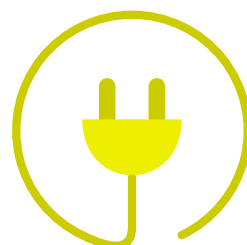
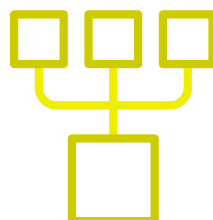
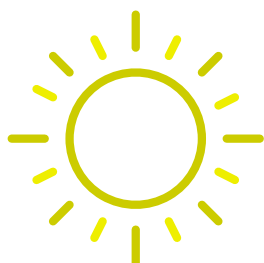




Project Name: 1616

Date Created: 28th March 2022

Designer: Michael Gancarz



Roof Layout

Roof 1



Component list

Item	Quantity
 *HIH* Longi HiMo4 375W Black Framed Mono (white backsheet) solar panel	18
 Solis 6kW inverter	1
 Emlite EMP1 Three Phase meter	1
 Label sheet	1
 AC isolator - KN Newbury 20A 4-pole	2
Pair of MC4 connectors	4
50m reel of 4mm2 solar cable	1
Metasole flat channel (landscape)	40
Renusol end clamp (black)	8
Renusol mid clamp (black)	32



Inverter checks

Solis 6kW

Panels

PV power **6750** Rated AC output **6600**

Input 1: 9 *HIH* Longi HiMo4 375W Black Framed Mono (white backsheet) solar panels in 1 strings

Panels

Inverter

PV power	3375 W		
Open circuit voltage at -10° C	407 V	Max DC voltage	1100 V
V _{mpp} at 40° C	299 V	V _{mpp} lower limit	160 V
V _{mpp} at -10° C	342 V	V _{mpp} upper limit	1000 V
I _{mpp} at 40° C	11 A	Max DC input current	16 A

Max voltage

The open circuit voltage of the solar panels never exceeds the voltage limit of the inverter.



Max power point range

The maximum power point voltage of the solar panels is always above the lower limit of the inverter MPPT tracker. The maximum power point voltage of the solar panels is always below the upper limit of the inverter MPPT tracker.



Max Current

The maximum power point current of the solar panels is always below the maximum current for the inverter MPPT tracker.



Input 2: 9 *HIH* Longi HiMo4 375W Black Framed Mono (white backsheet) solar panels in 1 strings

Panels

Inverter

PV power

3375 W

Open circuit voltage at -10° C

407 V

Max DC voltage

1100 V

V_{mpp} at 40° C

299 V

V_{mpp} lower limit

160 V

V_{mpp} at -10° C

342 V

V_{mpp} upper limit

1000 V

I_{mpp} at 40° C

11 A

Max DC input current

16 A

Max voltage

The open circuit voltage of the solar panels never exceeds the voltage limit of the inverter.



Max power point range

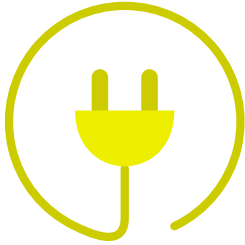
The maximum power point voltage of the solar panels is always above the lower limit of the inverter MPPT tracker. The maximum power point voltage of the solar panels is always below the upper limit of the inverter MPPT tracker.



Max Current

The maximum power point current of the solar panels is always below the maximum current for the inverter MPPT tracker.





Electrical

Solis 6kW



AC Isolator

A AC isolator - KN Newbury 20A 4-pole has been specified for this input

Current

The rated isolator current (20A) is greater than the rated inverter current (9.5A)



Phases

The isolator is suitable for use on a three phase inverter.



Input 1



DC Isolator

Integrated isolator

This inverter contains an integrated DC Isolator.





Cable

10m of 4mm² solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around
0.94 V (0.31 percent)



Input 2



DC Isolator

Integrated isolator

This inverter contains an integrated DC Isolator.



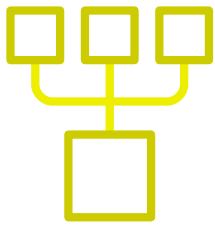
Cable

10m of 4mm² solar cable has been specified

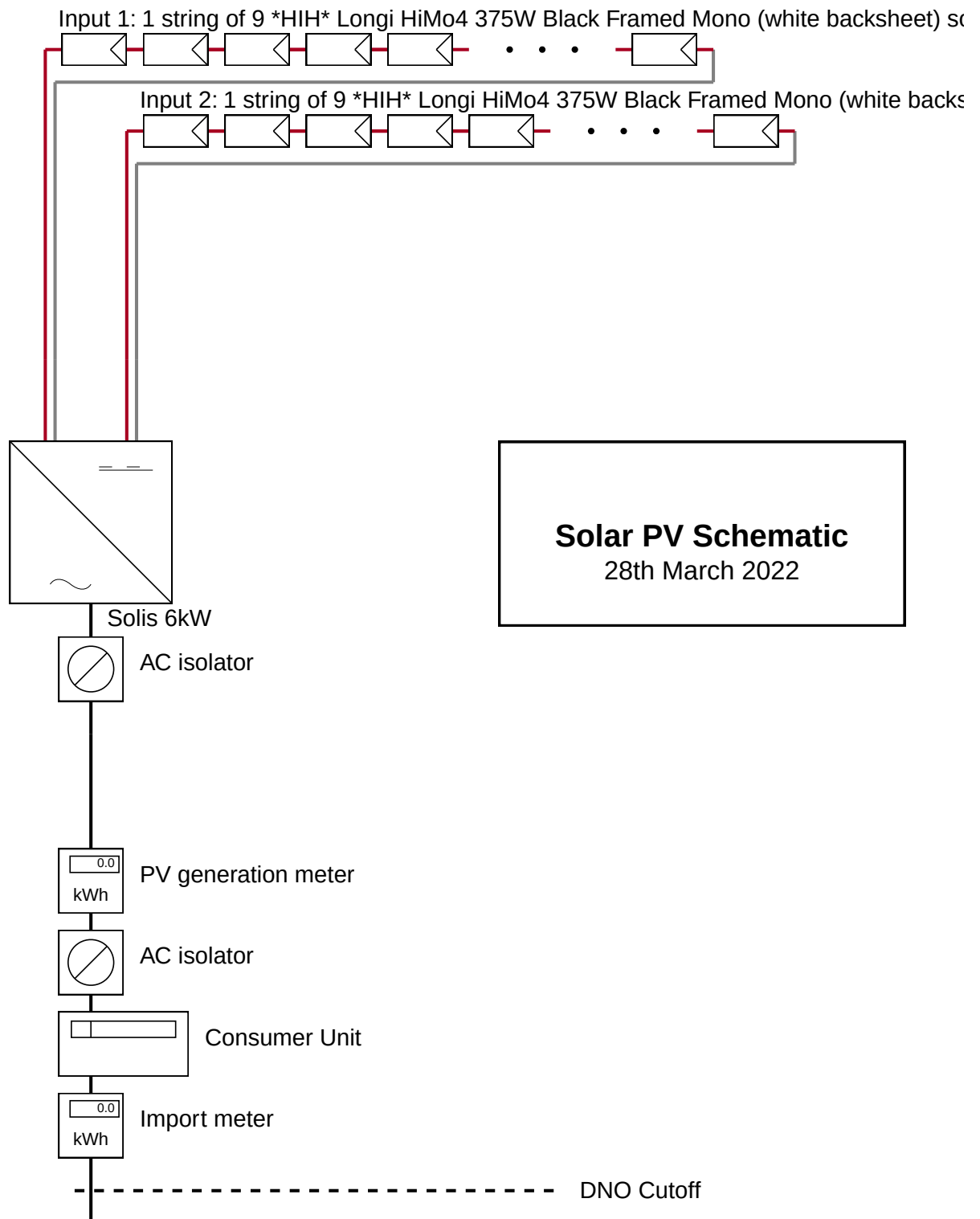
Voltage drop

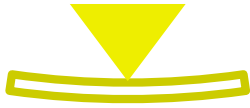
Voltage drop at maximum power point at 40°C will be around
0.94 V (0.31 percent)





Schematic diagram





Structural calculations

Weight loading calculations

For a traditional cut roof with rafters and purlins we recommend also using our rafter calculator to check the load-bearing capacity of the rafters. Even if the increase in loading is more than 15% the rafters may well be able to take the additional weight.

Please note that this method does not calculate the strength of the roof, and if a roof was badly constructed, does not meet existing building regulations, or is in poor condition then it may still not be appropriate to install an array.

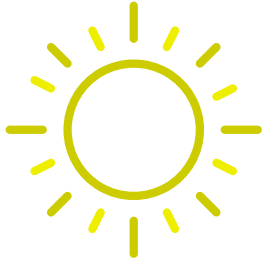
Roof 1

Dead load from roof covering	0.12 kN/m ²
Imposed load	0.75 kN/m ²
Total loading without solar array	0.87 kN/m²
Weight of solar panels and mounting	353.4 kg
Area covered by solar array	32.8 m ²
Loading imposed by solar array	0.11 kN/m ²
Total loading with solar array	1 kN/m²

**Increase in loading
due to solar array: 12.6%**

An increase of less than 15% in the load imposed on a roof is not considered to be a significant change (The Building Regulations 2000, Approved Document A).





Performance Estimate

Site details

Client

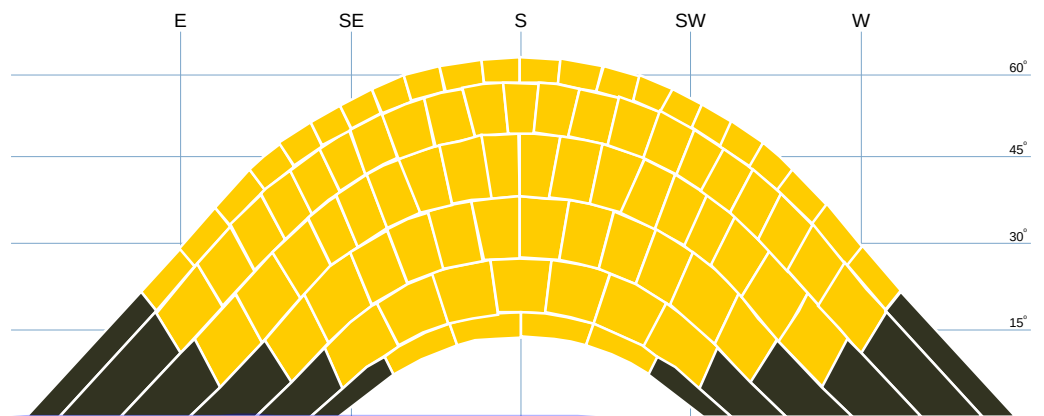
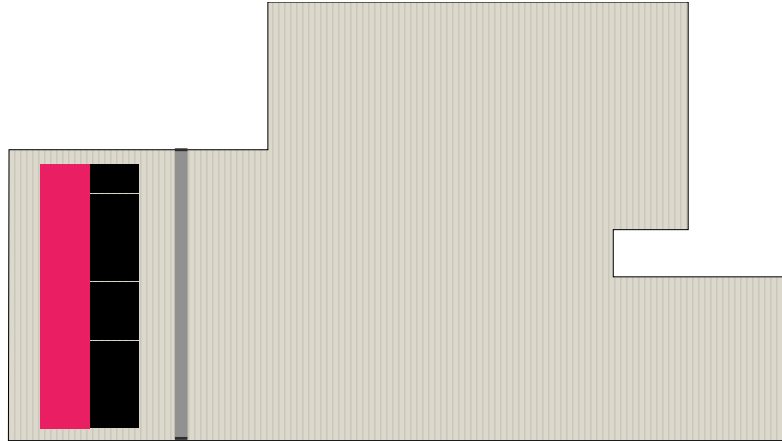
Address

The sunpath diagram shows the arcs of the sky that the sun passes through at different times of the day and year as yellow blocks. The shaded area indicates the horizon as seen from the location of the solar array. Where objects on the horizon are within 10m of the array, an added semi-circle is drawn to represent the increased shading. Blocks of the sky that are shaded by objects on the horizon are coloured red, and a shading factor is calculated from the number of red blocks. The performance of the solar array is calculated by multiplying the size of the array (kWp) by the shading factor (sf) and a site correction factor (kk), taken from tables which take account of the geographical location, orientation and inclination of the array.

Inverter 1

Solis 6kW

Input 1



A. Installation data

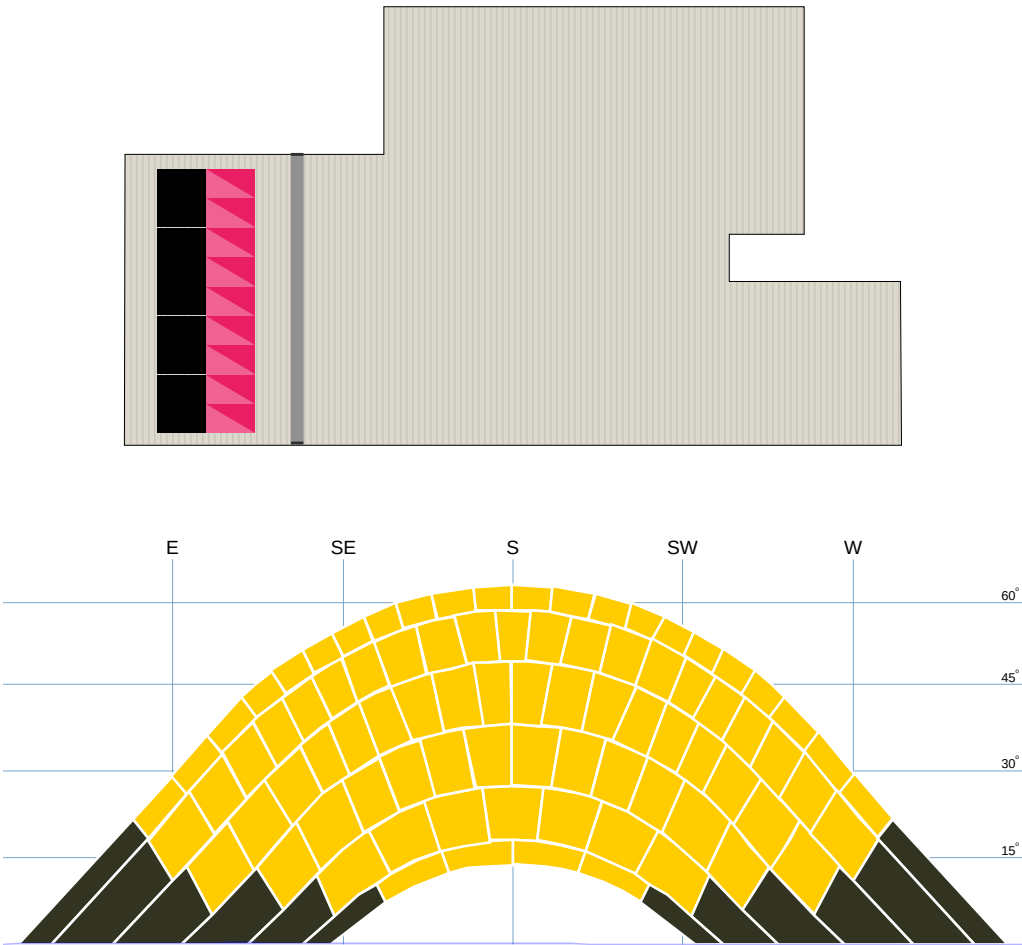
Installed capacity of PV system - kWp (stc)	3.375	kWp
Orientation of the PV system - degrees from South	0	°
Inclination of system - degrees from horizontal	6	°
Postcode region	7E	



B. Performance calculations

kWh/kWp (Kk)	771	kWh/kWp
Shade factor (SF)	1.00	
Estimated output (kWp x Kk x SF)	2602	kWh

Input 2



A. Installation data

Installed capacity of PV system - kWp (stc)	3.375	kWp
Orientation of the PV system - degrees from South	0	°
Inclination of system - degrees from horizontal	6	°
Postcode region	7E	



B. Performance calculations

kWh/kWp (Kk)	771	kWh/kWp
Shade factor (SF)	1.00	
Estimated output (kWp x Kk x SF)	2602	kWh

Performance Summary

A. Installation data		
Installed capacity of PV system - kWp (stc)	6.75	kWp
Orientation of the PV system - degrees from South	See individual inputs	
Inclination of system - degrees from horizontal	See individual inputs	
Postcode region	7E	
B. Performance calculations		
kWh/kWp (Kk)	See individual inputs	
Shade factor (SF)	See individual inputs	
Estimated output (kWp x Kk x SF)	5204	kWh

Important Note: The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the standard MCS procedure is given as guidance only for the first year of generation. It should not be considered as a guarantee of performance.

This system performance calculation has been undertaken using estimated values for array orientation, inclination or shading. Actual performance may be significantly lower or higher if the characteristics of the installed system vary from the estimated values.



Self consumption

We model here the performance of a solar PV system over the course of a year, using high resolution minute-by-minute generation data for a typical PV system and consumption data for a typical house, and calculating the flow of energy from the solar panels to the house during the day, and from the grid back to the house at night.

We provide yearly profiles of generation, consumption and import / export, along with detailed profiles for a typical spring day.



Consumption

Electricity consumed in the property each year

35000
kWh



Generation

Electricity generated by the PV array each year

5221 kWh



Self consumption

Proportion of PV generation used in the property

89 %



Independence

Proportion of electricity consumption provided by PV

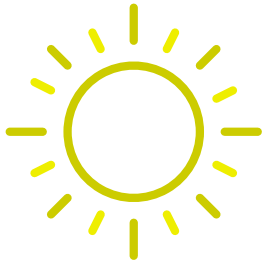
13 %



Import / Export

Electricity import / export each year from the property

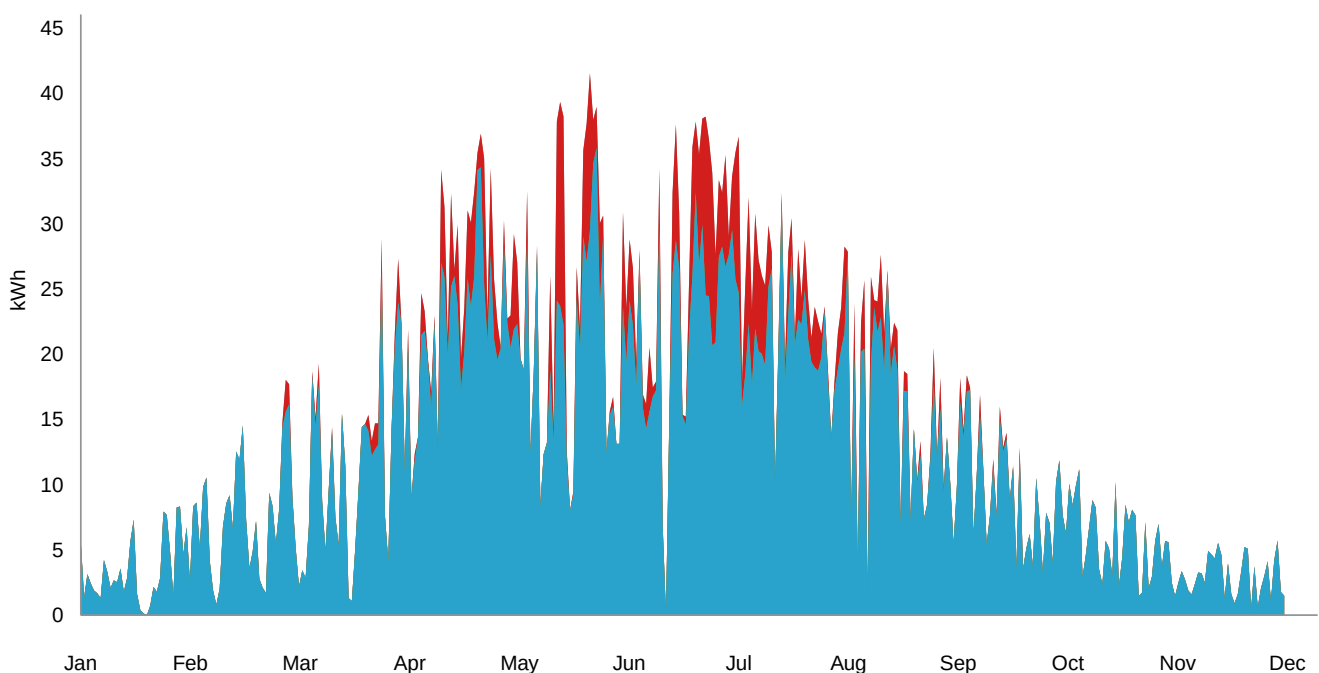
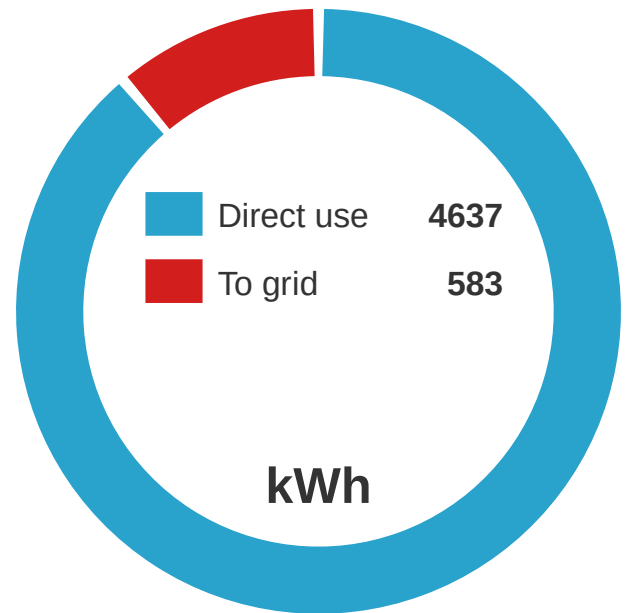
30504 /
583 kWh

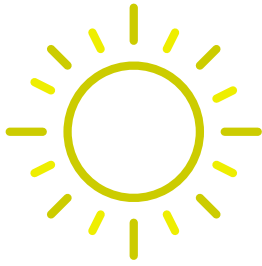


Yearly generation

The solar PV array is expected to generate 5221 kWh over a typical year. The graph shows whether the generated energy is used directly in the house or exported to the grid.

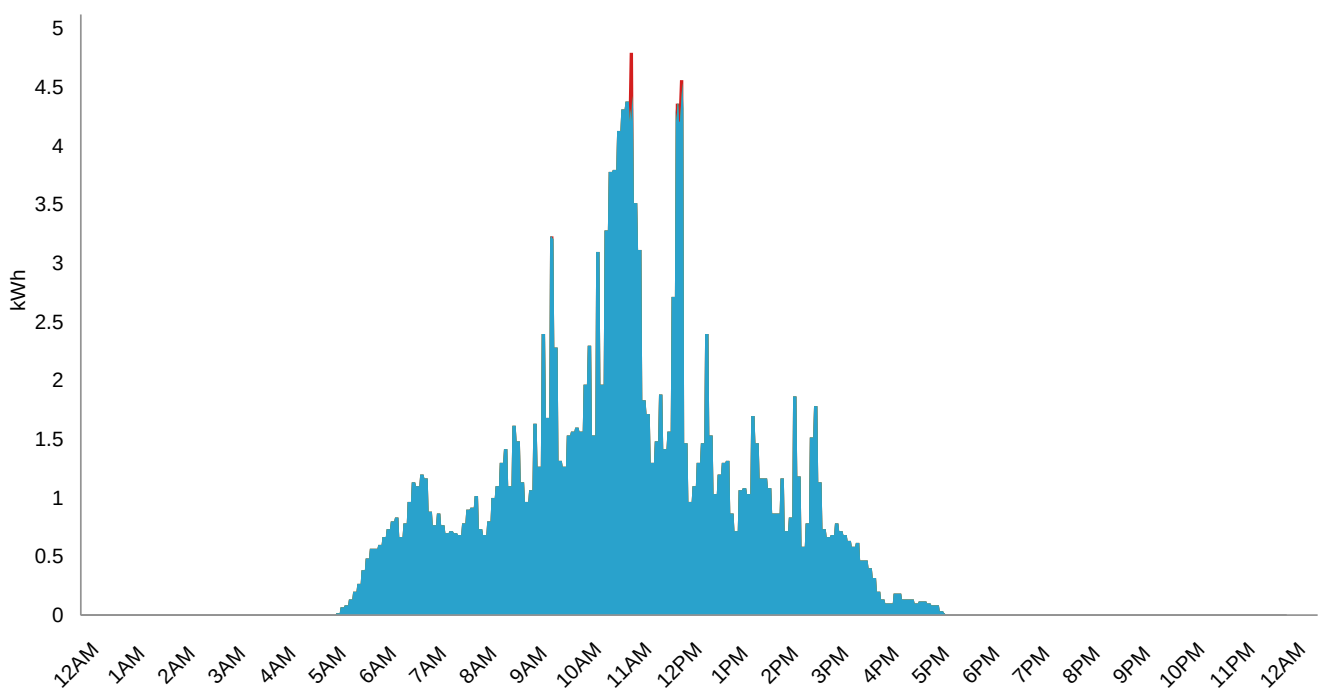
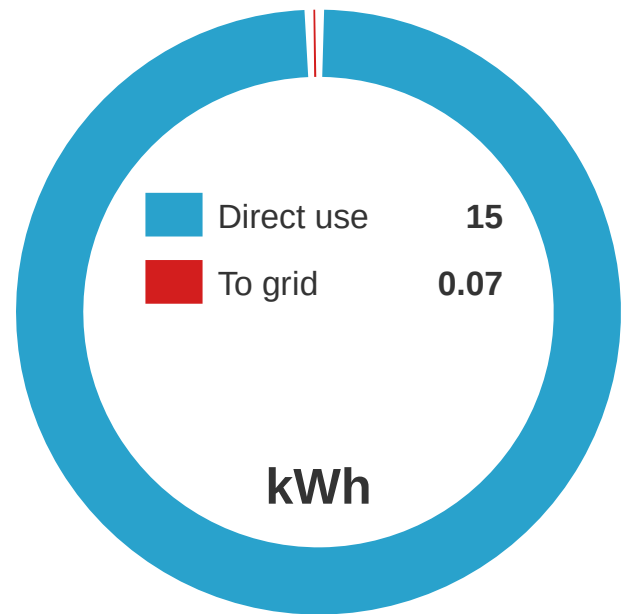
89% (4637 kWh) of the electricity generated is expected to be used directly in the property. The remaining generation (583 kWh, or 11% of the total) is exported to the grid.

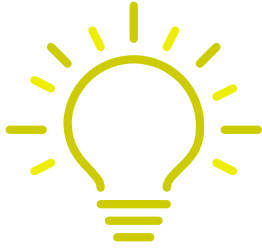




Daily generation

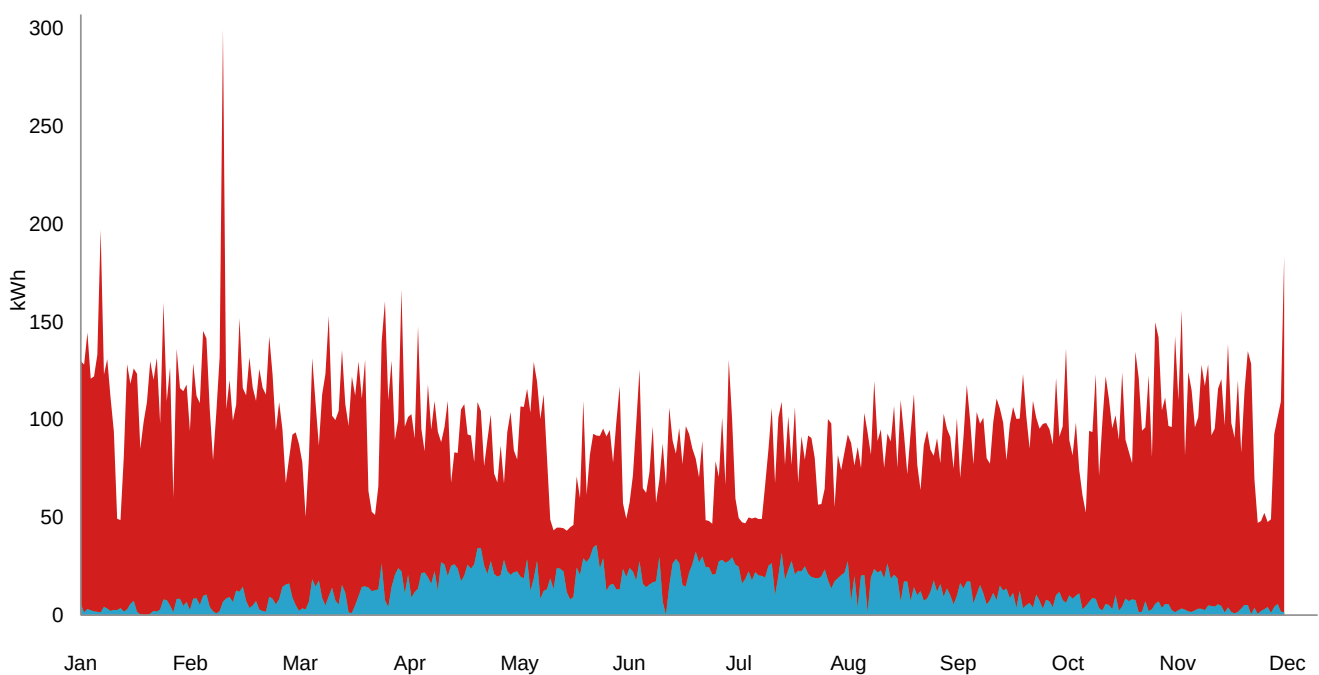
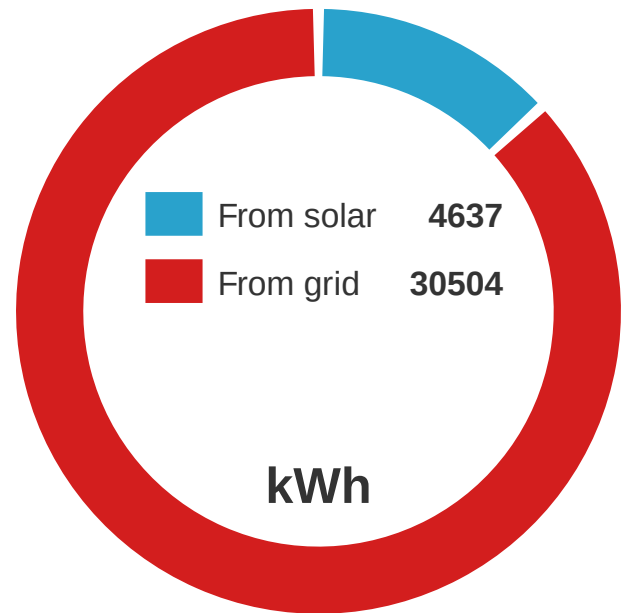
This graph shows the modelled profile of electricity generated by the PV array on a selected day (March 27th). On this day the PV system is expected to generate 14.7 kWh. Of this, 14.7 kWh (100%) is used directly in the property, and 0.1 kWh (1%) is exported to the grid.

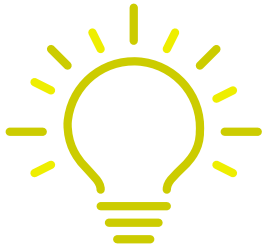




Yearly consumption

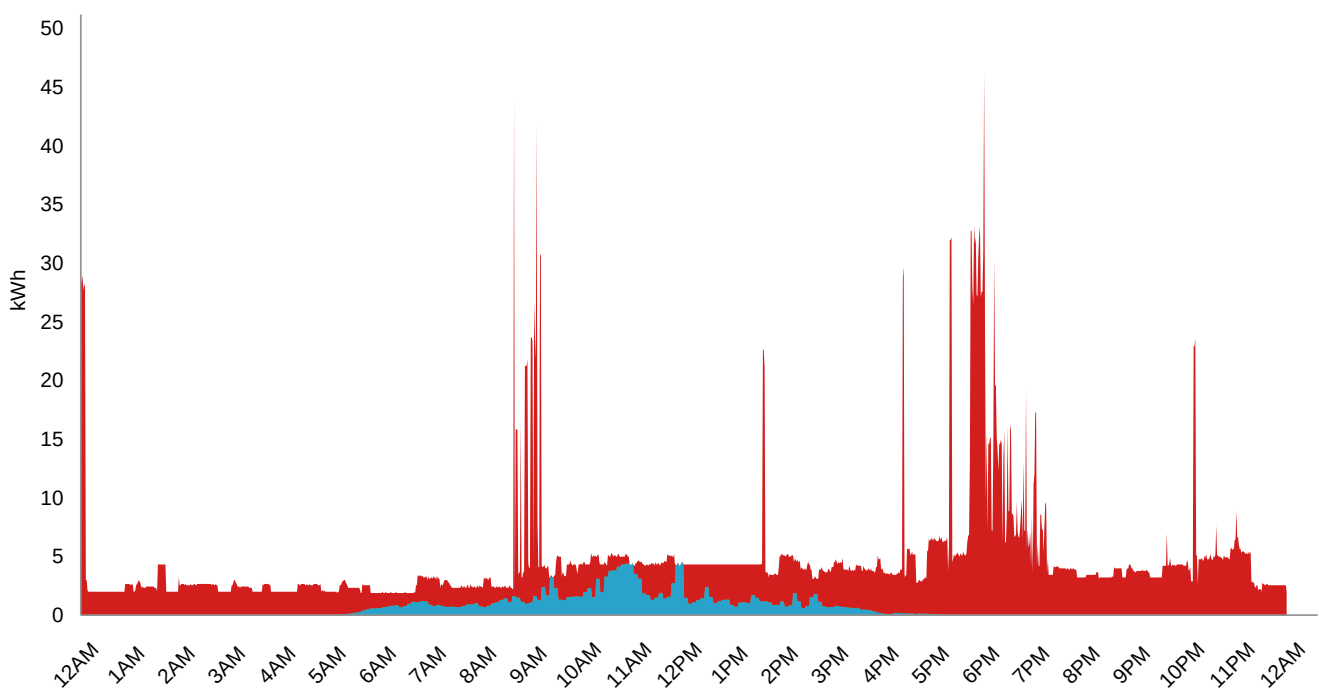
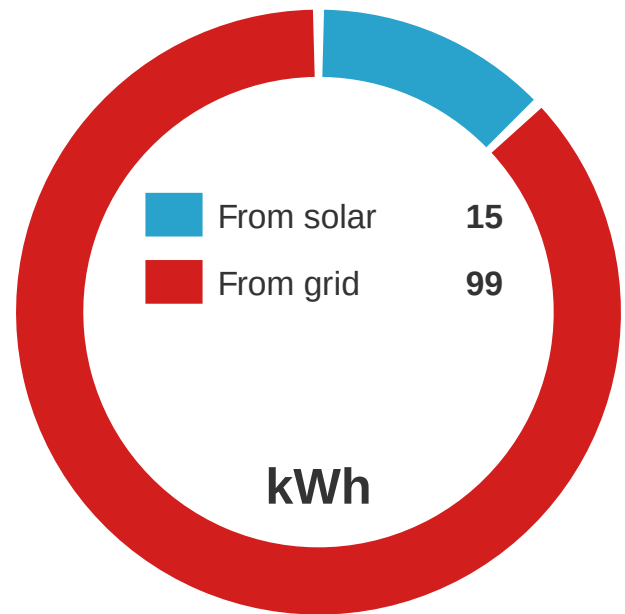
The property is expected to consume 35000kWh of electricity each year. Around 13% of this (4637 kWh) is expected to be supplied directly by the solar array. The remaining 87% (30504 kWh) is supplied from the grid.

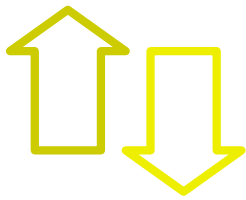




Daily consumption

This graph shows modelled consumption data over the course of the selected day (March 27th). Total electricity consumption on this day was 113.7 kWh, of which 14.7 kWh (13%) is expected to be supplied directly by the solar array. The remaining 99 kWh (87%) is imported from the grid.

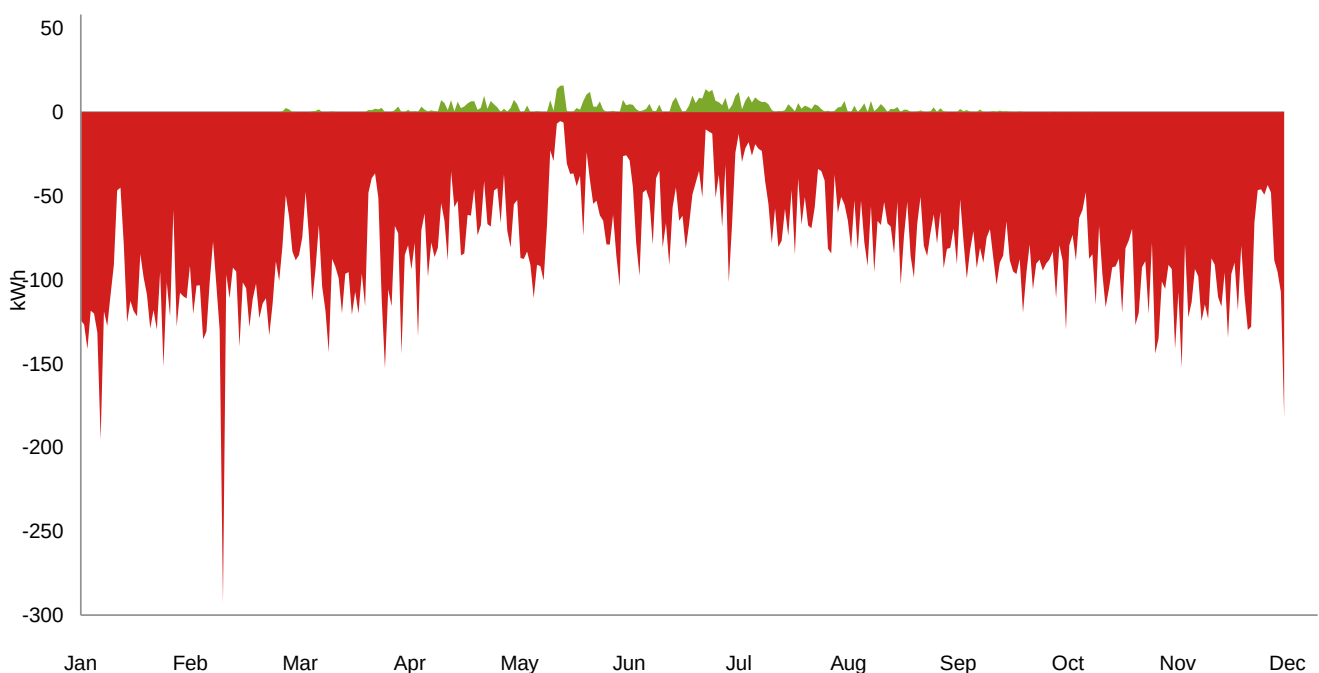
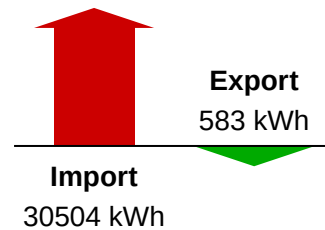


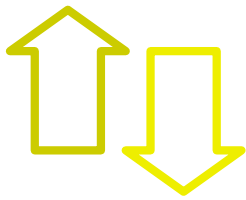


Yearly import and export

This graph shows modelled profiles of electricity imported and exported to and from the grid over the course of a year. The red area above the horizontal axis represents imported electricity, and the green area beneath the axis exported electricity.

Over the course of the year, a total of 30504 kWh is expected to be imported by the property, and 583 kWh exported back to the grid.





Daily import and export

This graph shows the modelled import and export of electricity over a selected day (March 27th). On this day 99.00 kWh is expected to be imported from the grid, and 0.1 kWh exported.

