



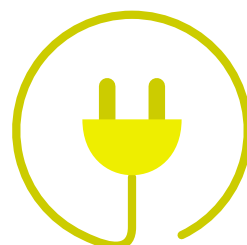
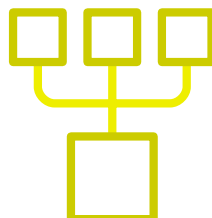
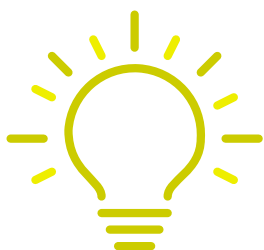
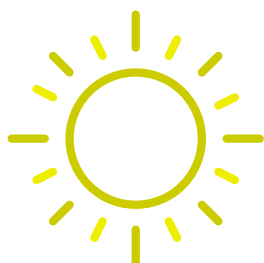
Craftman Ltd

Project Name: Wed Apr 05 2023

Phone: 07748460049

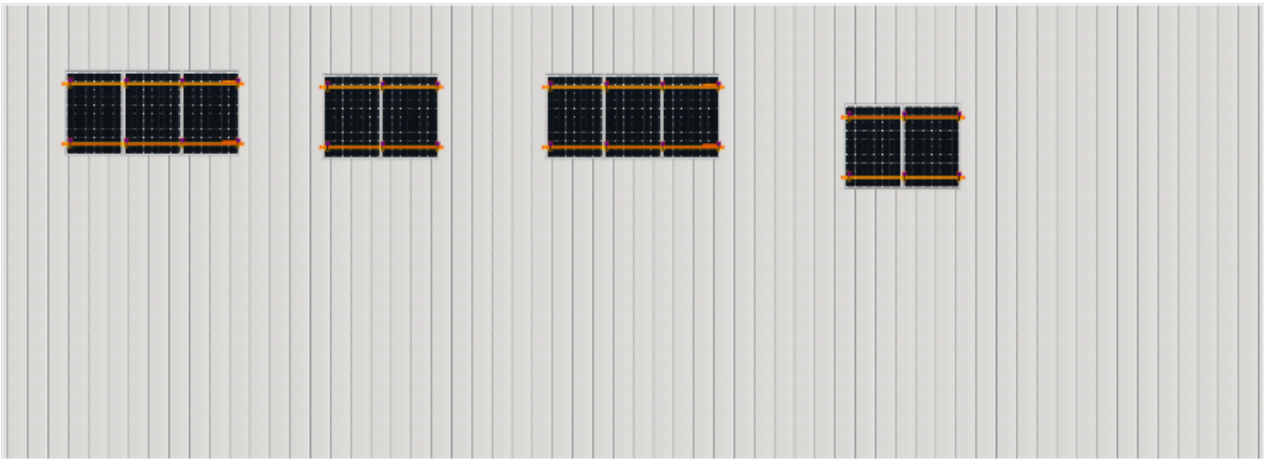
Date Created: 5th April 2023

Designer: Gerry Chaplin



Roof Layout

Roof 1



Component list

Item	Quantity
 Q Cells G11 M 405W solar panel	10
 Huawei 3.6kW L1 HV 1ph hybrid inverter	1
 **NET** Emlite Bi-directional Meter ECA2.nv	1
 Label sheet	1
 Huawei Smart Power Sensor for 1ph (Meter with CT)	1
 AC isolator - KN Newbury 20A 4-pole	2
 IMO DC isolator 16A 2p 1string	2
Pair of MC4 connectors	4
50m reel of 4mm ² solar cable	1
Fastensol end clamp (30mm silver)	16
Fastensol mid clamp (30mm silver)	12
Fastensol silver end cap	16
Standing seam clamp	28
Fastensol cross connect	28
Fastensol rail splice	4



Inverter checks

Huawei 3.6kW L1 HV 1ph hybrid

Panels

PV power **4050** Rated AC output **3680**

Input 1: 5 Q Cells G11 M 405W solar panels in 1 strings

Panels

Inverter

PV power	2025 W		
Open circuit voltage at -10° C	209 V	Max DC voltage	600 V
V _{mpp} at 40° C	148 V	V _{mpp} lower limit	90 V
V _{mpp} at -10° C	176 V	V _{mpp} upper limit	560 V
I _{mpp} at 40° C	13 A	Max DC input current	12.5 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	
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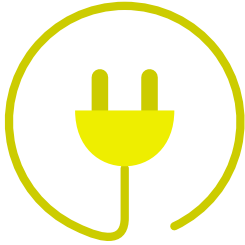
Input 2: 5 Q Cells G11 M 405W solar panels in 1 strings

Panels		Inverter	
PV power	2025 W		
Open circuit voltage at -10° C	209 V	Max DC voltage	600 V
V _{mpp} at 40° C	148 V	V _{mpp} lower limit	90 V
V _{mpp} at -10° C	176 V	V _{mpp} upper limit	560 V
I _{mpp} at 40° C	13 A	Max DC input current	12.5 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	
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Electrical

Huawei 3.6kW L1 HV 1ph hybrid



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 (16A)



Phases

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



Input 1



DC Isolator

A IMO DC isolator 16A 2p 1string has been specified for this input

Current

The isolator is rated for a current of 16A, which is more than the expected maximum current of 14A.



Voltage

At 16A the isolator is rated for a voltage of 600V, which is more than the expected maximum voltage of 209V.



Cable

10m of 4mm² solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around
1.10 V (0.74 percent)



Input 2



DC Isolator

A IMO DC isolator 16A 2p 1string has been specified for this input

Current

The isolator is rated for a current of 16A, which is more than the expected maximum current of 14A.



Voltage

At 16A the isolator is rated for a voltage of 600V, which is more than the expected maximum voltage of 209V.





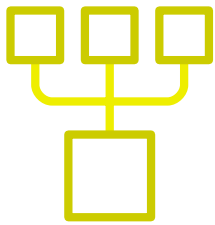
Cable

10m of 4mm² solar cable has been specified

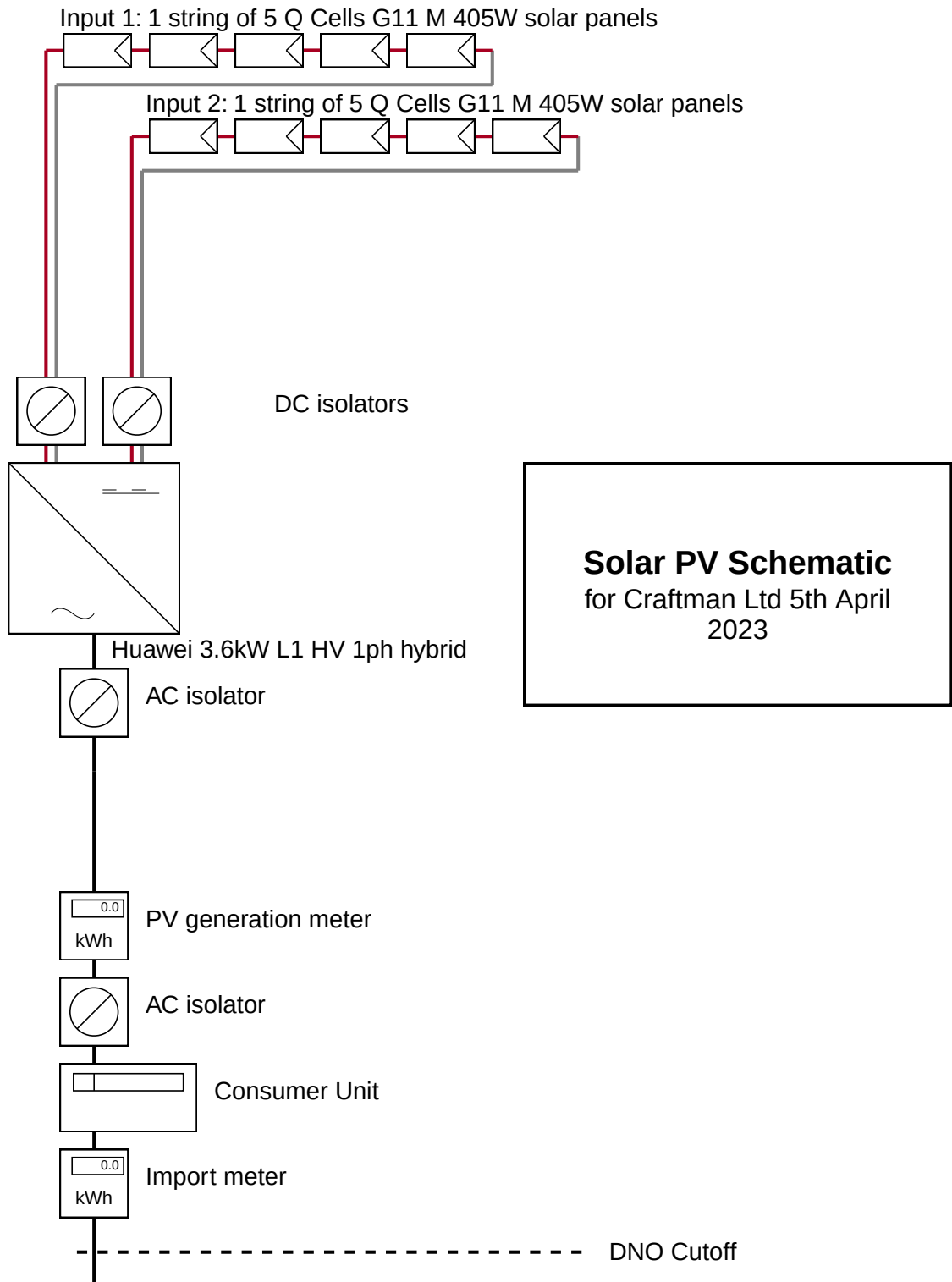
Voltage drop

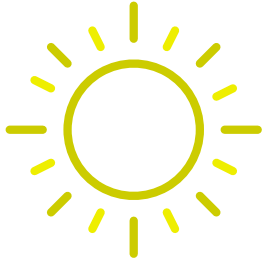
Voltage drop at maximum power point at 40°C will be around
1.10 V (0.74 percent)





Schematic diagram





Performance Estimate

Site details

Client

Craftman Ltd

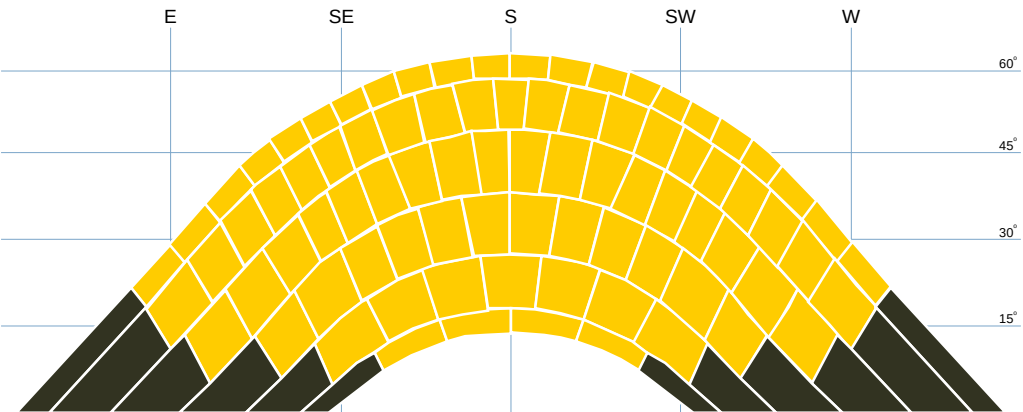
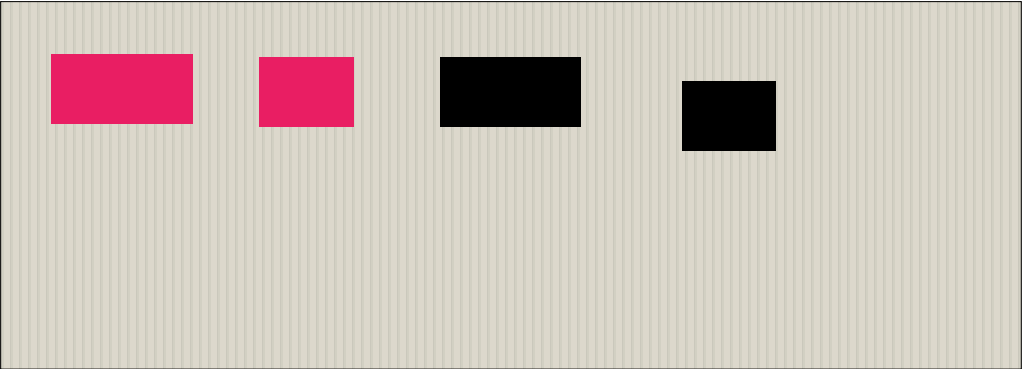
Address

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

Huawei 3.6kW L1 HV 1ph hybrid

Input 1



A. Installation data

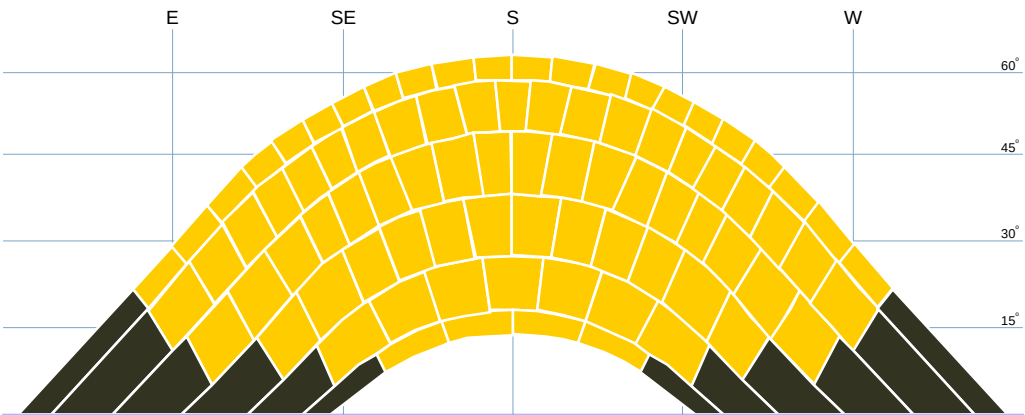
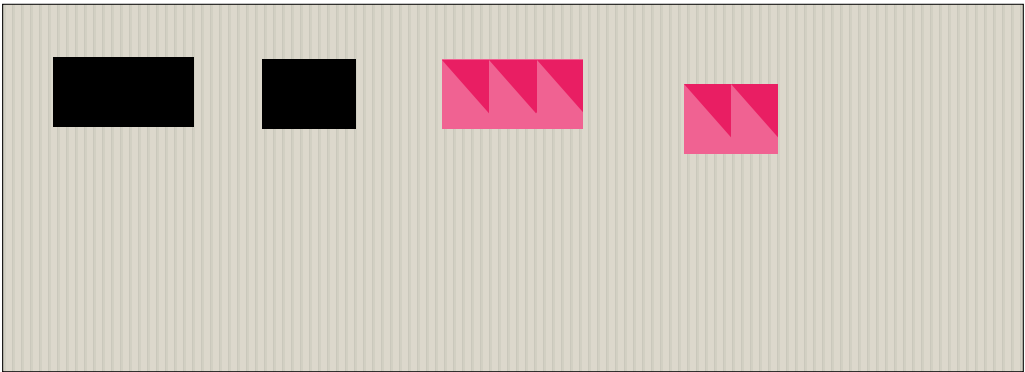
Installed capacity of PV system - kWp (stc)	2.025	kWp
Orientation of the PV system - degrees from South	0	°
Inclination of system - degrees from horizontal	25	°
Postcode region	1	



B. Performance calculations

kWh/kWp (Kk)	964	kWh/kWp
Shade factor (SF)	1.00	
Estimated output (kWp x Kk x SF)	1952	kWh

Input 2



A. Installation data

Installed capacity of PV system - kWp (stc)	2.025	kWp
Orientation of the PV system - degrees from South	0	°
Inclination of system - degrees from horizontal	25	°
Postcode region	1	



B. Performance calculations

kWh/kWp (Kk)	964	kWh/kWp
Shade factor (SF)	1.00	
Estimated output (kWp x Kk x SF)	1952	kWh

Performance Summary

A. Installation data		
Installed capacity of PV system - kWp (stc)	4.05	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)	3904	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.



Equipment and Services

Equipment Costs

10x Q Cells G11 M 405W solar panel	£1,562.50
Huawei 3.6kW L1 HV 1ph hybrid inverter	£962.50
NET Emlite Bi-directional Meter ECA2.nv	£43.13
Label sheet	£2.25
Huawei Smart Power Sensor for 1ph (Meter with CT)	£83.75
2x AC isolator - KN Newbury 20A 4-pole	£31.85
2x IMO DC isolator 16A 2p 1string	£54.50
4x Pair of MC4 connectors	£10.00
50m reel of 4mm2 solar cable	£50.00
16x Fastensol end clamp (30mm silver)	£24.40
12x Fastensol mid clamp (30mm silver)	£18.30
16x Fastensol silver end cap	£15.40
28x Standing seam clamp	£193.90
28x Fastensol cross connect	£43.75
4x Fastensol rail splice	£12.15
8x Fastensol silver rail 3300mm	£180.20
Total equipment cost	£3,288.58

Services Costs

Installation	£2,250.00
5 year Maintenance package	£1,750.00
	£0.00
Total services cost	£4,000.00

Totals

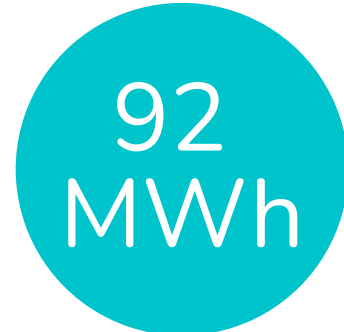
Total before tax	£7,288.58
VAT at 0%	£0.00
Total including tax	£7,288.58



Financial

Generation

The system is expected to generate 3904 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 91733 kwh, of which 68799 kWh will be consumed on site and 22933 kWh exported.



Payback

After adjusting projected costs and benefits for inflation, and applying a discount rate of 4%, the initial system cost of £7,288.58 is expected to be recouped after 5 years.



Net Present Value

The total present value of future benefits and costs, using a discount rate of 4% per year, is £29,600.09. The cost of the PV system is £7,288.58. The net present value of the project is therefore £22,311.51. A positive net present value is a good indication that the project is financially worthwhile.



IRR

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



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	2%
Cost of electricity	£0.5 /kWh increases with inflation
System size	4.05 kWp degrades at 0.5% per year
Discount rate	4%
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 2 percent.

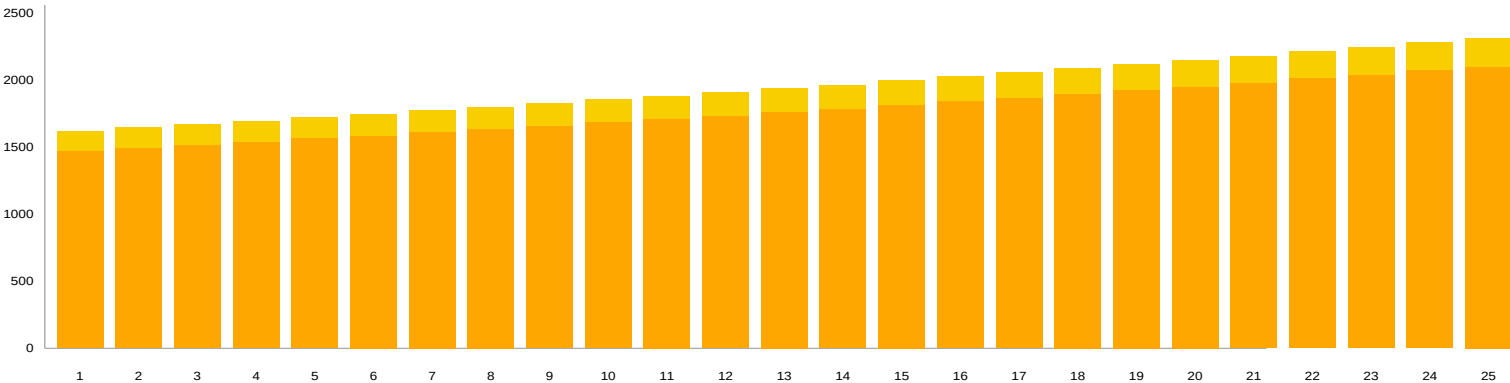
	Export payments	Electricity savings	Total
Year 1	147	1475	1622
Year 2	150	1497	1647
Year 3	152	1519	1671
Year 4	154	1542	1696
Year 5	156	1565	1721
Year 6	159	1588	1747
Year 7	161	1612	1773
Year 8	164	1636	1799
Year 9	166	1660	1826
Year 10	168	1685	1853
Year 11	171	1710	1881
Year 12	174	1736	1909
Year 13	176	1761	1938
Year 14	179	1788	1966
Year 15	181	1814	1996
Year 16	184	1841	2025
Year 17	187	1869	2056
Year 18	190	1897	2086
Year 19	192	1925	2117
Year 20	195	1954	2149
Year 21	198	1983	2181
Year 22	201	2012	2213
Year 23	204	2042	2246
Year 24	207	2073	2280
Year 25	210	2103	2314

£4428

Total Export Payments
over 25 years

£44285

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	1590	1590	0	7289	-5699
Year 2	1549	3139	0	7289	-4149
Year 3	1509	4648	0	7289	-2640
Year 4	1471	6119	0	7289	-1170
Year 5	1433	7552	0	7289	263
Year 6	1396	8948	0	7289	1659
Year 7	1360	10308	0	7289	3019
Year 8	1325	11633	0	7289	4344
Year 9	1291	12924	0	7289	5635
Year 10	1258	14182	0	7289	6893
Year 11	1226	15407	0	7289	8119
Year 12	1194	16601	0	7289	9313
Year 13	1163	17765	0	7289	10476
Year 14	1134	18898	0	7289	11610
Year 15	1104	20003	0	7289	12714
Year 16	1076	21079	0	7289	13790
Year 17	1048	22127	0	7289	14839
Year 18	1021	23149	0	7289	15860
Year 19	995	24144	0	7289	16855
Year 20	970	25113	0	7289	17825
Year 21	945	26058	0	7289	18769
Year 22	920	26978	0	7289	19690
Year 23	897	27875	0	7289	20587
Year 24	874	28749	0	7289	21460
Year 25	851	29600	0	7289	22312

