CLEVER ENERGY SOLAR

Hinckley Plumbing & Heating Services are part of the Clever Energy group.

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Mr Peter Shuttleworth

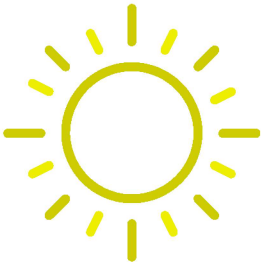
Project Name: Mr Peter Shuttleworth

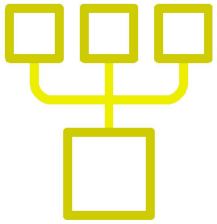
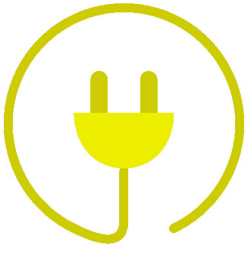
Phone: 07966215252

Address: 45, Avenue Road, BB7 9QB

Date Created: 1st June 2023

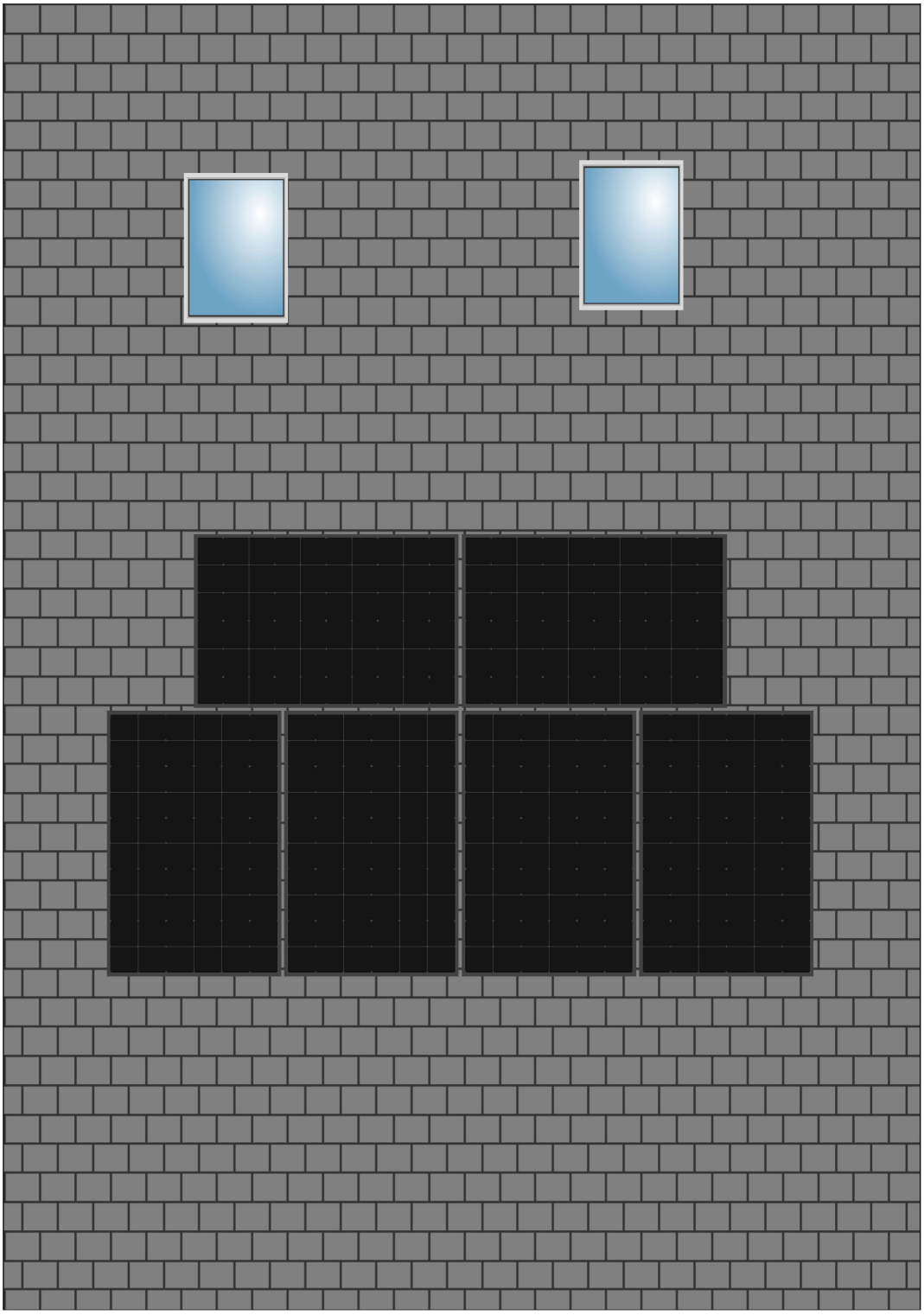
Designer: Paul Watson



Roof Layout

Roof 1



Component list

Item	Quantity
 *HIB* Longi HiMo5 400W All Black Mono solar panel	6
 SolaX X1 G4 3.7D hybrid inverter	1
 **NET** Emlite Bi-directional Meter ECA2.nv	1
 Label sheet	1
 AC isolator - KN Newbury 20A 4-pole	2
 SolaX Triple 5.8kWh LFP Battery (Master Console)	1
 SolaX Triple 5.8kWh LFP Battery (Slave Console)	2
 IMO DC isolator 16A 2p 1string	2
 Pair of MC4 connectors	4
 100m reel of 6mm2 solar cable	1
 Fastensol end clamp (30mm black)	12
 Fastensol mid clamp (30mm black)	6
 Fastensol black end cap	12
 Fastensol portrait slate roof hook	10
 Fastensol rail splice	2

	Fastensol landscape slate roof hook	8
	Fastensol silver rail 3300mm	5

Inverter checks

SolaX X1 G4 3.7D hybrid

Panels			
PV power	**2400**	Rated AC output	**3680**

Input 1: 3 *HIB* Longi HiMo5 400W All Black Mono solar panels in 1 strings

Panels		Inverter	
PV power	**1200 W**		
Open circuit voltage at -10° C	**121 V**	Max DC voltage	**600 V**
V_{mpp} at 40° C	**90 V**	V_{mpp} lower limit	**70 V**
V_{mpp} at -10° C	**102 V**	V_{mpp} upper limit	**550 V**
I_{mpp} at 40° C	**13 A**	Max DC input current	**14 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: 3 *HIB* Longi HiMo5 400W All Black Mono solar panels in 1 strings

Panels		**Inverter**	
PV power	**1200 W**		
Open circuit voltage at -10° C	**121 V**	Max DC voltage	**600 V**
V_{mpp} at 40° C	**90 V**	V_{mpp} lower limit	**70 V**
V_{mpp} at -10° C	**102 V**	V_{mpp} upper limit	**550 V**
I_{mpp} at 40° C	**13 A**	Max DC input current	**14 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 G4 3.7D 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 121V.

Cable

10m of 6mm2 solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around **0.75 V (0.83 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 121V.

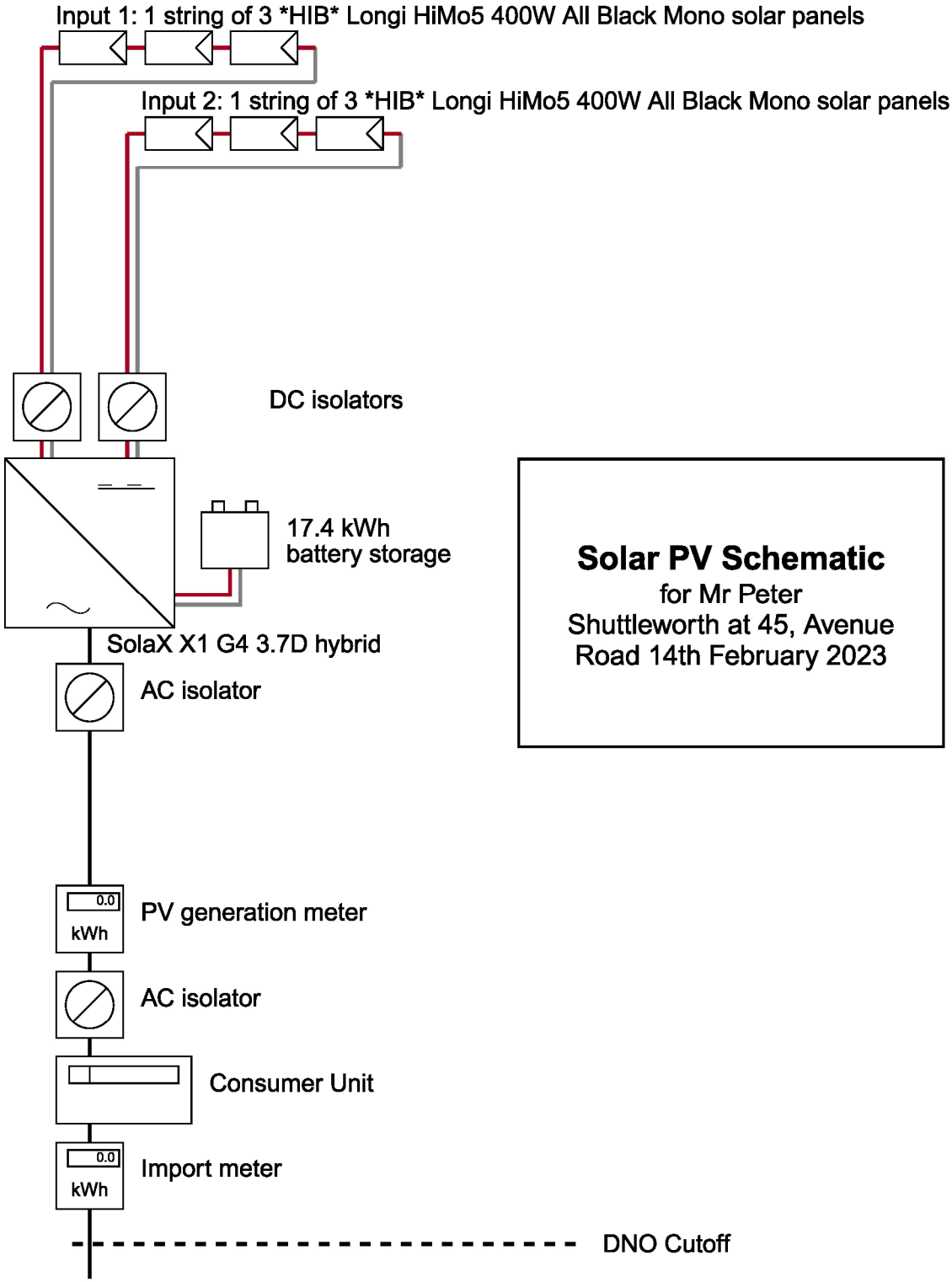
Cable

10m of 6mm2 solar cable has been specified

Voltage drop

Voltage drop at maximum power point at 40°C will be around **0.75 V (0.83 percent)**

Schematic diagram



Performance Estimate

Site details

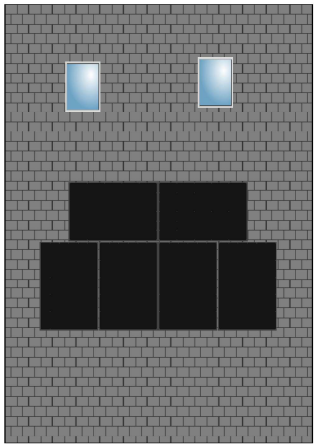
Client	Mr Peter Shuttleworth
Address	45, Avenue Road

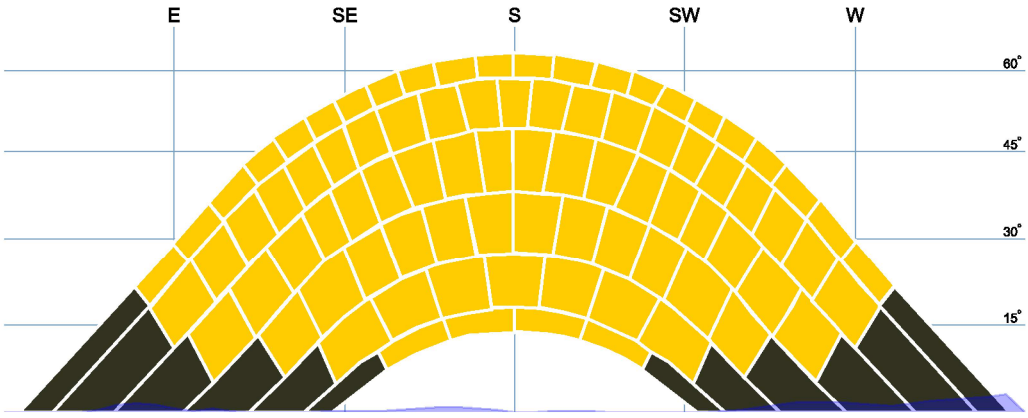
The sunpath diagram shows the arcs of the sky that the sun passes through at different times of the day and year as yellow blocks. The shaded area indicates the horizon as seen from the location of the solar array. Where objects on the horizon are within 10m of the array, an added semi-circle is drawn 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 G4 3.7D hybrid

Input 1

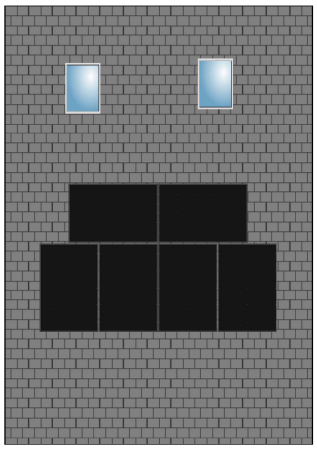


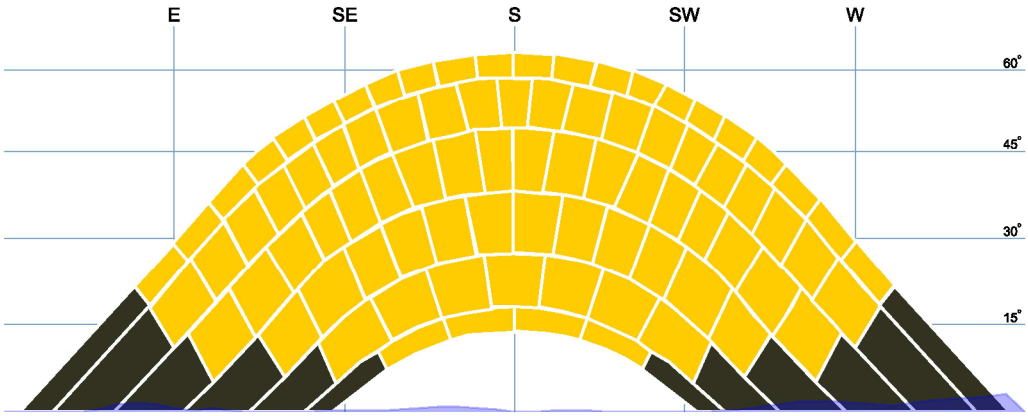


A. Installation data		
Installed capacity of PV system - kWp (stc)	**1.200**	kWp
Orientation of the PV system - degrees from South	**76**	°
Inclination of system - degrees from horizontal	**46**	°
Postcode region	**7E**	

B. Performance calculations		
kWh/kWp (Kk)	**810**	kWh/kWp
Shade factor (SF)	**1.00**	
Estimated output (kWp x Kk x SF)	**972**	kWh

Input 2





A. Installation data		
Installed capacity of PV system - kWp (stc)	**1.200**	kWp
Orientation of the PV system - degrees from South	**76**	°
Inclination of system - degrees from horizontal	**46**	°
Postcode region	**7E**	
B. Performance calculations		
kWh/kWp (Kk)	**810**	kWh/kWp
Shade factor (SF)	**1.00**	
Estimated output (kWp x Kk x SF)	**972**	kWh

Performance Summary

A. Installation data		
Installed capacity of PV system - kWp (stc)	**2.4**	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)	**1944**	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.

Equipment and Services

Equipment Costs	
6x *HIB* Longi HiMo5 400W All Black Mono solar panel	
SolaX X1 G4 3.7D hybrid inverter	
NET Emlite Bi-directional Meter ECA2.nv	
Label sheet	
2x AC isolator - KN Newbury 20A 4-pole	
SolaX Triple 5.8kWh LFP Battery (Master Console)	
2x SolaX Triple 5.8kWh LFP Battery (Slave Console)	
2x IMO DC isolator 16A 2p 1string	
4x Pair of MC4 connectors	
100m reel of 6mm2 solar cable	
12x Fastensol end clamp (30mm black)	
6x Fastensol mid clamp (30mm black)	
12x Fastensol black end cap	
10x Fastensol portrait slate roof hook	
2x Fastensol rail splice	
8x Fastensol landscape slate roof hook	
5x Fastensol silver rail 3300mm	
Meter	
18 x slate flashjng kit	
Total equipment cost	[redacted]

Services Costs	
Installation and Scaffolding	
Total services cost	[redacted]

Totals

Total before tax	[redacted]
VAT at 0%	
Total including tax	

Financial

Generation

The system is expected to generate 1944 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 45678 kwh, of which 36543 kWh will be consumed on site and 9136 kWh exported.

46 MWh

Payback

After adjusting projected costs and benefits for inflation, and applying a discount rate of 0%, the initial system cost of £13,583.00 is expected to be recouped after 15 years.

15 years

Net Present Value

The total present value of future benefits and costs, using a discount rate of 0% per year, is £33,281.22. The cost of the PV system is £13,583.00. The net present value of the project is therefore £19,698.22. A positive net present value is a good indication that the project is financially worthwhile.

£19698.22

IRR

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

6.2 %

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	**7%**
Cost of electricity	**£0.34 /kWh** increases with inflation
System size	**2.4 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 7 percent.

	Export payments	Electricity savings	Total
Year 1	22	546	**568**
Year 2	24	581	**605**
Year 3	25	619	**644**
Year 4	27	659	**685**
Year 5	28	701	**730**
Year 6	30	747	**777**
Year 7	32	795	**827**
Year 8	34	846	**881**
Year 9	36	901	**938**
Year 10	39	959	**998**
Year 11	41	1021	**1063**
Year 12	44	1087	**1131**
Year 13	47	1158	**1205**
Year 14	50	1233	**1282**
Year 15	53	1312	**1365**
Year 16	56	1397	**1454**
Year 17	60	1487	**1548**
Year 18	64	1584	**1648**
Year 19	68	1686	**1754**
Year 20	73	1795	**1868**
Year 21	77	1911	**1988**
Year 22	82	2035	**2117**
Year 23	88	2166	**2254**
Year 24	93	2306	**2399**
Year 25	99	2455	**2554**

£1293

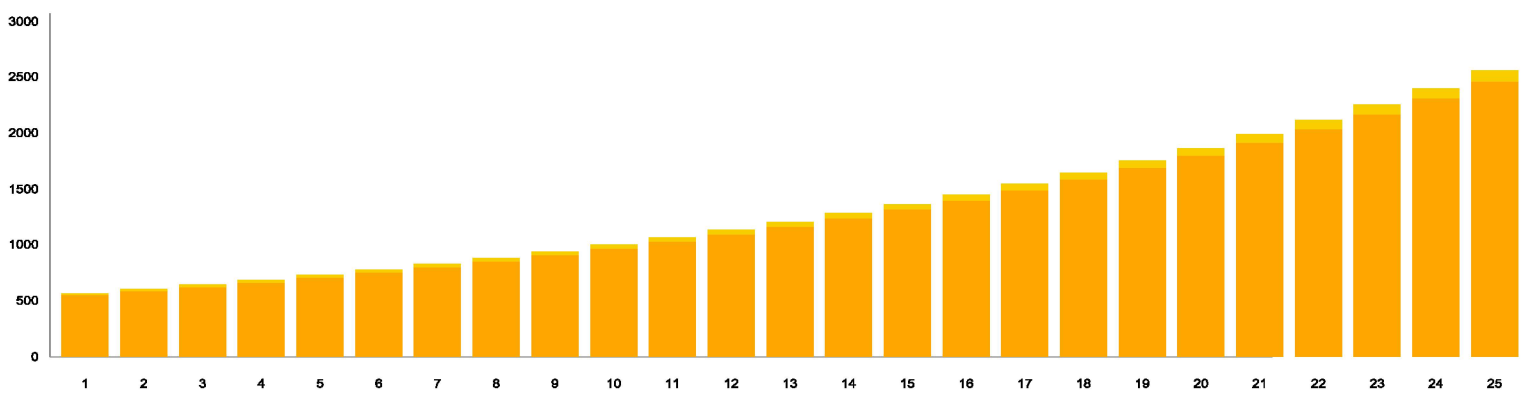
Total Export Payments

over 25 years

£31987

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 15 years.

	Discounted benefits	Cumulative benefits	Discounted costs	Cumulative costs	Cashflow
Year 1	568	568	0	13583	**-13015**
Year 2	605	1173	0	13583	**-12410**
Year 3	644	1816	0	13583	**-11767**
Year 4	685	2502	0	13583	**-11081**
Year 5	730	3232	0	13583	**-10351**
Year 6	777	4009	0	13583	**-9574**
Year 7	827	4836	0	13583	**-8747**
Year 8	881	5716	0	13583	**-7867**
Year 9	938	6654	0	13583	**-6929**
Year 10	998	7652	0	13583	**-5931**
Year 11	1063	8715	0	13583	**-4868**
Year 12	1131	9846	0	13583	**-3737**
Year 13	1205	11051	0	13583	**-2532**
Year 14	1282	12333	0	13583	**-1250**
Year 15	1365	13698	0	13583	**115**
Year 16	1454	15152	0	13583	**1569**
Year 17	1548	16699	0	13583	**3116**
Year 18	1648	18347	0	13583	**4764**
Year 19	1754	20101	0	13583	**6518**
Year 20	1868	21969	0	13583	**8386**
Year 21	1988	23957	0	13583	**10374**
Year 22	2117	26074	0	13583	**12491**
Year 23	2254	28327	0	13583	**14744**
Year 24	2399	30727	0	13583	**17144**
Year 25	2554	33281	0	13583	**19698**