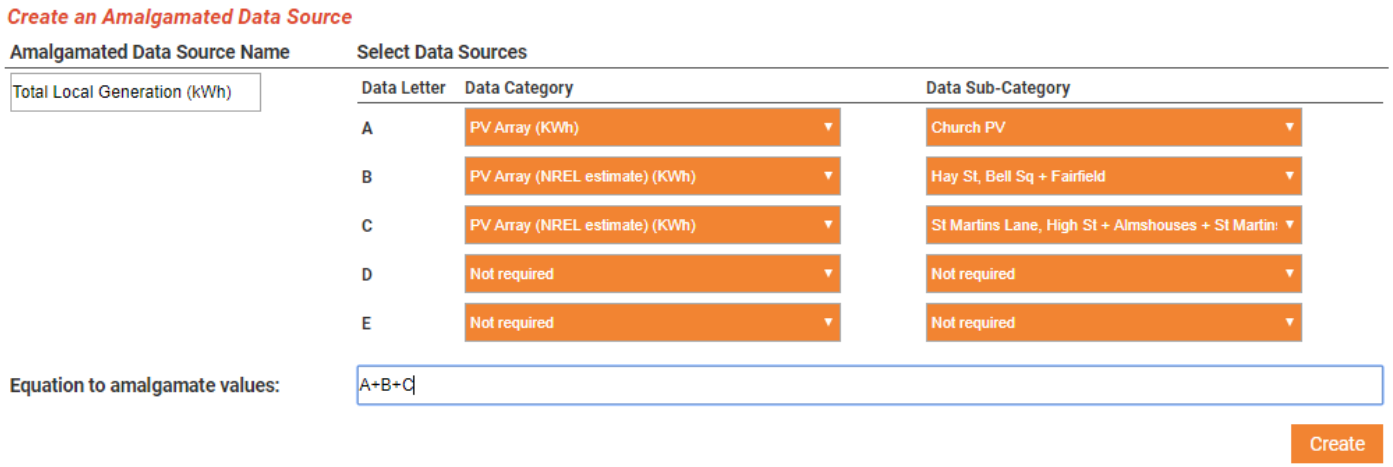
- Enter a name, e.g. "Group Active Energy (kWh)"
- Next to "A", select "Energy, Active (Wh) (average)" and "Community Group (Total)"
- Enter the equation: "A/1000" i.e. divide the Wh value by 1000 to get kWh
- Click on create



TOTAL LOCAL GENERATION

This is the sum of all the local generation sources.

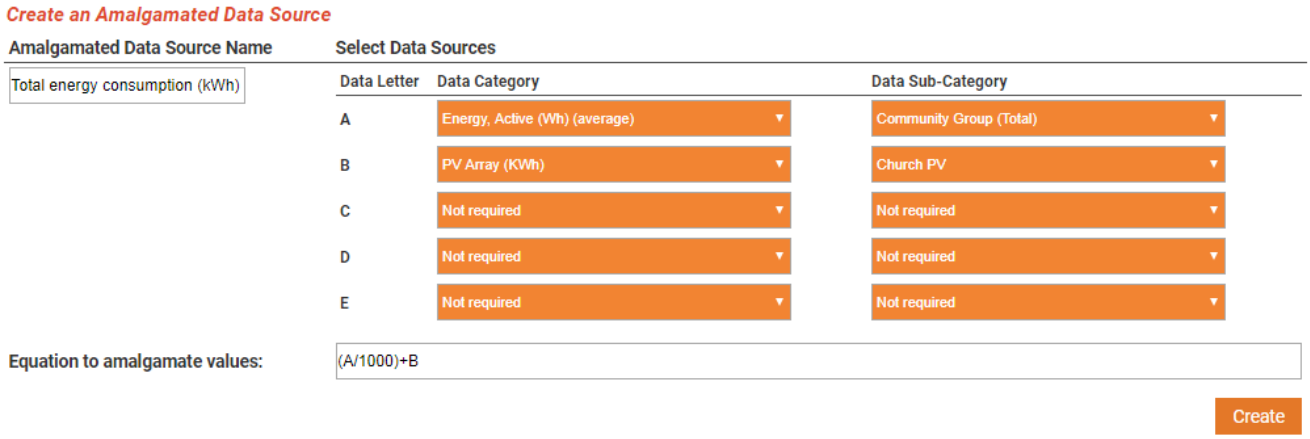
- Enter a name, e.g. "Total Local Generation (kWh)"
- Select the local generation sources next to "A", "B", "C" etc. Note, if there are more than 5 local sources, multiple sub-amalgamations can be created and then these can be summed.
- Enter an equation, e.g.: A+B+C+D+E
- Click on create



GET ENERGY USED, INCLUDING FROM LOCAL GENERATION

This is the sum of the total active energy measured at the substation and the energy generated by local systems (e.g. PV). Values for all the local systems are needed.

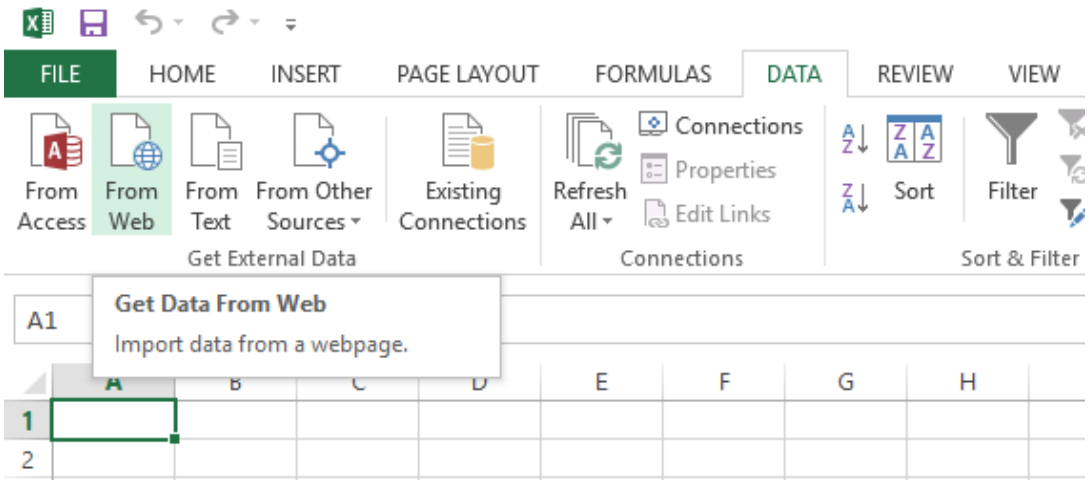
- Enter a name, e.g. “Total energy consumption (kWh)”
- Next to “A”, select “Energy, Active (Wh) (average)” and “Community Group (Total)”; Next to “B”, select the data source for the energy generated by local systems (this will probably need to be created by amalgamating all the local systems, see above).
- Enter an equation, e.g.: (A/1000)+B



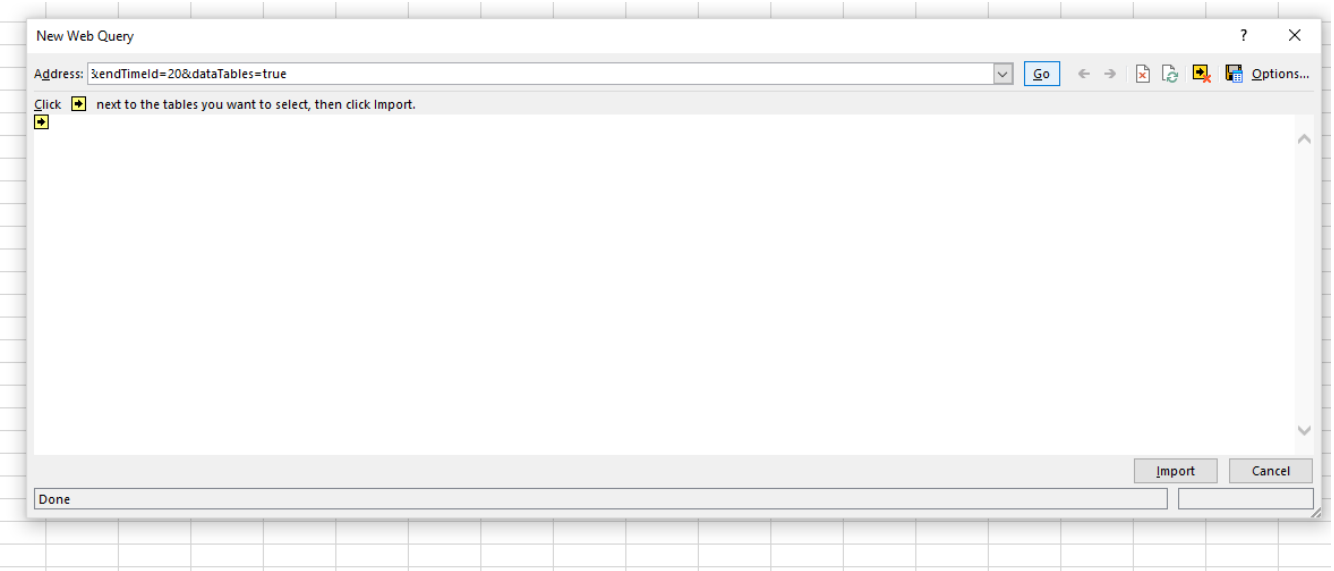
Analysing data in Excel

If you want to extract data from the web app to analyse, you can do this easily through Excel.

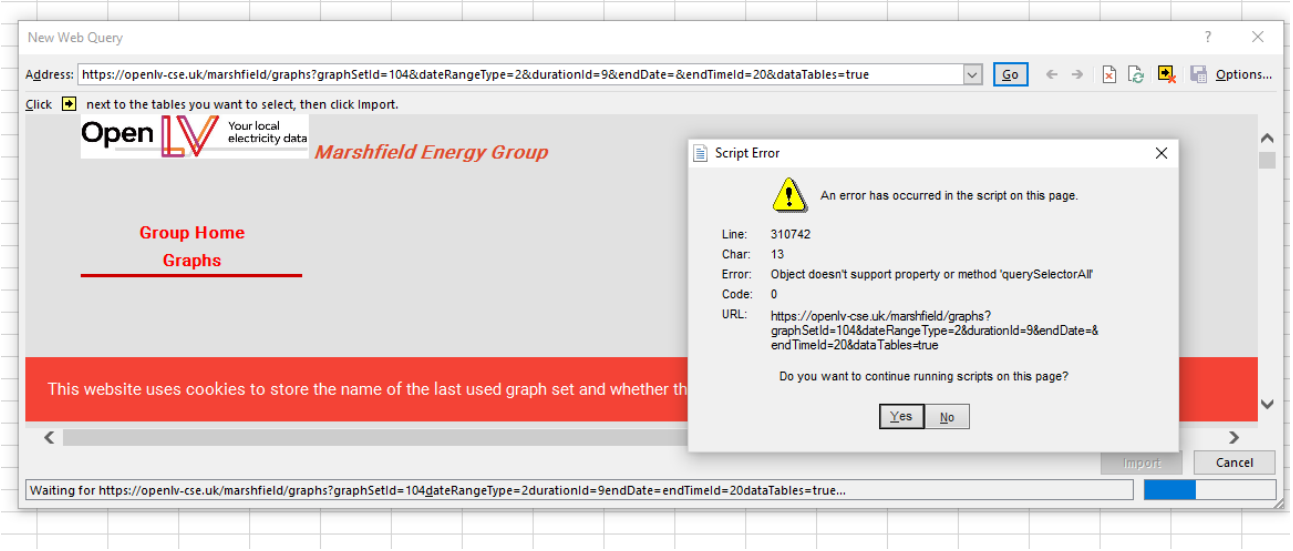
- Firstly you will need to create a graph and display it using the Graph Display tab. *NOTE: You must remember to tick the box "**Display data in tables"** for this to work.*
- Once you've created and displayed a data set, you will need to copy the URL link.
- Once you've done this, open Microsoft Excel. On the tab called "DATA" at the top, select "From Web":



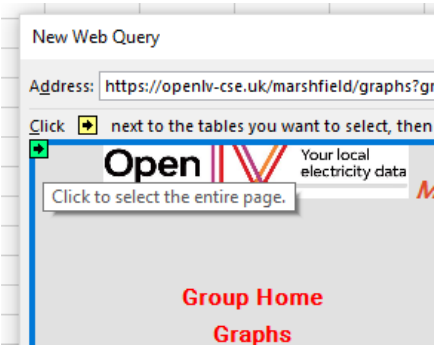
- A box will appear where you have to paste in the URL (in the box called "Address"). Then click "Go".



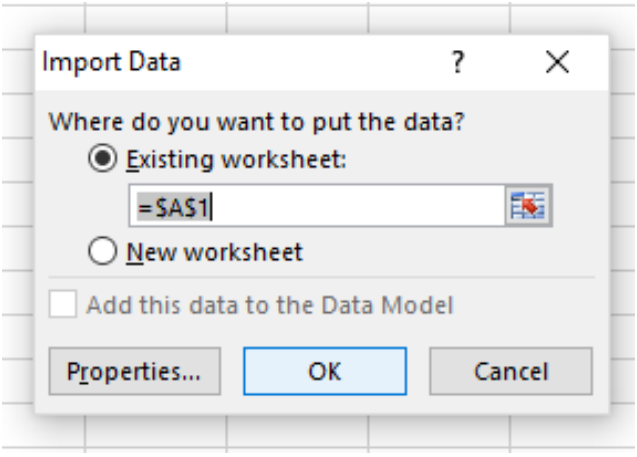
- A series of “Script Error” messages will appear – Click “Yes” on ALL of them.



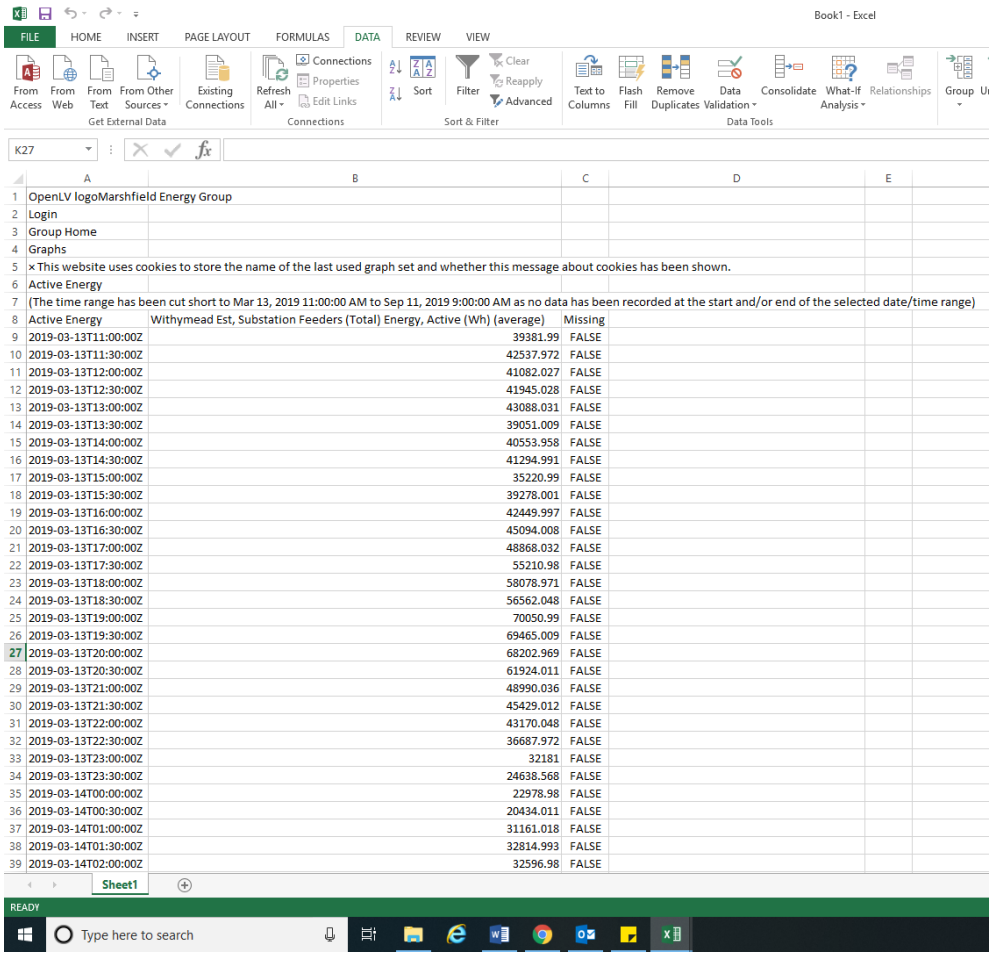
- Once you’ve clicked “Yes” on all the “Script Error” messages, you will need to click on the small arrow on the top left of the box (highlighted in green in the image below).



- Click “Import” on the bottom right of the box.
- The box below will appear – click “OK”



- Your data will then appear in the spreadsheet. You can then use this data to create your own graphs and run your own analysis.



	A	B	C	D	E
1	OpenLV logoMarshfield Energy Group				
2	Login				
3	Group Home				
4	Graphs				
5	× This website uses cookies to store the name of the last used graph set and whether this message about cookies has been shown.				
6	Active Energy				
7	(The time range has been cut short to Mar 13, 2019 11:00:00 AM to Sep 11, 2019 9:00:00 AM as no data has been recorded at the start and/or end of the selected date/time range)				
8	Active Energy	Withymead Est, Substation Feeders (Total) Energy, Active (Wh) (average)	Missing		
9	2019-03-13T11:00:00Z	39381.99	FALSE		
10	2019-03-13T11:30:00Z	42537.972	FALSE		
11	2019-03-13T12:00:00Z	41082.027	FALSE		
12	2019-03-13T12:30:00Z	41945.028	FALSE		
13	2019-03-13T13:00:00Z	43088.031	FALSE		
14	2019-03-13T13:30:00Z	39051.009	FALSE		
15	2019-03-13T14:00:00Z	40553.958	FALSE		
16	2019-03-13T14:30:00Z	41294.991	FALSE		
17	2019-03-13T15:00:00Z	35220.99	FALSE		
18	2019-03-13T15:30:00Z	39278.001	FALSE		
19	2019-03-13T16:00:00Z	42449.997	FALSE		
20	2019-03-13T16:30:00Z	45094.008	FALSE		
21	2019-03-13T17:00:00Z	48868.032	FALSE		
22	2019-03-13T17:30:00Z	55210.98	FALSE		
23	2019-03-13T18:00:00Z	58078.971	FALSE		
24	2019-03-13T18:30:00Z	56562.048	FALSE		
25	2019-03-13T19:00:00Z	70050.99	FALSE		
26	2019-03-13T19:30:00Z	69465.009	FALSE		
27	2019-03-13T20:00:00Z	68202.969	FALSE		
28	2019-03-13T20:30:00Z	61924.011	FALSE		
29	2019-03-13T21:00:00Z	48990.036	FALSE		
30	2019-03-13T21:30:00Z	45429.012	FALSE		
31	2019-03-13T22:00:00Z	43170.048	FALSE		
32	2019-03-13T22:30:00Z	36687.972	FALSE		
33	2019-03-13T23:00:00Z	32181	FALSE		
34	2019-03-13T23:30:00Z	24638.568	FALSE		
35	2019-03-14T00:00:00Z	22978.98	FALSE		
36	2019-03-14T00:30:00Z	20434.011	FALSE		
37	2019-03-14T01:00:00Z	31161.018	FALSE		
38	2019-03-14T01:30:00Z	32814.993	FALSE		
39	2019-03-14T02:00:00Z	32596.98	FALSE		

NOTE: This will probably not work for massive data sets. For example, 1 years' worth of data from the whole substation (if the substation has many feeders).

Using the API to access data

API NOTES

- The API allows users to access 30 minute data from the app for manipulation outside, or alongside, use of the graphs and other functions in the web app
- Time periods in a given day can be set by the user, but for multiple days you will need to run multiple queries.
- You will need to have a basic understanding of JSON to be able to extract data using this guidance but there are various programmes online which you can use to convert JSON output from this API into CSV files, SQL, and other formats.
- The guidance below shows how to create a string which you can enter as a URL into a web browser to return a full set of OpenLV (method 2 community trials) data for a given period

THE "READINGS" INTERFACE

Query

The RESTful api allows GET on

https://{server}/{groupShortName}/api/readings?
password={password}&
startTime={startTime}&
endTime={endTime}

The arguments are:

server = openlv-cse.uk (live) or olv-cse-qa.co.uk *(QA)*
groupShortName = groups' short name as used in the main website,
marshfield, bwce, rooftop, whg, ece, owensquare or *tec*.
password = The groups' password
startTime = UTC time for required start date & time, using the usual format: YYYY-MM-DDThh:mm:ssZ (see the example below), where
YYYY = 4 digit year
MM = 2 digit month 01 to 12
DD = 2 digit day of month 01 to 31
hh = 2 digit hour 00 to 23
mm = 2 digit minute 00 to 59 (note data is available at 00 and 30)
ss = 2 digit second 00 to 59 (note data is available at 00)
endTime = UTC time for required end date & time (same format as startTime)

Example:

https://olv-cse-qa.co.uk/marshfield/api/readings?password=****&startTime=2018-10-24T00:00:00Z&endTime=2018-10-24T03:00:00Z

Response

The response is a JSON string with the following top level format.

```
{
"startTime": "2018-10-24T00:00:00Z",
"status": "OK",
"readings": []
}
```

startTime: This gives the starting time for the readings contained in the readings array. The first reading will be at this time. The next reading will be 30 minutes later and so on until all the readings are exhausted.

status: This contains a descriptive code for the query. Values are:

> **OK** (HTTP Status – OK): Success
> **BUSY** (HTTP Status – SERVICE_UNAVAILABLE): Try again later. This may happen while readings are being updated.
> **TRUNCATED_DURATION** (HTTP Status – OK): The duration requested was too long and has been truncated. The max is set at 1 day.
> **BAD_REQUEST** (HTTP Status – BAD_REQUEST): Non-specific issue with the request
> **BAD_DATETIME** (HTTP Status – BAD_REQUEST): Failed to parse the date and/or time information
> **BAD_PASSWORD** (HTTP Status – UNAUTHORIZED): Incorrect password used
> **BAD_GROUPNAME** (HTTP Status – BAD_REQUEST): Invalid group name used (must be from the list above.

readings: This is where the actual reading data is contained. There is one entry for each sensor / data source. All sensor data for the community group is included. These have the format:

```
{
"id": 1345,
"description": "Community Group Total Carbon Intensity (gCO₂)",
"halfHourlyValues": []
}
```

id: This is a unique and fixed id for the sensor / data source (which can be a total value based on a set of data sources).

description: This is a human readable description for the data source which matches the description used in the web interface.

halfHourlyValues: This is where the actual readings are contained. Here is an example:

"halfHourlyValues": [
871.0788000000002,
818.51234,
931.16664,
"NaN",
902.4346300000001,
882.6938299999999
]

The first entry is the reading for the time in the startTime field (see above), then each further value is for 30 minutes later. Gaps in the data, due to missing readings, are filled using “NaN”. Missing readings at the end of the duration are not output, meaning the arrays for different sensors can be different lengths.

Embedding graphs using i-frames

UNDECORATED GRAPH NOTES

- There is a page for use in iframes, it has the same parameters as “graphs” but is called “graphsundecorated”.
- The “graphsundecorated” page can be added to an iframe tag on any website:

```
<!DOCTYPE html>
<html>
    <head>
        <title>iframe test</title>
    </head>
    <body>
        <iframe
            height="400" width="800"
            src="https://openlv-cse.uk/marshfield/graphsundecorated?{args}>
        </iframe>
    </body>
</html>
```

- This page has no “x-frame-options” setting. All other pages have an “x-frame-options” setting of DENY.
- The arguments to the “graphsundecorated” page are the same as to the “graphs” page, so, to show some graphs within an iframe on a 3rd party website, find the required arguments using the webapp and the “graphs” page, then copy and use with the above page.

EXAMPLES:

For times up to the request time (dateRangeType 2):

https://openlv-cse.uk/whg/graphs?graphSetId=41&dateRangeType=2&durationId=6&endDate=&endTimeId=27

becomes:

https://openlv-cse.uk/whg/graphsundecorated?graphSetId=41&dateRangeType=2&durationId=6&endDate=&endTimeId=27

or, *for dateRangeType 1, with a date:*

https://openlv-cse.uk/whg/graphs?graphSetId=41&dateRangeType=1&durationId=8&endDate=2018-11-07&endTimeId=18

becomes:

https://openlv-cse.uk/whg/graphsundecorated?graphSetId=41&dateRangeType=1&durationId=8&endDate=2018-11-07&endTimeId=18

Note: The auto-refresh for “dateRangeType 2” mode is disabled for the graphsundecorated page. However, the data displayed will be updated when the page is reloaded.

Full example (using QA server):

```
<!DOCTYPE html>
<html>
	<head>
		<title>iframe test</title>
	</head>
	<body>
		<iframe
			height="400" width="800"
			src="https://olv-cse-qa.co.uk/whg/graphsundecorated?
graphSetId=27&dateRangeType=1&durationId=8&endDate=2018-11-05&endTimeId=24">
		</iframe>
	</body>
</html>
```

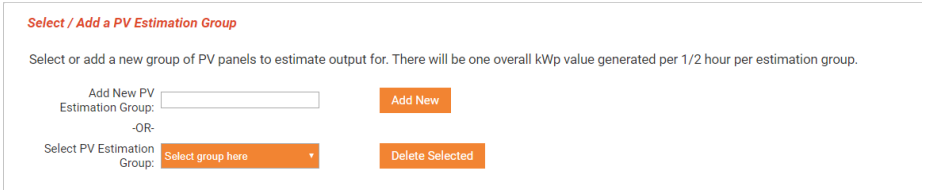
Displaying data from solar PV array

ESTIMATING SOLAR PV OUTPUT

We are able to estimate the solar output of any PV arrays you have using the NREL "pvwatts" service see: https://developer.nrel.gov/docs/solar/pvwatts/v6/ & https://www.nrel.gov/docs/fy14osti/62641.pdf. Configuration for panels to be estimated needs to be added per community group. Outputs can be grouped together e.g. by the feeder the PVs are connected to.

If you would like to estimate PV output, you will need to use the "PV Estimation" function (see below). This function allows you to manually input the details of any solar PV installations in your community and use the app to estimate the PV output.

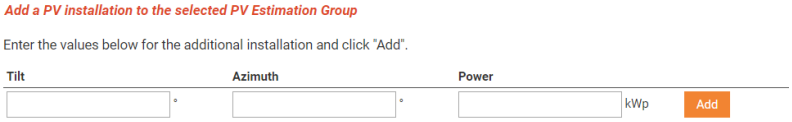
- To create a new PV Estimation group you will need to use the first box on the page. Here you can also edit any that you've previously used. Here you can chose how you will group your PV outputs by creating an appropriate name (for example if you are estimating the PV outputs of all PV panels on a feeder, use the same name as you've chosen for the feeder).



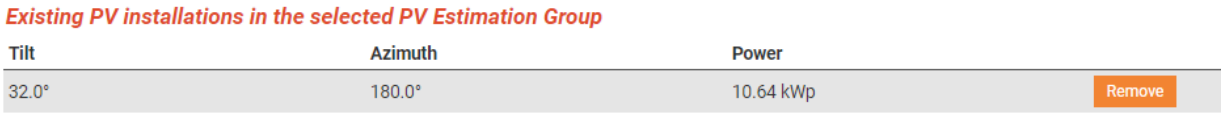
- Once you've created a new PV Estimation Group, you'll need to "select" it to edit the group.

- Once you've selected your PV Estimation group, you can start adding the solar installations to be estimated in the box at the bottom of the page (see below). To do this you will need to input the following information:

1. System size (kW) or simply the number of panels (we will estimate the system size using 280w per panel)
2. Tilt angle (°) (angle from horizontal)
3. Azimuth angle (°) (angle from North)



- Once you've added an installation, this will appear in the box "*Existing PV installations in the selected PV Estimation Group*" (see below)

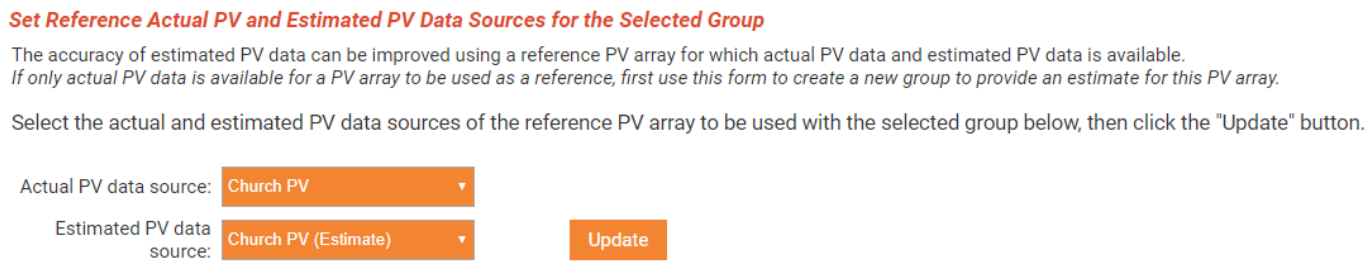


IMPROVED ESTIMATES FUNCTION – FOR GROUPS WITH ACTUAL SOLAR PV DATA INTERGRATED INTO THE WEB APP!

A new function allows groups to improve the modelled estimates by comparing it with actual solar data (if this is already integrated in the app through an API). This works by calculating the error between the actual solar array output and its estimated version, and using this error to correct the estimate of another PV Estimation group that you've added.

NOTE: You can only use this function if you have a local solar PV installation which we have integrated into the web app through an API to display output.

- On the PV Estimation page there is a box called "*Set Reference Actual PV and Estimated PV Data Sources for the Selected Group".* To create the reference, you'll need to select an "Actual PV data source" and an "Estimated PV data source". In the example below which comes from Marshfield, we are using the Church PV as the actual data source.
- To create the "Estimated PV data source", you MUST add an estimated version of the actual PV data source (in this example, an estimated version of the Church PV data). You do this by creating a new estimation group as shown previously. Once you've created this group, you can select it in the "Estimated PV data source" drop down list.



- Once you've selected both data sources, click "Update".

DISPLAYING ACTUAL AND ESTIMATED SOLAR PV OUTPUT

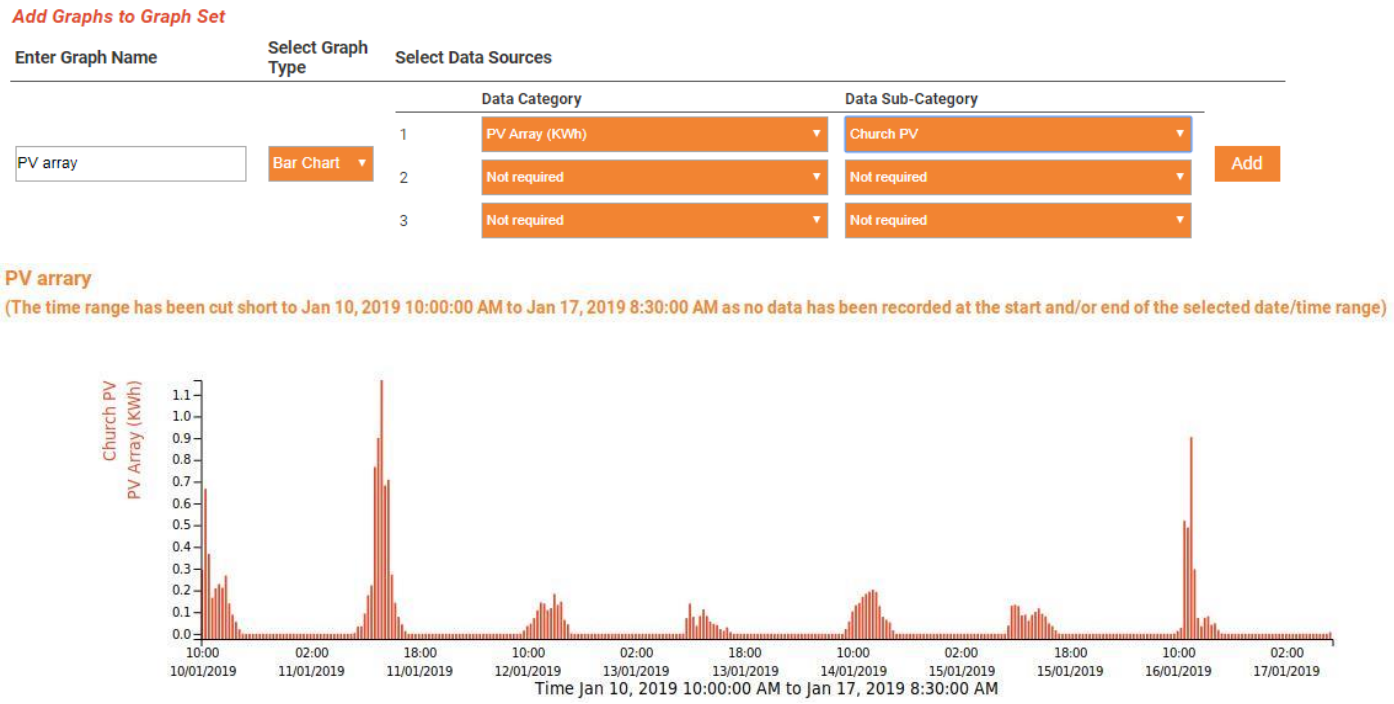
On the Graph Configuration page, you can set up graphs to display your actual PV outputs (if you have this integrated on the app – ie SolarEdge installations), your estimated outputs for a PV installation and your improved estimates.

DISPLAYING ACTUAL SOLAR DATA (FROM SOLAREDGE INSTALLATIONS)

For groups who have a local PV array installed by SolarEdge, we were able to access an API that allows real data collected from SolarEdge PV installations to be displayed. The display is based on the 15 min watts output values. These are converted to KWh and summed over 30 min periods to match the other data measurements.

Please contact CSE for details of the information you need to provide to allow CSE to configure the system to access your SolarEdge data.

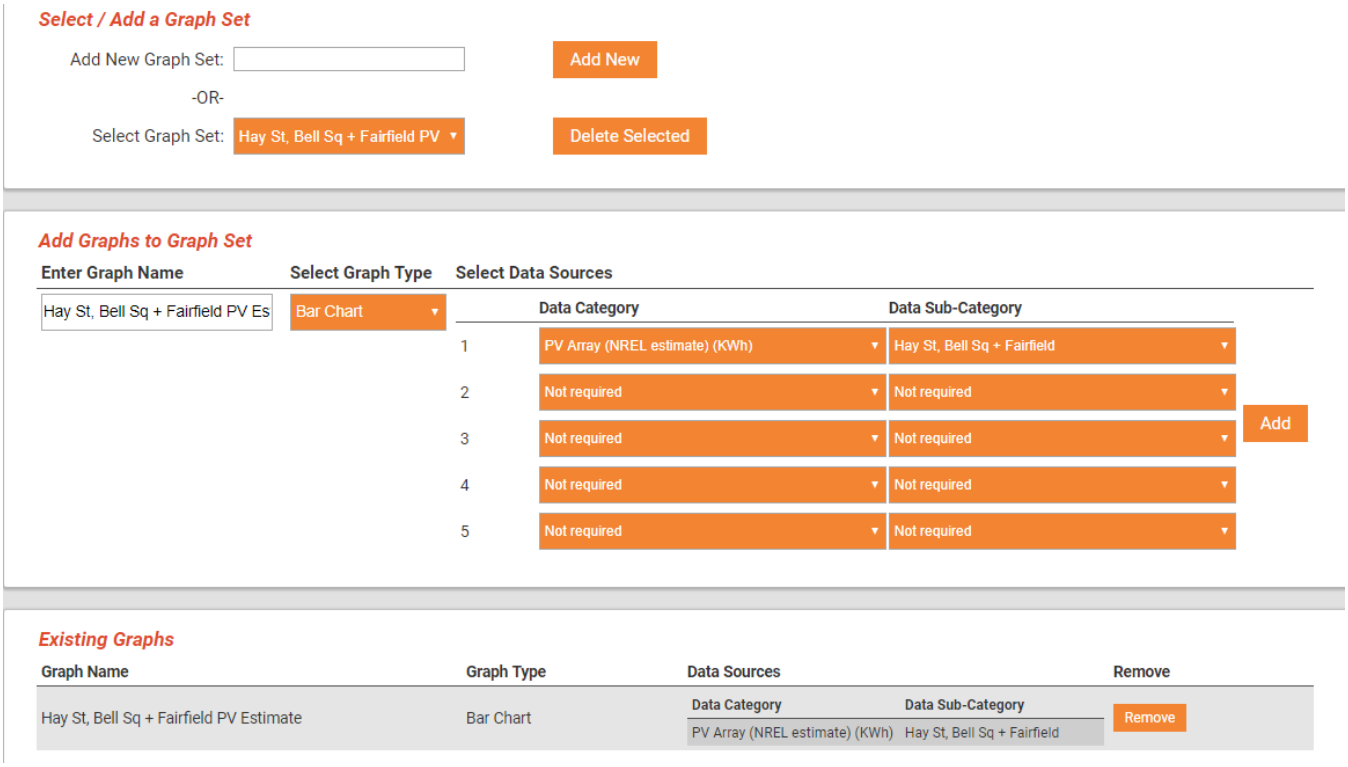
To configure a graph using the solar data from your SolarEdge PV installation, see screenshot below:

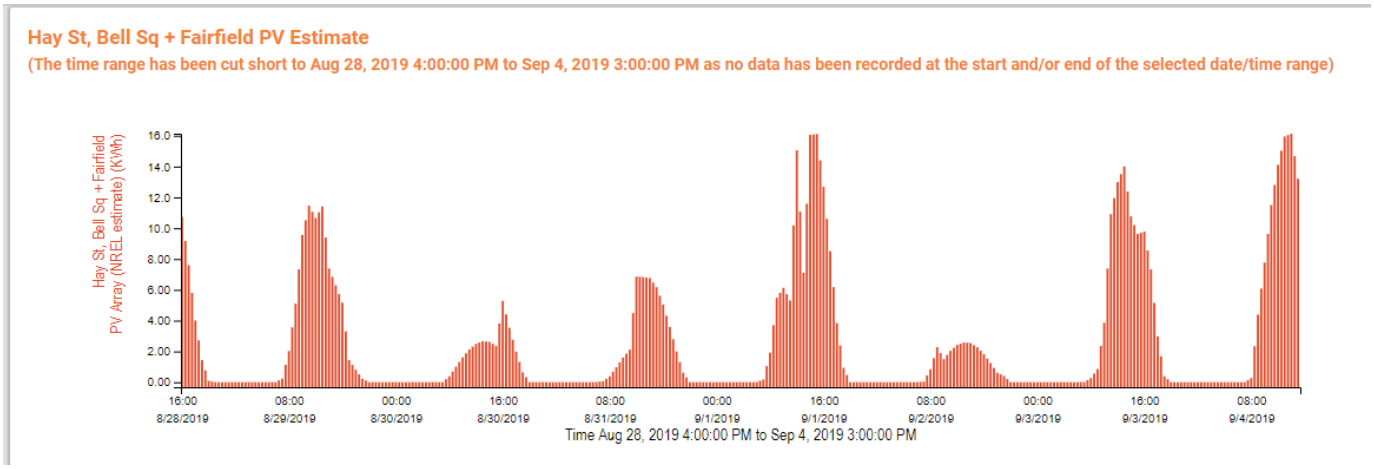


NOTE: If you have a SolarEdge installation, select the "PV Array (KWh)" Data Category.

DISPLAYING ESTIMATED SOLAR DATA (NREL ESTIMATE)

Once you've added your Estimated PV group using the PV Estimation function, you will be able to configure a graph using this solar PV estimated output as in the screenshot below:





DISPLAYING ESTIMATED SOLAR DATA (IMPROVED ESTIMATE)

If you've used a reference PV data source to improve the accuracy of your estimated solar output, then you can configure a graph with this improved estimate. The below graph configuration set up and graph shows how to do this (graph set has both the NREL estimate AND the improved estimate):

Select / Add a Graph Set

Add New Graph Set: [ ] Add New

-OR-

Select Graph Set: [Hay St, Bell Sq + Fairfield PV] Delete Selected

Add Graphs to Graph Set

Enter Graph Name	Select Graph Type	Select Data Sources	Data Category	Data Sub-Category
Hay St, Bell Sq + Fairfield PV Es	Bar Chart	1	PV Array (NREL estimate) (KWh)	Hay St, Bell Sq + Fairfield
		2	PV Array (estimate + ref.) (kWh)	Hay St, Bell Sq + Fairfield
		3	Not required	Not required
		4	Not required	Not required
		5	Not required	Not required

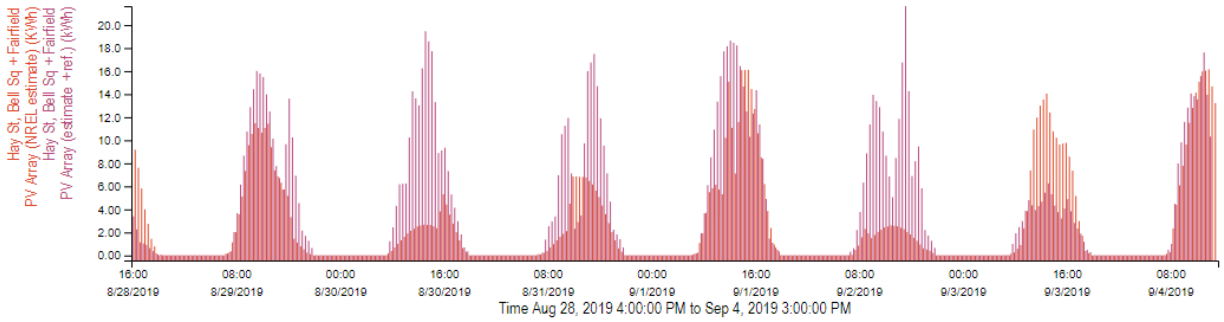
Add

Existing Graphs

Graph Name	Graph Type	Data Sources		Remove
		Data Category	Data Sub-Category	
Hay St, Bell Sq + Fairfield PV Estimate (improved)	Bar Chart	PV Array (NREL estimate) (KWh)	Hay St, Bell Sq + Fairfield	Remove
		PV Array (estimate + ref.) (kWh)	Hay St, Bell Sq + Fairfield	

Hay St, Bell Sq + Fairfield PV Estimate (improved)

(The time range has been cut short to Aug 28, 2019 4:00:00 PM to Sep 4, 2019 3:00:00 PM as no data has been recorded at the start and/or end of the selected date/time range)



Data sources, calculations and assumptions

This link takes you to a document which lists the data being recorded within the LV-CAP units:

https://openlv.net/wp-content/uploads/2017/10/OpenLV-Measurement-Points-V1.0.pdf

In addition to this data, the Method 2 web app also draws on several sources of external data, including carbon intensity data, solar and wind data (from specific renewable energy installations in several of the communities taking part in the trials, imported via FTP and APIs), and estimated solar data which uses an external solar PV calculator.

Carbon intensity data

In the web app you can generate graphs and smileys which show the carbon emissions associated with the energy mix being used to generate electricity at a given time of day. It uses an API which converts a postcode into a region of the UK, then returns at estimated intensity (named 'forecast' in the response) for the region of the UK and the from/to times specified. The "actual" values are not available from the app developers - the actual values are only available on a UK wide level.

This is the API: https://api.carbonintensity.org.uk/regional/intensity/{from}/{to}/postcode/{postcode}

The methodology is documented here:

https://carbon-intensity.github.io/api-definitions/?shell#get-regional-intensity-from-to-postcode-postcode

Locally generated electricity data

Some of the communities in the Method 2 trials have renewable energy assets which are generating electricity from wind or solar PV arrays which have data loggers. The app can use an FTP system, or the API provided by SolarEdge, to visualise data alongside the substation data, and provides a way of comparing energy generation with energy demand.

Timestamps

The OpenLV Platform uses Co-ordinated Universal Time (UTC) web app, so the timestamps for the 1-min data downloads from the LV-CAP units may be different (by one hour) during the Daylight Saving Time (DST) period (i.e. British Summer Time). However, the web app corrects this and uses British Summer Time during the DST period. So if you use the web app for 'real time' data, it will be the actual time, and not an hour out. However, the API uses UTC time as described above.

Inside temperature readings

In some substations the LV-CAP unit is attached outside the substation, which means that there will never be an inside temperature reading. If this is the case, and you have set up a graph to show the inside temperature, the data will not display (because there is no data). This is the case for the following substations in the trials:

079 – Bloomfield Ave

069 – West Littleton Rd

043 – Withymead Estate

044 – Hay St.

066 – Harpfield Close

070 – St. Martins Lane

Octopus Energy's "Agile Octopus" time of use tariff

Octopus Energy's "Agile Octopus" tariff rates have been integrated into the web app. A function will be developed that will query these rates at the start of each day and update a new OpenLV "Agile Octopus" tariff entry for each of the community groups.

For more information about this innovative flexible time of use tariff: https://octopus.energy/agile/

More information about the OpenLV project

For more information about the OpenLV project, visit: https://openlv.net/about/

For more information about the OpenLV web app and how to use it, email:

OpenLV@cse.org.uk

or

Communities@cse.org.uk