Myco

Project Name: 4250Wp PV

Address: Acorn House, Grays oinn road, WC1X 8DP

Date Created: 9th July 2024

Designer: Terry Warman

Roof Layout

Roof 1

Component list

Item	Quantity
 Trina Vertex S 425W Black Framed Mono (White Backsheet) solar panel	10
 SolaX X1-3.6T 1ph inverter	1
 Emlite ECA2 1ph Meter (Extended Cover)	1
 Label sheet	1
 AC isolator - IMO - 20A 4-pole	2
 MC4 4mm Connector Pair	4
 50m reel of 4mm2 solar cable	2
 Renusol console	10
 Console mounting bar	20
 Console mounting clips - pack of 4	10
 Console elongation bar - set of 2	20

Inverter checks

SolaX X1-3.6T 1ph

Panels			
PV power	**4250**	Rated AC output	**3680**

Input 1: 5 Trina Vertex S 425W Black Framed Mono (White Backsheet) solar panels in 1 strings

Panels		Inverter	
PV power	**2125 W**		
Open circuit voltage at -10° C	**272 V**	Max DC voltage	**600 V**
V_{mpp} at 40° C	**200 V**	V_{mpp} lower limit	**70 V**
V_{mpp} at -10° C	**226 V**	V_{mpp} upper limit	**580 V**
I_{mpp} at 40° C	**10 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: 5 Trina Vertex S 425W Black Framed Mono (White Backsheet) solar panels in 1 strings

Panels		**Inverter**	
PV power	**2125 W**		
Open circuit voltage at -10° C	**272 V**	Max DC voltage	**600 V**
V_{mpp} at 40° C	**200 V**	V_{mpp} lower limit	**70 V**
V_{mpp} at -10° C	**226 V**	V_{mpp} upper limit	**580 V**
I_{mpp} at 40° C	**10 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

SolaX X1-3.6T 1ph

AC Isolator

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

Current

The rated isolator current (20A) is greater than the rated inverter current (17.6A)

Phases

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

Input 01

DC Isolator

Integrated isolator

This inverter contains an integrated DC Isolator.

Cable

18m of 4mm2 solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around **1.53 V (0.77 percent)**

Input 11

DC Isolator

Integrated isolator

This inverter contains an integrated DC Isolator.

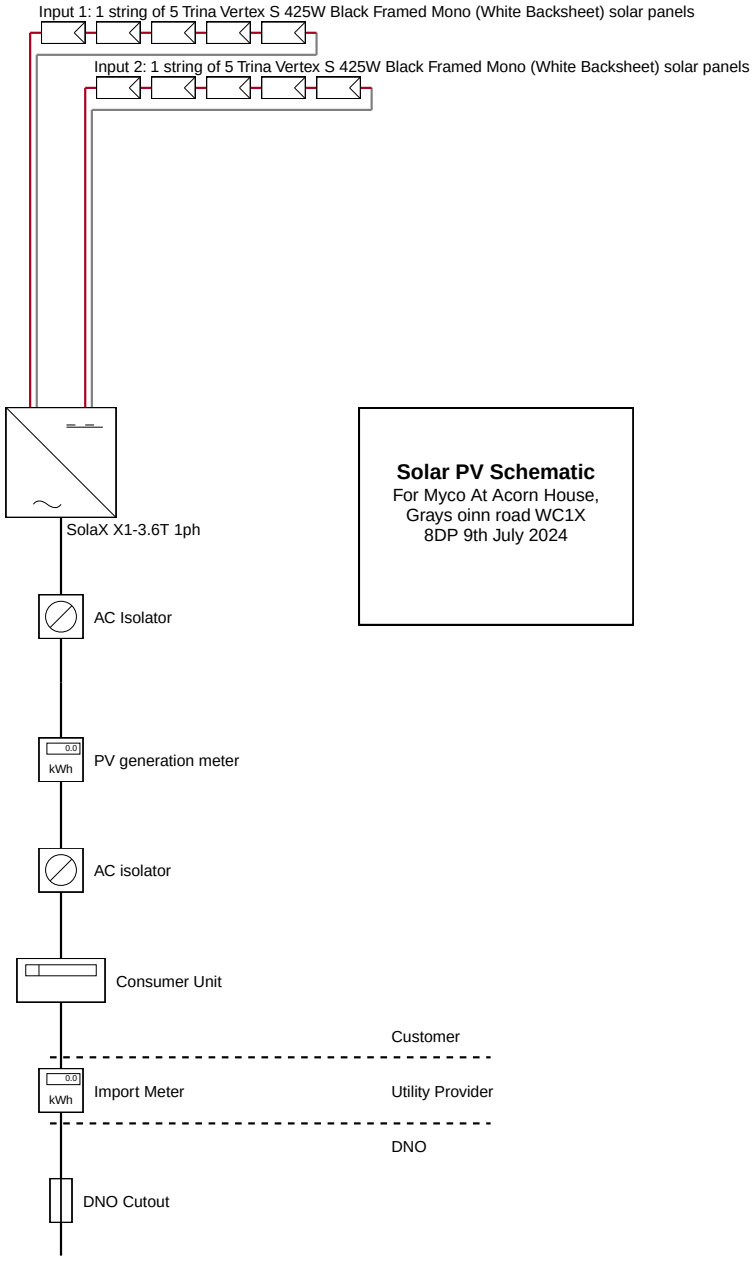
Cable

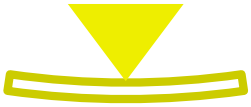
20m of 4mm2 solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around **1.70 V (0.85 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	0.49 kN/m^2
Imposed load	0.75 kN/m^2
Total loading without solar array	**1.24 kN/m^2**

Weight of solar panels and mounting	269 kg
Area covered by solar array	25.1 m^2
Loading imposed by solar array	0.11 kN/m^2
Total loading with solar array	**1.4 kN/m^2**

Increase in loading due to solar array: 8.9%

An increase of less than 15% in the load imposed on a roof is not considered to be a significant change (The Building Regulations 2010, Approved Document A).

Performance Estimate

Site details

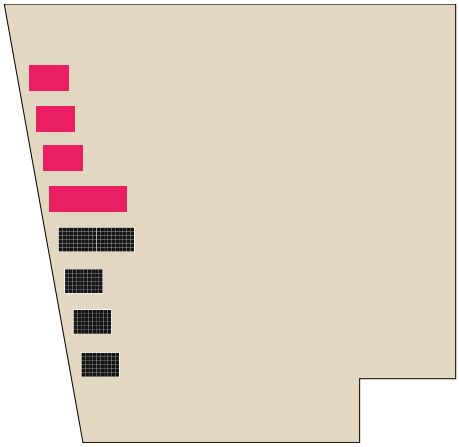
Client	Myco
Address	Acorn House, Grays oinn road

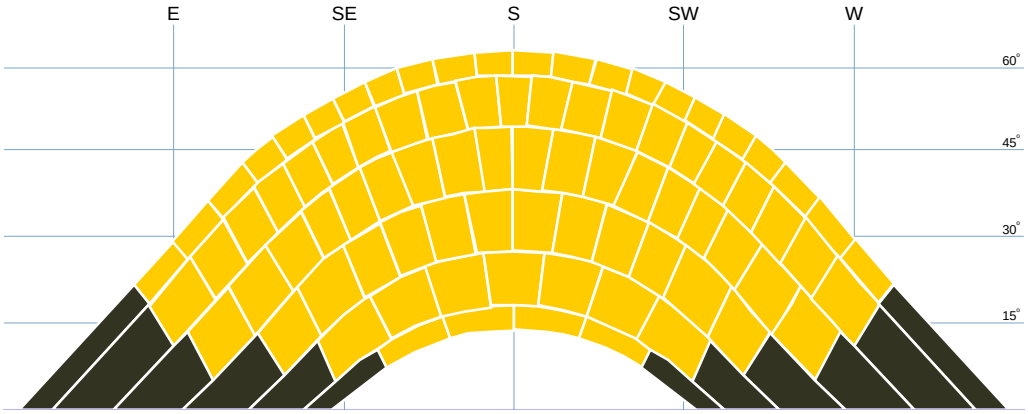
The sunpath diagram shows the arcs of the sky that the sun passes through at different times of the day and year as yellow blocks. The shaded area indicates the horizon as seen from the location of the solar array. Where objects on the horizon are within 10m of the array, an added semi-circle is drawn 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

SolaX X1-3.6T 1ph

Input 1

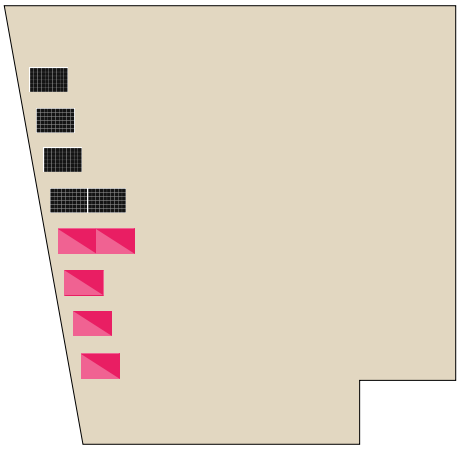


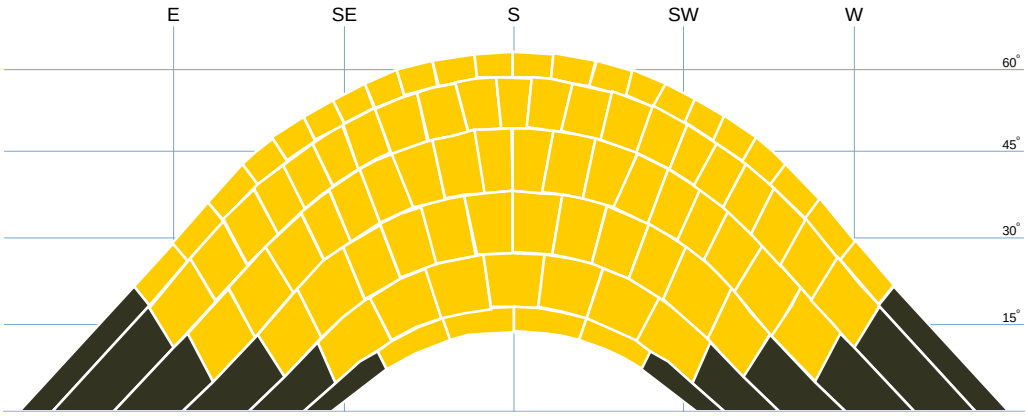


A. Installation data		
Installed capacity of PV system – kWp (stc)	**2.125**	kWp
Orientation of the PV system – degrees from South	**-18**	°
Inclination of system – degrees from horizontal	**5**	°
Postcode region	**1**	

B. Performance calculations		
kWh/kWp (Kk)	**862**	kWh/kWp
Shade factor (SF)	**1.00**	
Estimated output (kWp x Kk x SF)	**1832**	kWh

Input 2





A. Installation data		
Installed capacity of PV system – kWp (stc)	**2.125**	kWp
Orientation of the PV system – degrees from South	**-18**	°
Inclination of system – degrees from horizontal	**5**	°
Postcode region	**1**	

B. Performance calculations		
kWh/kWp (Kk)	**862**	kWh/kWp
Shade factor (SF)	**1.00**	
Estimated output (kWp x Kk x SF)	**1832**	kWh

Performance Summary

A. Installation data		
Installed capacity of PV system – kWp (stc)	**4.25**	kWp
Orientation of the PV system – degrees from South	**See individual inputs**	
Inclination of system – degrees from horizontal	**See individual inputs**	
Postcode region	**1**	
B. Performance calculations		
kWh/kWp (Kk)	**See individual inputs**	
Shade factor (SF)	**See individual inputs**	
Estimated output (kWp x Kk x SF)	**3664**	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 guidence 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.

Equipment and Services

Equipment Costs	
Equipment	£2,896.66
Total equipment cost	**£2,896.66**

Services Costs	
Engineering	£2,600.00
Test & Commission	£260.00
MCS/NAPIT Registration & DNO Notifications	£474.50
O&M Manual & Handover Documentation	£325.00
Scaffold Access Excluded	£0.00
Crane Lift to roof Excluded	£0.00
230V AC Supplies & Part P Certificate Excluded	£0.00
Total services cost	**£3,659.50**

Grants

Totals	
Total before tax	**£6,556.16**
VAT at 0%	**£0.00**
Total including tax	**£6,556.16**

Financial

Generation

The system is expected to generate 3664 kWh per year initially, decreasing gradually as the solar cells degrade. Over the 25 year term of this financial projection the total generation is expected to be 86093 kwh, of which 64570 kWh will be consumed on site and 21523 kWh exported.

86 MWh

Payback

After adjusting projected costs and benefits for inflation, and applying a discount rate of 0%, the initial system cost of £6,556.16 is expected to be recouped after 5 years.

5 years

Net Present Value

The total present value of future benefits and costs, using a discount rate of 0% per year, is £43,445.08. The cost of the PV system is £6,556.16. The net present value of the project is therefore £36,888.92. A positive net present value is a good indication that the project is financially worthwhile.

£36888.92

IRR

The Internal Rate of Return is a useful measure for comparing the relative profitability of investments.

18.1 %

Disclaimer

Our financial model calculates the benefits of a solar PV installation (such as savings in electricity, or payments for exported electricity) and costs (the initial purchase cost, and any future maintenance costs if entered), over the projected lifespan of the system. Values are corrected for inflation, system degradation, and discount rate - a measure that accounts for the fact that a promise of a monetary sum in the distant future is usually considered less valuable than the promise of the same sum in the near future.

A model is only as accurate as the assumptions it makes. You should consider whether the values chosen are appropriate for your situation. There are many variables that dictate the financial return of a solar installation and we cannot forecast how they may change in the future. This financial projection shows a likely scenario for future financial returns. Actual returns may vary significantly from this forecast.

Assumptions

Inflation rate	**4%**
Cost of electricity	**£0.35 /kWh** increases with inflation
System size	**4.25 kWp** degrades at 0.5% per year
Discount rate	**0%**
Projection length	**25 years**

Income and savings

The projected income from the system over the project lifetime in payments for generated and exported electricity, along with electricity savings, are shown in the table and graph below.

These figures assume an inflation rate of 4 percent.

	Export payments	Electricity savings	**Total**
Year 1	140	979	**1118**
Year 2	145	1013	**1157**
Year 3	150	1048	**1198**
Year 4	155	1084	**1239**
Year 5	160	1122	**1282**
Year 6	166	1161	**1327**
Year 7	172	1202	**1373**
Year 8	178	1243	**1421**
Year 9	184	1287	**1470**
Year 10	190	1331	**1522**
Year 11	197	1378	**1575**
Year 12	204	1426	**1629**
Year 13	211	1475	**1686**
Year 14	218	1527	**1745**
Year 15	226	1580	**1805**
Year 16	234	1635	**1868**
Year 17	242	1692	**1933**
Year 18	250	1750	**2001**
Year 19	259	1811	**2070**
Year 20	268	1874	**2142**
Year 21	277	1940	**2217**
Year 22	287	2007	**2294**
Year 23	297	2077	**2374**
Year 24	307	2149	**2456**
Year 25	318	2224	**2542**

£5430

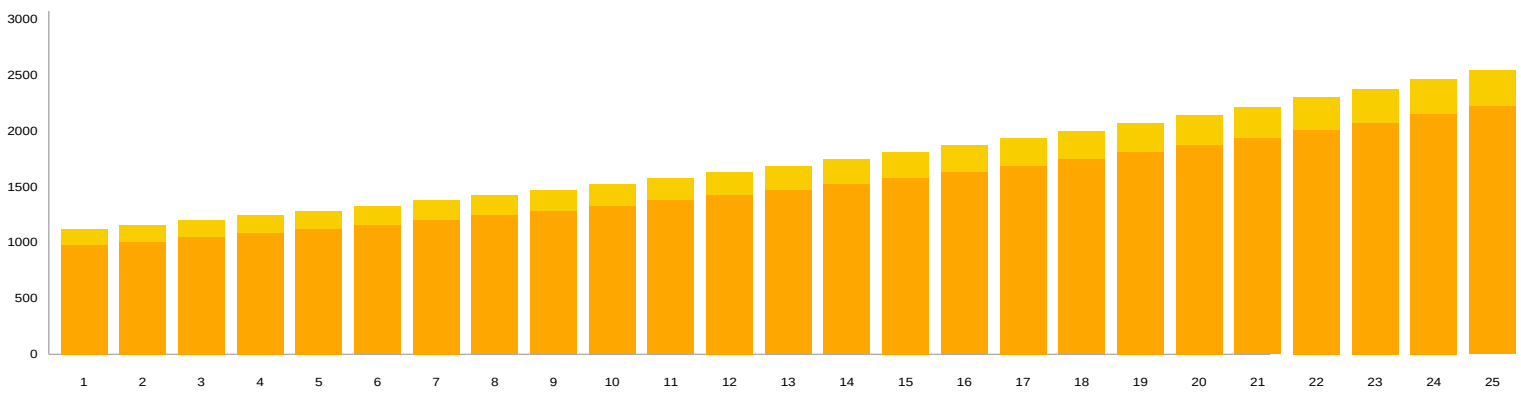
Total Export Payments

over 25 years

£38014

Electricity savings

over 25 years



The bottom line

The table and graph below show the discounted costs for the project (including the initial capital required for the installation), against the total discounted benefits from income and savings on electricity bills.

The system pays for itself in 5 years.

	Discounted benefits	Cumulative benefits	Discounted costs	Cumulative costs	**Cashflow**
Year 1	1118	1118	0	6556	**-5438**
Year 2	1157	2276	0	6556	**-4280**
Year 3	1198	3473	0	6556	**-3083**
Year 4	1239	4713	0	6556	**-1844**
Year 5	1282	5995	0	6556	**-561**
Year 6	1327	7322	0	6556	**766**
Year 7	1373	8695	0	6556	**2139**
Year 8	1421	10116	0	6556	**3560**
Year 9	1470	11586	0	6556	**5030**
Year 10	1522	13108	0	6556	**6552**
Year 11	1575	14683	0	6556	**8126**
Year 12	1629	16312	0	6556	**9756**
Year 13	1686	17998	0	6556	**11442**
Year 14	1745	19743	0	6556	**13187**
Year 15	1805	21548	0	6556	**14992**
Year 16	1868	23416	0	6556	**16860**
Year 17	1933	25350	0	6556	**18793**
Year 18	2001	27350	0	6556	**20794**
Year 19	2070	29420	0	6556	**22864**
Year 20	2142	31563	0	6556	**25006**
Year 21	2217	33779	0	6556	**27223**
Year 22	2294	36073	0	6556	**29517**
Year 23	2374	38447	0	6556	**31891**
Year 24	2456	40903	0	6556	**34347**
Year 25	2542	43445	0	6556	**36889**