

# Performance and consumption

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# Performance task

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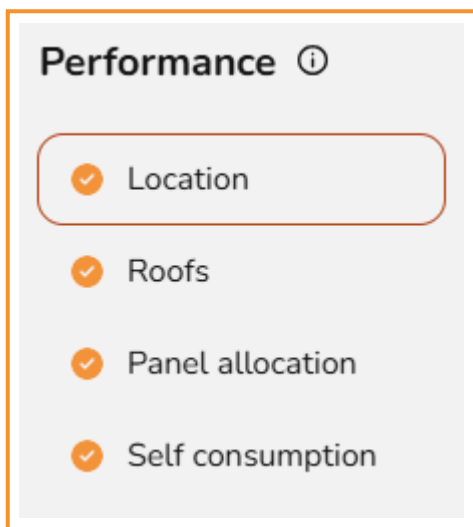
The performance task uses the system data, location and shading information to estimate the annual output of the system. This is then used in self-consumption calculations to estimate how much of what is generated will be used directly, used to charge a battery or exported to the grid, which is needed to estimate the [financial benefits](#) of the system.

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## Navigating the performance task

You can access the Performance task via the **'Tasks' drop-down menu** or from the **task list** to the left on the project overview page.

When the Performance task first opens, you'll be shown a popup that lets you **configure the settings** you want to use. You can use the left hand navigation to choose the settings you want to edit. More information on each of the settings is available below.



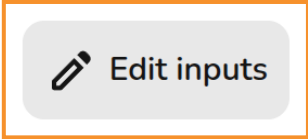



When you have finished configuring these inputs, click **Done**.

The right hand sidebar contains options to switch between the **Sunpaths** and the **Performance results**:

## Sunpaths

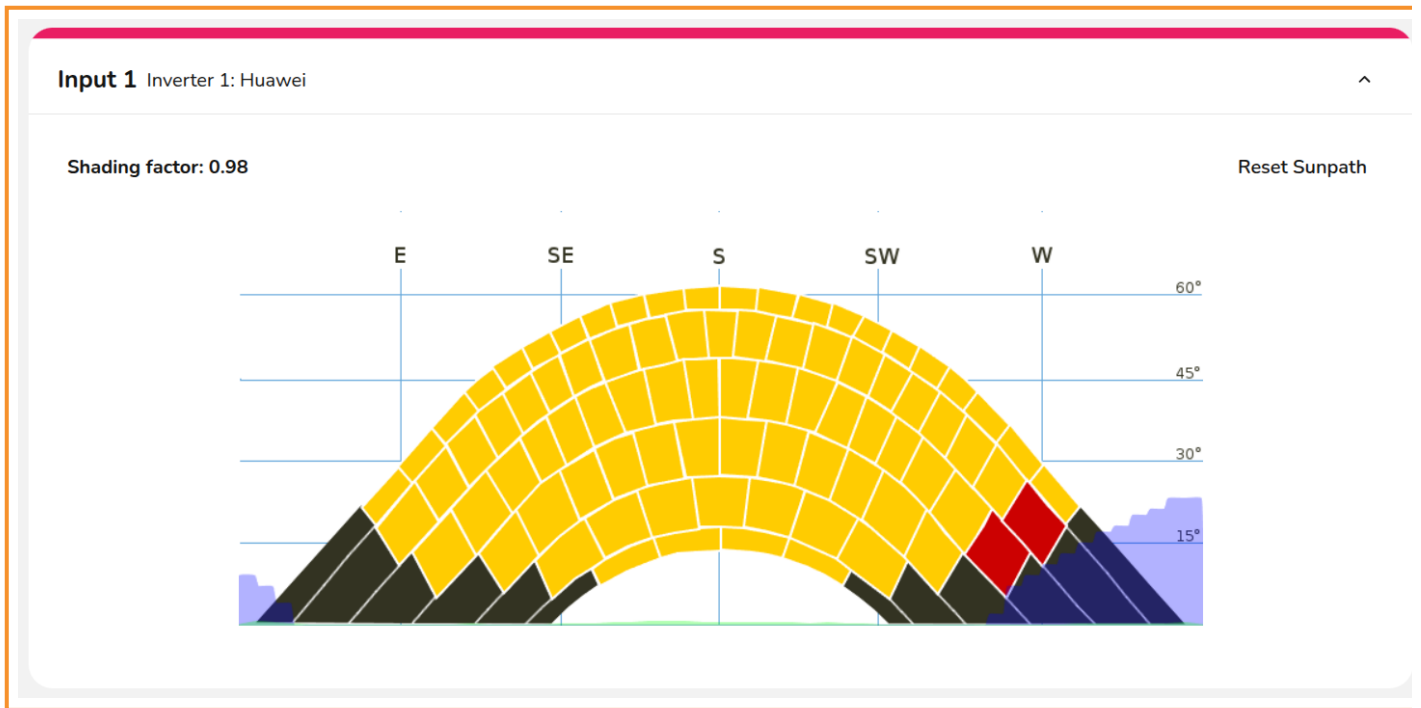
### Performance Results

As well as the following:

	<b>Edit inputs</b> Click to update the location, pitch and orientation of the roofs and panel allocation
	<b>Open help page</b> Go directly to this help page if you're ever having trouble.
	<b>Go to user preferences</b> Adjust which performance dataset is used, sunpath and panel allocation automation, and MCS self-consumption defaults.
	<b>Open performance report</b> See MCS performance table with sections A, B, C and D (if MCS self consumption completed and selected in <a href="#">financial task</a> ).

## View and edit Sunpaths

The sunpath diagrams maps the path of the sun across the sky at different hours in the day for different months of the year. For each point on the sunpath diagram, Easy PV calculates the amount of solar radiation reaching the panels from direct and diffuse radiation. For shaded regions, where direct radiation is radiation is fully blocked, the system calculates how much diffuse radiation still reaches the panels. The shading factor is the proportion of solar radiation that reaches the panels after accounting for these shading losses.



## Automating with 3D

If designing in 3D or magic design mode, the shading can be calculated automatically, provided any trees or obstructions have been modelled. If you would like to manually edit the sunpaths then toggle off 'Auto calculate sunpaths'.



If designing in 2D, you will need to manually draw on the sunpath diagram what shade is on the panels at different points in the year. Click between the inputs to expand the sunpath diagrams for each inverter.

Read here about the differences between [design modes](#).

## Navigating between inverters and inputs

On the right you will see each of your inverters, when selecting between them you will see each input or shading group for that inverter on the left. Once each sunpath diagram has been calculated, a green tick will show on the inverter.

# View the Performance results

These results will depend on which version of Easy PV you are using, below you can expand for information on each version:

## MCS performance and self-consumption results

The performance estimate calculated here is based on the method detailed in [MCS 032](#). See the end of [this section](#) for more information on the methodology used for the self-consumption calculation.

The MCS performance report can be accessed from the forms (and then reports) drop down menu.

### A. Installation data

This section details the installed capacity, orientation of the system, inclination of the system and the location. These inputs can be adjusted by clicking the pen icon in the top right or by adjusting the panels on the system.

### B. Calculations

Using the installation data and the shading factor, an estimated annual output is calculated. To adjust the shading factor, navigate to the sunpaths diagrams tab.

### C. Estimated PV self-consumption - PV only

The estimated self-consumption for the system with PV only is taken from the MCS lookup tables, depending on the values above and those input in the task. Click the pen icon to adjust these inputs.

### D. Estimated PV self-consumption - with EESS

The estimated self-consumption for the system with PV **and** battery storage is taken from the MCS lookup tables. This section will not show if there is no battery storage, navigate to the inverter task to include battery storage.

### E. Additional benefits from PV and EESS

If additional consumption is anticipated or some of the battery capacity is reserved for ancillary services, that will be detailed here. This section will not show if that is not the case, to edit those inputs click the pen icon in the top right and navigate to the self-consumption tab.

A. Installation data	Inverter 1 SolaX X1 G4 5.0D hybrid	
	Input 1	Input 2
Installed capacity of PV system – kWp (stc)	2.610 kWp	3.480 kWp
Orientation of the PV system – degrees from South	23°	23°
Inclination of system – degrees from horizontal	32°	12°
Postcode region	1	
B. Calculations		
kWh/kWp (Kk) from table	963	900
Shade factor (SF)	0.98%	0.63%
Estimated annual output (kWp x Kk x SF) – kWh	2463	1973
Estimated total annual output – kWh	4436	
C. Estimated PV self-consumption – PV only		
Assumed annual domestic electricity consumption	3500 kWh	
Expected solar PV self-consumption (PV only)	1242 kWh	
Grid electricity independence / Self-sufficiency (PV only)	35%	
D. Estimated PV self-consumption – with EESS		
Assumed usable capacity of electrical energy storage device, which is used for self-consumption	2.7 kWh	
Expected solar PV self-consumption (with EESS)	2129 kWh	
Grid electricity independence / Self-sufficiency (with EESS)	61%	
E. Additional benefits from PV and EESS		
EESS capacity not used for self-consumption	2.7 kWh	
Total energy discharged per annum	1971 kWh	
Additional self-consumption from EV, heat pumps, diverters (only when present)	0 kWh	

## NREL performance results

Section **A** details the installed capacity, orientation of the system, inclination of the system and the location. These inputs can be adjusted by clicking the pen icon in the top right.

In section **B**, the data in section **A** is used to estimate the output per kWp for the unshaded array using the NREL's PVWatts calculator. The percentage of output lost from shade is then subtracted from this value. This is then multiplied by the kWp of the input to calculate the estimated generation per input. To adjust the percentage lost, navigate to the sunpaths tab.

## Edit the Performance task inputs

Certain inputs are required for the performance estimate to be calculated. Designing in 3D and [configuring your settings](#) to automate panel allocation and sunpath diagram calculations will streamline much of this task.

## Location

If not already input when creating the project, you will need to set the location. This is necessary for performance calculations since where in the world the system is located determines how much sunlight it will get. If there is no postcode for the location of your system, choose the most local one you can find.

This section may show as ticked and completed already if this information can be pulled from the start of the project.

## Roofs

If you are creating a flat roof system or using quick roof mode, you will also need to input pitch and orientation. Both this and the location data are used to determine the output of the system.

This section may show as ticked and completed already if the pitch and orientation can be populated from earlier in the project.

## Panel allocation

This section will depend on how you have configured your settings.

- If you have selected for your panels to be **automatically allocated**, then panel allocation will show as completed
- If you have selected **suggest allocation** then here you can choose to edit the allocation or select **Done** to accept the allocation and close the window.
- If you have **manual allocation** selected then you will need to allocate the panels here.

There are some cases where auto-stringing will not work and manual allocation will be required. Further information about manual panel allocation can be found [here](#).

## Self-consumption calculation

A self-consumption model is available through the [Consumption Task](#). For UK users, this can be provided to customers in addition to the MCS calculation, which is completed here in the performance task.

## **MCS self-consumption calculation**

This process follows MCS guidelines defined in [MCS 032](#) to predict self-consumption of the generated PV electricity. UK companies installing under MCS will need to provide this calculation when it can be used.

### **Annual electricity consumption of the property**

The lookup tables for this calculation only permit values between 1500kWh and 6000kWh. Use the [consumption task](#) for more detailed consumption calculations or for values that fall outside this range.

For the most accurate results use a value from past electricity bills. Where possible, consumption data should be taken before the installation of electric heating / hot water or electric vehicle charging.

### **Occupancy archetype**

Properties that are occupied during the day will typically consume more PV-generated electricity directly. Properties that are empty during the day may benefit more from battery storage that can store PV-generated electricity for later use.

### **Proportion of battery used for ancillary services such as backup power or arbitrage**

If there is a battery on the project, this question will appear. If the entire battery capacity to be used to increase self-consumption, this value will be 0%.

The lookup tables for this calculation only permit that the usable capacity is less than 15.1kWh, in this case use the [consumption task](#) for more detailed consumption calculations.

### **Is additional self-consumption anticipated?**

The MCS calculation does not account for consumption arising from "non-typical domestic loads" such as electric space heating, swimming pools, heat pumps, electricity power diverters, electric water heating and electric vehicles.

You can enter any figure here, but the calculation assumes that a maximum of 95% of the generated electricity is available for self-consumption so the value in the results table will be capped to the remaining available generation capacity.

# Manual panel allocation

Manually allocating panels is slightly different depending on whether the panels are optimised or not. All panels connected to an input must be within a certain pitch and orientation threshold and panels incompatible with the selected string will be un-selectable. In this case the panels may need to be optimised.

## Without optimisers

1. Select inverter input and the roof you'd like to allocate from the lists on the left.
2. Click or drag over panels to allocate them to an inverter input.
3. Go to the next inverter input and repeat.
4. Once all inverter inputs have the correct number of panels, all inputs will be in green and a tick will show at the top. Below all your inverters and roofs, you can then click *next* to continue with the [performance task](#).

## With optimised systems

You can add optimisers in the inverter task by clicking *Add optimisers +* to the top right of the inverter string. This will automatically add optimisers to all panels on that inverter, if you would like to remove some, this will have to be done manually in the [financial task](#).

When you come to allocating the panels the steps are largely similar to non-optimised systems:


1. Select inverter input and the roof you'd like to allocate from the lists on the left.
2. Use the *Add group +* option to sub-divide the input into shading groups and then select the roof you want to allocate panels to. **You should group panels that will get similar levels of shade and Easy PV will require that you use shading groups for panels that are on different facing roofs but on the same string.**
3. Click or drag over panels to allocate them to an inverter input or shading group.
4. Go to the next inverter input or shading group and repeat.
5. Once all inverter inputs have the correct number of panels, all inputs will be in green and a tick will show at the top. Below all your inverters and roofs, you can then click *next* to continue with the [performance task](#).

**Adding optimisers in the inverter task will not automatically change the generation.**

The generation is a product of the kWp of the inverter, the kk value (which is based on the pitch, orientation and location of the panels) and the shading factor. Putting panels in separate **shading groups** in Easy PV allows Easy PV to factor in differences in the kk value and shading factor for the panels in each group on a single string. Without shading groups the generation will not change because the kk value and shading factor will be the same on the whole string, as it would be without optimisers.

## Other options



- Use the  icon to reset the allocation on the inverter or individual inverter inputs.
- Below where it says *Next*, you also have the option to use auto-stringing. This will not work for systems that require shading groups.

# Getting started with the Consumption task

For UK users, the Consumption task is an alternative to the MCS self-consumption calculation completed in the [Performance task](#). Unlike the MCS self-consumption calculation, the Easy PV calculation can be used for projects larger than 6000 kWh and with batteries over 15.1 kW.

## Configuring the Consumption task

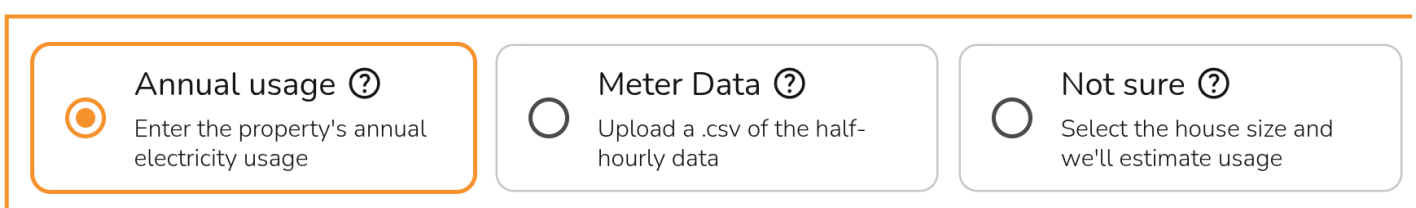
When the Consumption Task opens, a popup will appear. Here, you can configure the settings for calculating the system's generation and consumption. This will open on the *Annual consumption*. Use the left-hand navigation to choose the settings you want to edit.



When you have finished configuring these inputs, click *Done* on the *Energy Management* tab. If you'd like to change these values at a later stage, click *Edit inputs* in the top right or edit specific options directly from the right-hand sidebar.

## 1. Annual consumption

In this section you are configuring how energy is consumed in the property across the year. This consists of the **annual consumption figure** (kWh) and how the consumption is distributed across the year (the **consumption profile**). You can select from the following options to set the annual consumption:



Expand the section below for more details on these options.

## Annual usage

If you know the annual consumption in kWh (for example from an electricity bill) you can enter it here in the annual usage field.

Annual usage

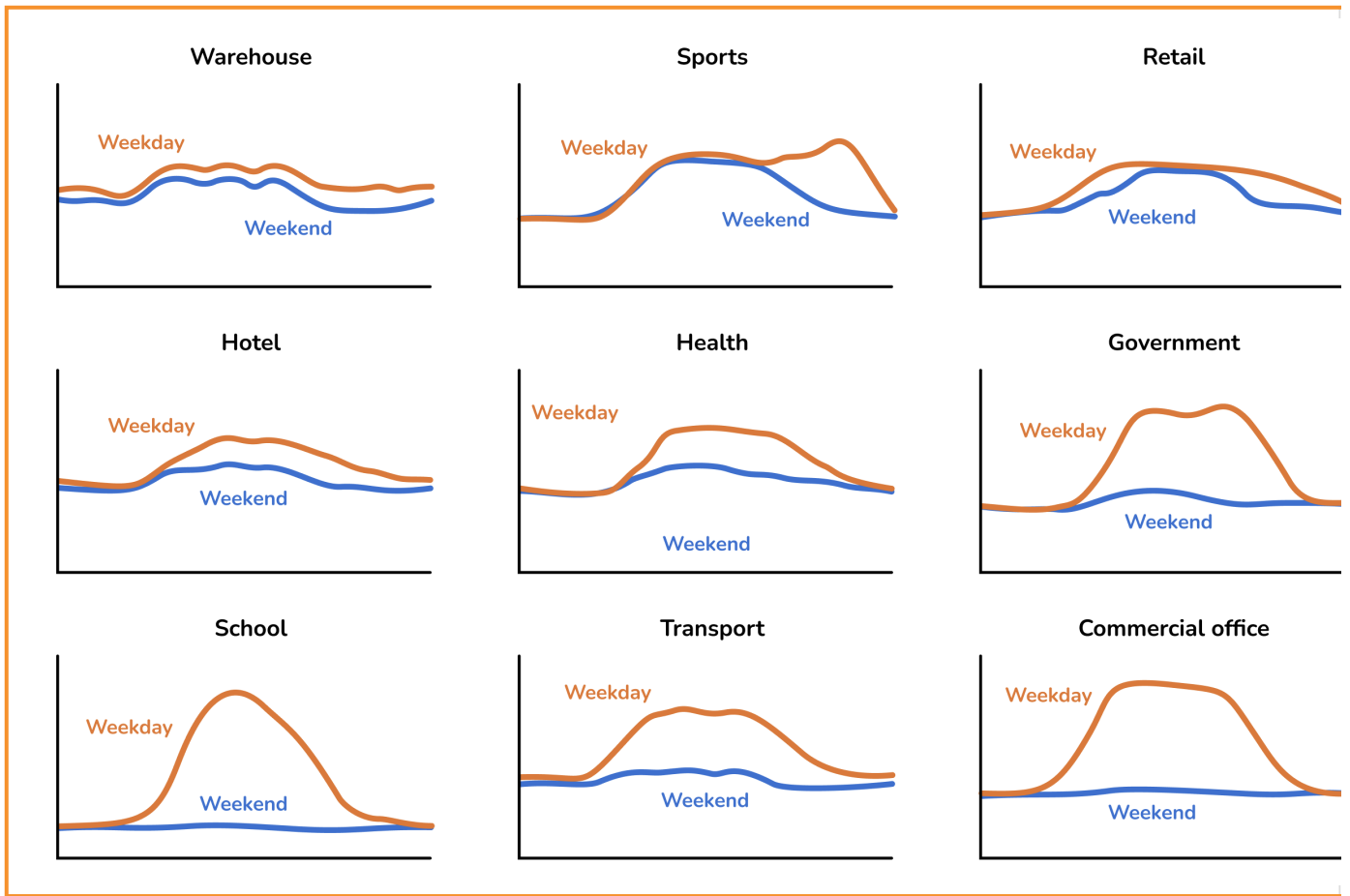
 kWh

When you use this option you can choose from a variety of domestic and commercial consumption profiles, the consumption profile determines how the energy is used within a week and throughout the year.

Consumption profile ⓘ

 Domestic  Commercial

The following Ofgem commercial profiles are available



### Meter data





If the property has a smart meter you can upload **half-hourly** data to get a more accurate projection. The data should ideally span at least a year (but if it contains a **minimum of 6 months** our algorithm will automatically attempt to fill in gaps where they are detected).

The file must have a **.csv file extension**. If your data is in another format you can export it as csv from Excel, Google Sheets, Libreoffice or any other spreadsheet editor.

Note that there are many different CSV formats for smart meter data, and we don't support all of them yet. If your upload doesn't work, please send us the spreadsheet at [help@easy-pv.co.uk](mailto:help@easy-pv.co.uk) or [help@easy-pv.ie](mailto:help@easy-pv.ie) and we will see if we can add the format. You can also download our sample spreadsheet [here](#) and change your data into this format.

### Not sure

If you don't know the electricity consumption in the property and it's domestic, you can use typical values for the size of property provided here.

 <b>1-2 Bed House</b> Annual electricity use 2000 kWh	 <b>3 Bed House</b> Annual electricity use 3100 kWh	 <b>4 Bed House</b> Annual electricity use 3900 kWh	 <b>5+ Bed House</b> Annual electricity use 4600 kWh
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These options will assume a domestic consumption profile.

## 2. Setting the import and export tariffs

Here you should select the tariffs used in the Easy PV calculation. It is important to set suitable tariffs so the financial calculations for this project are accurate, particularly if you plan to configure forced charging or discharging of a battery. By default, we'll calculate the financial benefits using your default flat tariffs which you can specify in your [financial settings](#).

Expand the section below for more details setting this up.

### Tariff configuration

You can select from the drop down you can create and select a new tariff by selecting **+ New import/export tariff**. See [here](#) for a full guide on creating tariffs in Easy PV.

#### Tariffs ?

By default, we'll calculate the financial benefits using the default tariffs set by your Pro team admin. However, you also have the option to create or select a custom tariff. Manage tariffs

Import tariffs + New Import Tariff

Example variable import User 15.41 p/kWh - 35.96 p/kWh ▼

Export tariffs + New Export Tariff

Example variable export User 5.16 p/kWh - 27.74 p/kWh ▼

If the tariffs you've selected are different to the ones the customer is currently on, then you can select their current tariff for more accurate financial benefit calculations. This is used to calculate how much they will save on their current bills. The tariffs input above will be used for any future calculations.

Is the end user switching to this import tariff? BETA

Previous import tariff + New Import Tariff

Previous tariff Project 24.50 p/kWh ▼

This only sets the tariffs for the Easy PV self-consumption calculation. If you'd like to use the MCS method you will need to set your tariffs in the [Financial task](#).

### 3. Energy management

In this section you can optionally model export limitation and forced charging and discharging of batteries. Read more about setting these up below.

#### Export limitation

In this section you can limit the export rate if this is required by the DNO. Export limitation restricts the amount of solar power sent to the grid, preventing it from exceeding a set threshold. This is used to comply with grid regulations, prevent overloading, and encourage self-consumption. Any excess energy beyond the limit is curtailed.

Switch the toggle on and then input the annual export limit in kW.

**Export limiting**

Limit export rate

Export limitation

3.4 kW

## Battery management

In this section you can set the periods where the battery will force charge and discharge **to and from the grid**. Switch on the toggle and then input the times and days you want the battery to charge and discharge.

### Charge periods ⓘ

+ New charge period

02:00 to 05:00 Every day



### Discharge periods ⓘ

+ New discharge period

Start time

End time

Days active

--:--



--:--



Save

Easy PV will still model when the battery will be charged and discharged based on solar production and consumption, these charge and discharge periods are to override the Easy PV model.

## Navigating the Consumption task

Once the task has been configured, you'll be able to view the full insights. The right-hand sidebar on the page includes options to help you navigate through the different sections of insights.

Generation

Consumption

Import and Export

Financial Benefits

Battery Utilisation

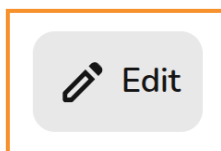
Below that you will see the following:

- **Annual Generation:** This pulls through from the [Performance task](#).
- **Annual Consumption:** This is based on your input when opening the task. Click the pencil to edit.
- **Battery Management:** If showing battery optimisation, this will show you the percentage improvement and cost benefit of the configured optimisation. If you are not seeing the expected benefits, make sure you have the right **tariffs** and **charging periods** configured.
- **Tariffs:** This shows the tariffs you have selected on the project. If you've selected that the customer is changing their tariff, their previous tariff will display here as well.

The screenshot displays a user interface for a consumption task. It features four main sections: 1. Annual generation: 5175 kWh. 2. Annual consumption: 3500 kWh, with a pencil icon for editing and a note 'Consumption profile: Home half the day'. 3. Battery Management: Shows an improvement of 25% and a table comparing costs, income, and benefits with and without management. 4. Tariffs: Includes an 'Edit project tariffs' button.

	Cost	Income	Benefit
Without management	£217	£336	£977
With management	£1018	£1381	£1221
Difference	£801	£1045	£244

In the top right corner, you'll have the following options:



**Edit inputs**

Update the annual consumption, tariffs and energy management settings used for the calculations.



**Download data**

Download your generation and consumption profiles as a .csv file to import into other software.



### **Help page**

Open this page directly.

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If you have any additional questions about the consumption task, please reach out at [help@easy-pv.co.uk](mailto:help@easy-pv.co.uk).

# Understanding the Consumption task

## How does the Consumption task estimate self-consumption?

Easy PV simulates generation, consumption and battery usage across a full year to estimate how much solar energy is used on site. The [self-consumption](#) is the proportion of electricity generated that is consumed on the property (directly or via a battery).

To determine how much is used in the property, we use the total generation figure from the [Performance task](#) and model this across the year using a PVGIS **generation profile**. This is then compared against the chosen **consumption profile**. Easy PV looks **minute-by-minute over the course of the year** at how much energy is generated and consumed and, if present, how charged the battery is. It then models how the energy would be diverted accordingly. For example, if solar power is being generated and the profile shows they are consuming energy at that time, then this energy will be diverted to consumption. If they are not consuming at that time then it will be used to charge a battery (where present) or discharged to the grid. This factors in forced charge and discharge times, battery specs and export limits. We can then determine how much is used directly, used to charge the battery or sent to the grid.

## What is the difference between the MCS and Easy PV self-consumption calculations?

	MCS (UK only)	Easy PV
<b>Easy PV task</b>	Completed at the end of <a href="#">Performance task</a> , select <i>MCS</i> in <a href="#">Financial task</a> to use	Completed in <a href="#">Consumption task</a> , select <i>Easy PV</i> in <a href="#">Financial task</a> to use
<b>System size and consumption</b>	Consumption: 1500-6000kWh Generation: <6000kWh Usable battery capacity: <15.1kWh	Any consumption, generation or battery capacity
<b>Consumption profile</b>	Domestic profiles: home all day, home half the day and out all day	Domestic, commercial consumption profiles or half-hourly data from customer

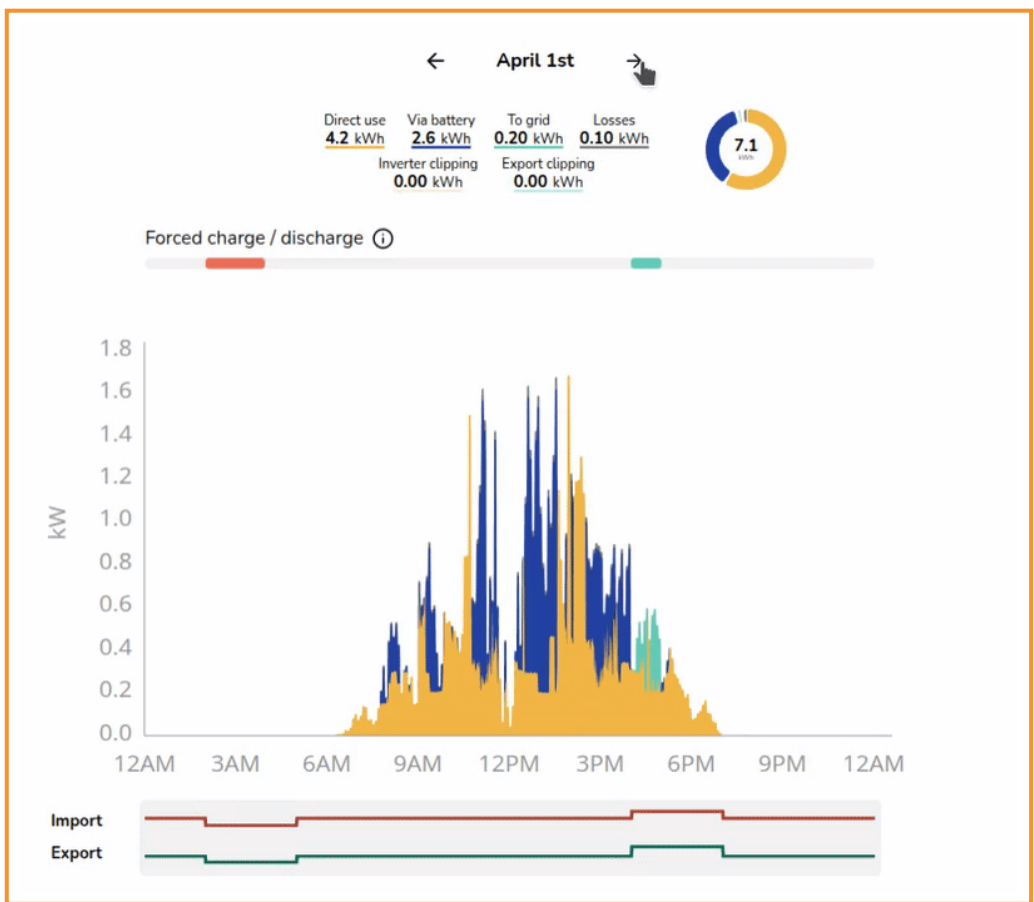
<b>Method</b>	Compares annual generation and determines self-consumption based on look-up tables.	Compares generation and consumption profiles minute-by-minute across the year to determine self-consumption
<b>Additional options</b>	Limited since it only compares annual figures.	Minute-by-minute calculation means <b>export limits, inverter clipping, variable tariffs</b> and <b>forced charging/discharging of batteries</b> are factored into calculations

For IE users, only Easy PV method is available.

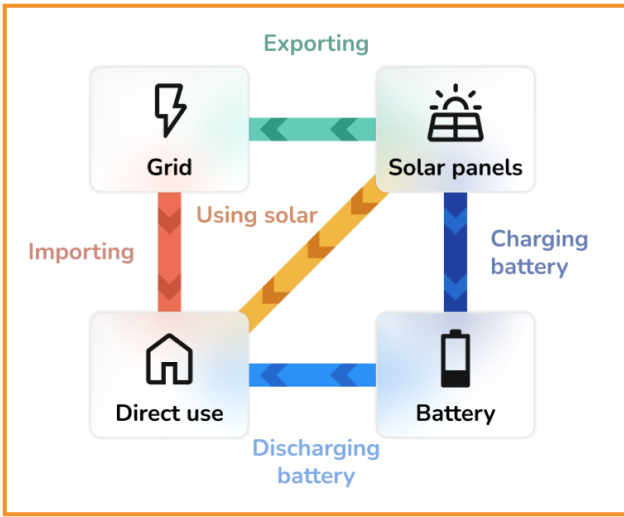
## Understanding consumption data

Once you have configured the Consumption task inputs and submitted them, you can explore the calculated information.

The left-hand side shows the full results of the Consumption task calculations with **interactive graphs** and **detailed insights**. For each section, the top graph gives you the annual figures in kWh and the bottom graph gives daily figures in kW.

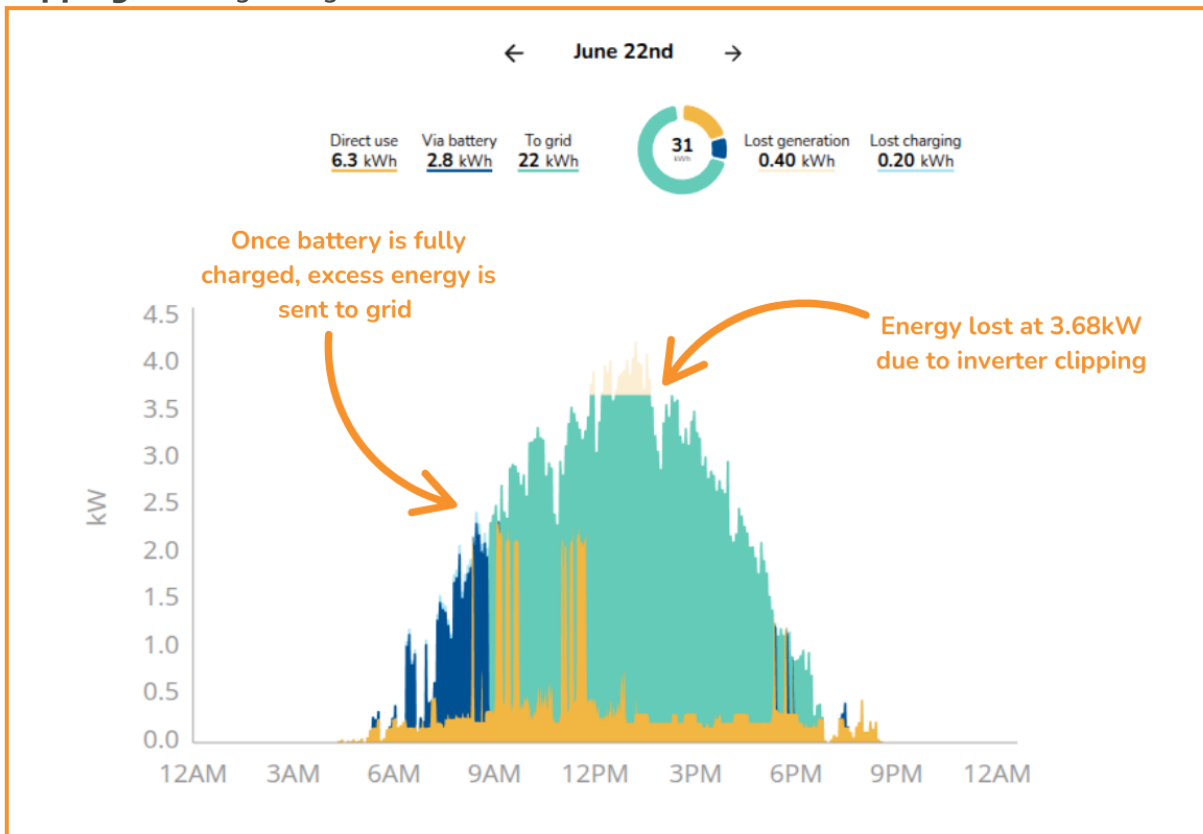


All graphs use the following key to help you understand the generated data:



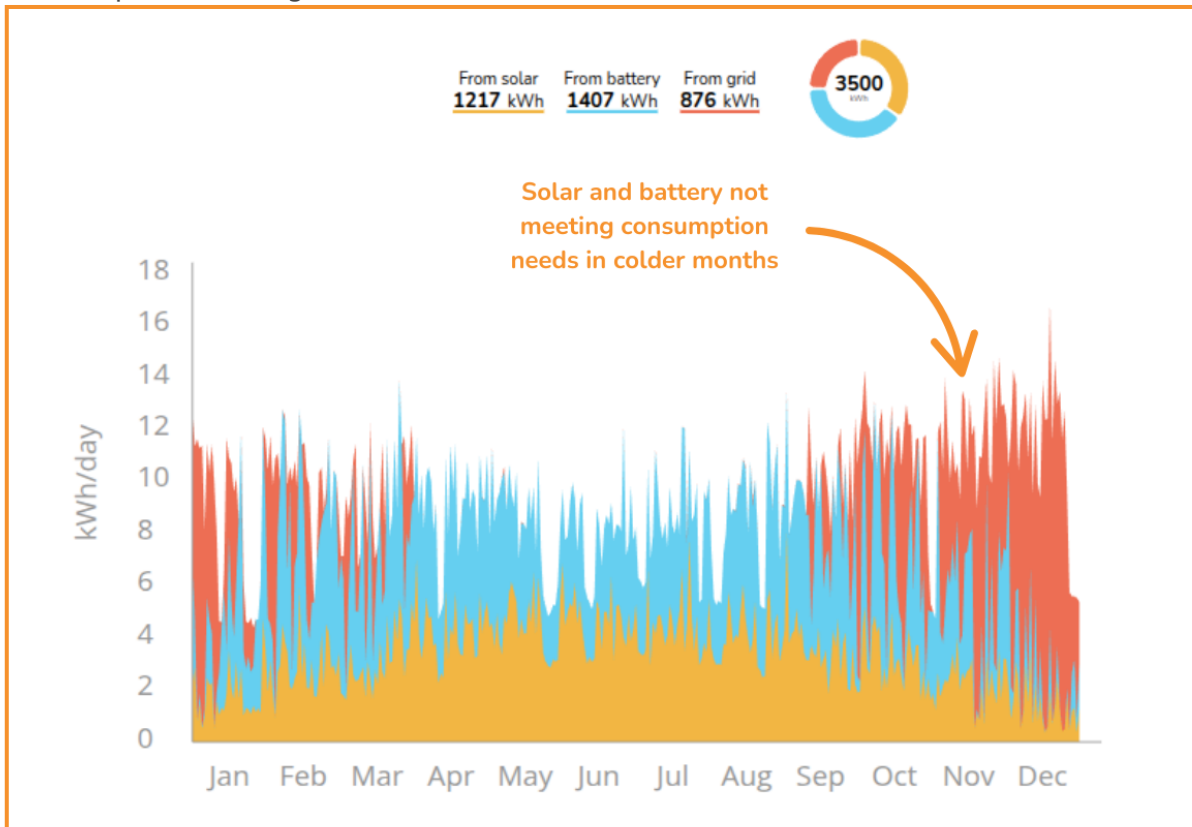
## Generation

- This shows the estimated annual generation of the system and whether the generated energy is used directly in the house, used to charge the battery or exported to the grid.
- It will also display the amount of energy lost through inverter clipping, export clipping and charging if applicable.
- Bottom graph can help understand **export rates** and the impact of **export or inverter clipping**, with figures given in kW.



## Consumption

- This shows the total annual energy consumption of the property across the year based on the selected consumption profile.
- It shows how much energy is expected to be supplied directly from the solar array, via the battery or imported from the grid.
- Top graph useful to see how consumption is distributed across the year and how this consumption is being met.



## Import and export

- This shows the likely flow of energy to and from the grid over the course of a year.
- It's likely that there will be more energy exported during summer when the solar array is generating more energy, and more energy will be imported from the grid during winter months.

## Financial benefits

- This shows the money spent and earned on electricity flowing to and from the grid over the course of a year based on selected tariffs.
- It allows you to see the total money earned from export payments versus the money spent on imports, and how it would compare to having no solar installed.

If you would like to use the Easy PV self-consumption calculations as the basis for your financial projections in the customer proposal, make sure it is selected in the [Financial task](#).

## Battery utilisation

- This helps you understand the modelled utilisation of the battery over the course of the year based on the amount of the the available battery capacity that is actually charged and discharged each day.
- Utilisation of over 100% is possible at times where a battery is charged and discharged more than once during a day.

If you have low battery utilisation you may want to reduce the size of the batteries or model forced charging of the batteries on an overnight tariff.

# Editing and creating tariffs

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This guide covers how you can manage and create tariffs in Easy PV. Setting tariffs is an essential part of ensuring the financial benefits can be calculated as accurately as possible for your customer.

Tariffs can be created, viewed and edited in the [consumption task](#) or the [financial task](#). You can also set up user level default tariffs in your [account financial settings](#) or if you are a member of a Pro team, this will be set by a Pro team admin in Pro account financial settings.

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<https://www.youtube.com/embed/df7chLORbdI>

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## Creating a new tariff

### 1. Set the name of tariff

This name will appear in the quote wording.

### 2. Set the scope of tariff

Set when you want to be able to use this tariff - just this project, in all projects or accessible to all team members if you're in a pro team.

Once the scope of the tariff has been set, this cannot be edited.

#### What is the scope of tariff for?



Project

#### Project level

- These will only be viewable on the specific projects it's created for.
- A good option if you frequently change the tariffs on each project.

A light pink rounded rectangle with the word "User" inside, centered within a larger orange-bordered square.

#### User level

- These can be used for any projects and set as a default in your financial settings.
- A good option if you aren't sure what tariffs your customer is on so want to use standard values.
- Tariffs will not be shared within shared projects if they are user level.

A light orange rounded rectangle with the word "Team" inside, centered within a larger orange-bordered square.

#### Team level

- If you are a member of a Pro Team, you will be able to create Team level tariffs.
- These will work much like the User level tariffs but will show for all members of your team.

### 3. Input the price bands

**Flat tariff:** Input a value for the base rate and select save.

**Variable tariff:** Input each different tariff rate. The first band you enter will be used as the base rate - any time period that doesn't have a price band applied will be priced at this rate.

If you're using £, ensure you're putting this in in p. This value should be greater than 1 (so 15, not 0.15).

### 4. Set tariff periods (if using variable tariff)

In the **tariffs period** section you will be able to select the different price bands and indicate when they apply. For some tariffs different rates might apply at the weekend, you can select the days for which the tariff period applies.

**Tariff periods**

Price band 🗑️

Night ▾

Start

00:00 🕒

End

06:00 🕒

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Days Active	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

## Editing existing tariffs

You can view and edit your tariffs from within projects (in [Financial](#) > Self consumption or [Consumption](#) > Tariffs) or within your account settings.

Selecting tariffs in the Consumption task will only apply to the Easy PV self-consumption calculation. Select this in the Financial task if you'd like this to apply.

When you editing tariffs, you will see the following options:

# Electricity tariffs

## Import tariffs

The screenshot shows the 'Import tariffs' section with a '+ Add import tariff' button at the top right. Below are two tariff cards. The first card, 'Variable example', has a pink 'Project' scope button. It lists 'Base' at 23.5 p/kWh and 'Night' at 15.5 p/kWh, with a 'Tariff period' of '02:00 to 05:00 All week'. A menu is open over the 'Night' row, showing 'Edit' and 'Delete' options. The second card, 'Default flat tariff', has an orange 'User' scope button and a 'Base' rate of 20 p/kWh. Annotations with arrows point to the 'Project' button (labeled 'Tariff name'), the '02:00 to 05:00 All week' text (labeled 'Tariff period'), and the 'User' button (labeled 'Tariff scope').

Tariff Name	Scope	Base Rate	Other Rates	Tariff Period
Variable example	Project	23.5 p/kWh	Night: 15.5 p/kWh	02:00 to 05:00 All week
Default flat tariff	User	20 p/kWh		

When editing tariffs you can change any of the details, except the tariff scope, but note that any changes you make will affect previous projects that use these tariffs.