

Reading Scout & Guide Headquarters

PV and Battery Proposals

Detail Design and Calculations, with Panel &
Battery Details

(main prices redacted)

- **Option 1: 36.13 kWp solar system, made up of 85 x 425W panels plus 1 x Tesla Gateway 2 and 9 x Tesla Powerwall battery.**

Cost:

Option 1 is for a 36.13 kWp installation, consisting of 85 x 425W Monocrystalline solar panels plus Tesla battery system. The panels will be mounted on a pitched roof, using brackets fixed to the rafters with over-roof mounting frames. The panels will be wired to 1 x Solis-36K-S5 inverter located in a top floor riser cupboard. The active PV cell area (not including any spaces between panels) will be approx. 170 m², and the system is anticipated to produce 31,813 kWh/annum. It is assumed that 80% of power generated by the PV will be used on site, and the 20% exported generation will be paid at a rate of Op/kWh (see end of quote for more details on export payments). The system will require prior permission to connect from the network operator.

- **Option 2: 36.13 kWp solar system, made up of 85 x 425W panels plus 1 x Tesla Gateway 2 and 6 x Tesla Powerwall battery.**

Cost:

Option 2 is for a 36.13 kWp installation, consisting of 85 x 425W Monocrystalline solar panels plus Tesla battery system. The panels will be mounted on a pitched roof, using brackets fixed to the rafters with over-roof mounting frames. The panels will be wired to 1 x Solis-36K-S5 inverter located in a top floor riser cupboard. The active PV cell area (not including any spaces between panels) will be approx. 170 m², and the system is anticipated to produce 31,813 kWh/annum. It is assumed that 80% of power generated by the PV will be used on site, and the 20% exported generation will be paid at a rate of Op/kWh (see end of quote for more details on export payments). The system will require prior permission to connect from the network operator.

Summary

A detailed description of each system is included in the Quotation section following this cover letter. A summary is given in the table below:

Option	Solar PV System Size	Battery size	System Cost (exc VAT)	Annual Output (kWh)	Estimated Annual Benefits*	Estimated Payback Time*
1	36.13 kWp	121.5 kWh		31,813	£7,031	10 years
2	36.13 kWp	81 kWh		31,813	£7,031	9 years

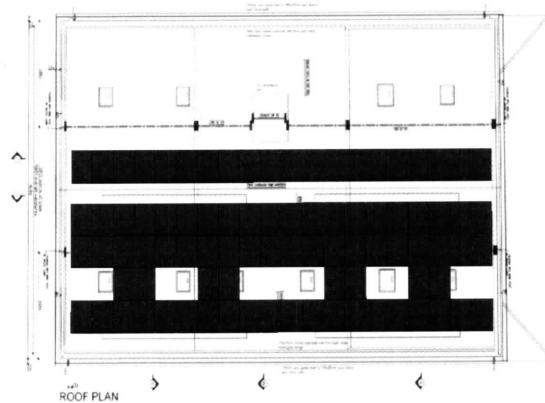
**Please see Quotation section for individual option assumptions. Figures for options including battery exclude any time-of-use saving from battery.*

*Assuming grid electricity displaced at 26p/kWh with 85% on-site usage, and 15% metered export paid at an assumed rate of 0p/kWh (please see end of quote for more details on export payments).

System Performance & Financial Analysis

Option 1: 36.13 kWp solar system plus 9 x Tesla Powerwall battery.

Layout Diagram



Summary Cost / Benefit Analysis

Please note that batteries store excess solar and offer timed grid charging ('charge off-peak, discharge peak'). They may provide power-cut back-up. This quote only models the benefit from storing excess solar. We can model the other financial benefits on request, but we need to know your tariff structure and ideally have access to half hourly usage data.

System Performance

Array	1	2
PV orientation from south	14°	166°
Inclination of PV panels	30°	30°
Shade %	0%	0%
System capacity (kW)	27.625	8.5
Annual generation (kWh)†	26,824	4,990

Financial Benefits

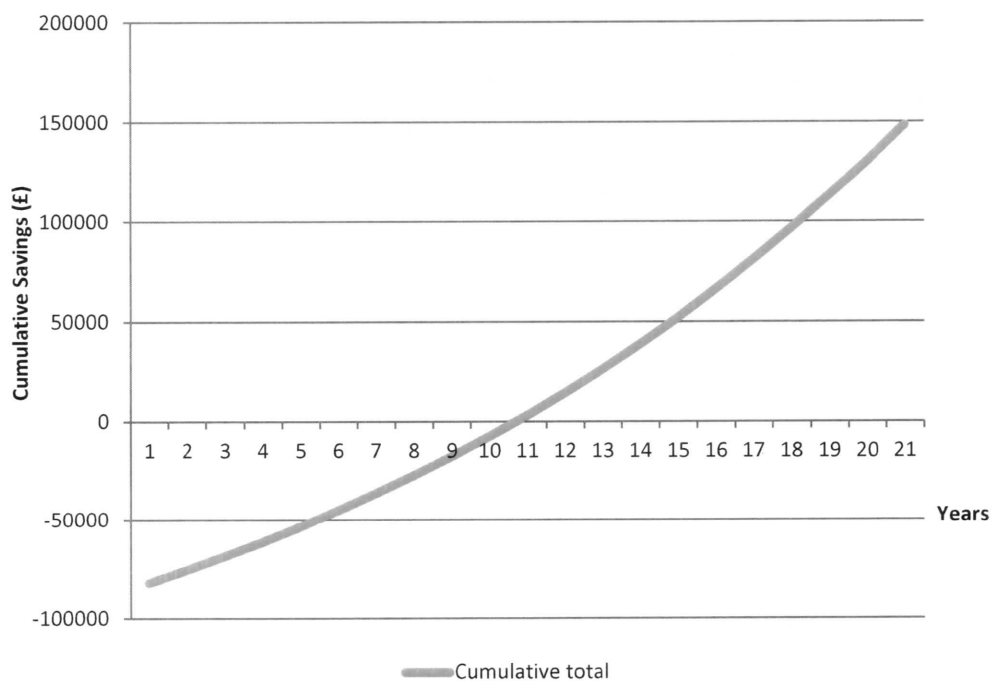
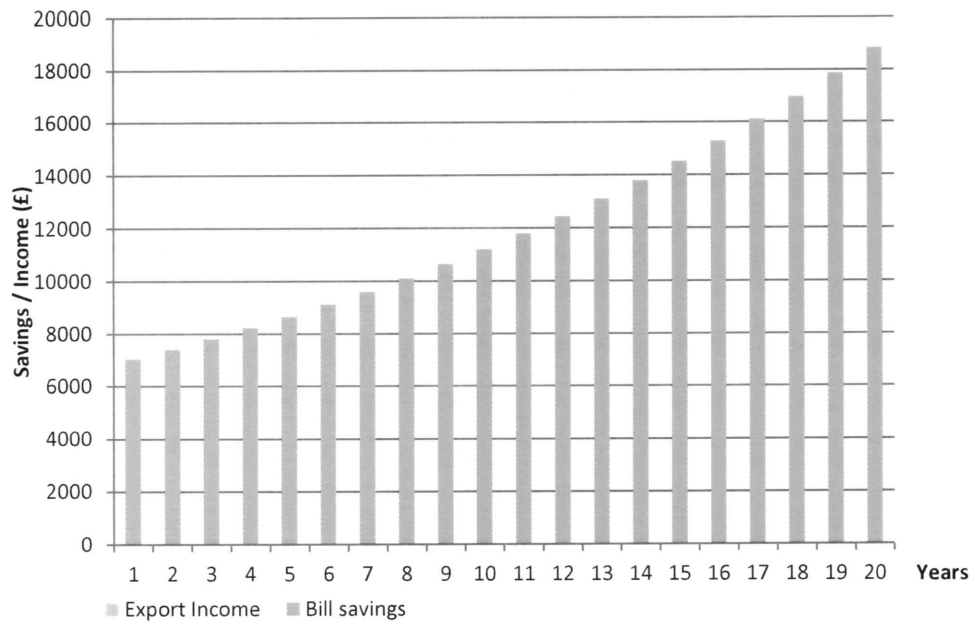
System Cost:

Annual benefits*	£7,031
Payback time for investment:	10 years
IRR% of investment:	10%
Net present value of savings and income (NPV)	£24,414
Absolute return on investment (NPV / Purchase cost):	121%

*First year values only. See detailed cash flow for subsequent years.

Performance Charts

The following charts have been created using the DTI guide version 3 in compliance with the MCS.



Cash flow

Year	Output (kWh)	Value of Electricity Savings	Export Income	Total Benefits	Running Cost	Savings less maintenance	Cumulative Savings	Present Value of Savings
0						-£82,409	-£82,409	-£82,409
1	31,813	£7,031	£0	£7,031	-£360	£6,671	-£75,738	£6,540
2	31,610	£7,405	£0	£7,405	-£371	£7,034	-£68,704	£6,761
3	31,407	£7,799	£0	£7,799	-£382	£7,417	-£61,287	£6,989
4	31,206	£8,214	£0	£8,214	-£393	£7,821	-£53,466	£7,225
5	31,007	£8,651	£0	£8,651	-£405	£8,246	-£45,221	£7,469
6	30,808	£9,111	£0	£9,111	-£417	£8,694	-£36,526	£7,720
7	30,611	£9,596	£0	£9,596	-£430	£9,167	-£27,360	£7,980
8	30,415	£10,107	£0	£10,107	-£443	£9,664	-£17,696	£8,248
9	30,221	£10,645	£0	£10,645	-£456	£10,189	-£7,507	£8,526
10	30,027	£11,211	£0	£11,211	-£470	£10,742	£3,235	£8,812
11	29,835	£11,808	£0	£11,808	-£484	£11,324	£14,559	£9,108
12	29,644	£12,436	£0	£12,436	-£498	£11,938	£26,497	£9,413
13	29,454	£13,098	£0	£13,098	-£513	£12,585	£39,082	£9,729
14	29,266	£13,795	£0	£13,795	-£529	£13,267	£52,349	£10,054
15	29,078	£14,529	£0	£14,529	-£545	£13,985	£66,333	£10,391
16	28,892	£15,303	£0	£15,303	-£561	£14,742	£81,075	£10,739
17	28,707	£16,117	£0	£16,117	-£578	£15,539	£96,614	£11,098
18	28,524	£16,975	£0	£16,975	-£595	£16,380	£112,994	£11,468
19	28,341	£17,878	£0	£17,878	-£613	£17,265	£130,259	£11,851
20	28,160	£18,829	£0	£18,829	-£631	£18,198	£148,457	£12,247
								£99,958

Calculation Data

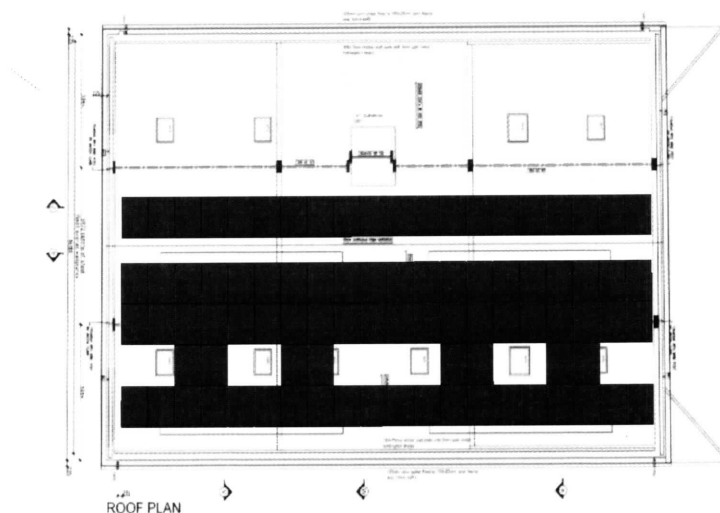
The system performance data is shown on the previous two pages

kWh/ kWp from MCS Guide (Kk):	881
Shade Factor (SF)	1.00
Estimated annual output (kWh)	31813
Assumed output used on site:	85%
Value of displaced electricity (p/kWh):	26.00
Estimated value of export rate (p/kWh):	0
Assumed percentage annual increase in value of displaced electricity and export rate:	6.00%
Assumed panel degradation per annum:	0.70%
Discount factor applied to future cash flows to calculate Net Present Value of investment:	2.00%

Where the Shade factor (SF) is less than 1 shading will be present on your system and will reduce its output to the factor stated. This factor was not calculated using the MCS shading methodology, but we can confirm that the system as quoted, taking into account the shading present, is estimated to deliver the energy as set out in this quote and above performance estimates table.

Option 2: 36.13 kWp solar system plus 6 x Tesla Powerwall battery.

Layout Diagram



Summary Cost / Benefit Analysis

Please note that batteries store excess solar and offer timed grid charging ('charge off-peak, discharge peak'). They may provide power-cut protection. The system is designed for a 10-year lifespan.

System Performance

Array	1	2
PV orientation from south	14°	166°
Inclination of PV panels	30°	30°
Shade %	0%	0%
System capacity (kW)	27.625	8.5
Annual generation (kWh)†	26,824	4,990

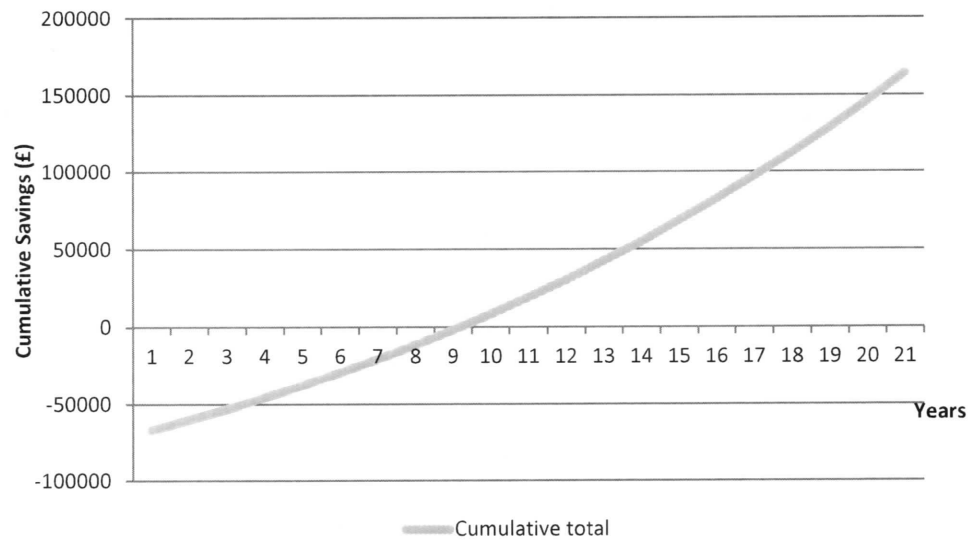
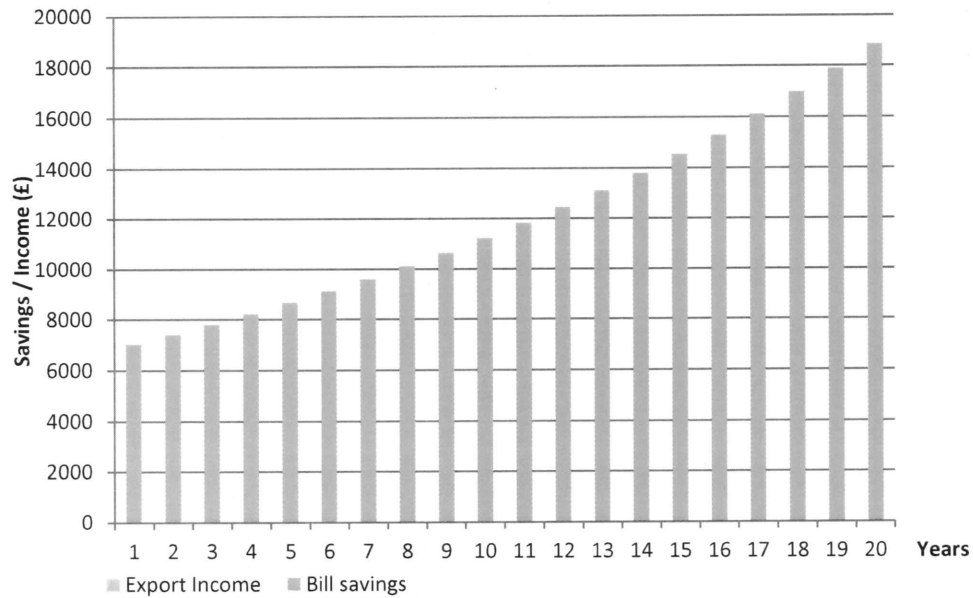
Financial Benefits

System Cost:	
Annual benefits*	£7,031
Payback time for investment:	9 years
IRR% of investment	13%
Net present value of savings(NPV):	
Absolute return on investment (NPV / Purchase cost):	174%

*First year values only. See detailed cash flow for subsequent years.

Performance Charts

The following charts have been created using the DTI guide version 3 in compliance with the MCS.



Cash flow

The table below gives a detailed analysis of the cash flows expected to arise from the investment.

Year	Output (kWh)	Value of Electricity Savings	Export Income	Total Benefits	Running Cost	Savings less maintenance	Cumulative Savings	Present Value of Savings
0						-£66,596	-£66,596	-£66,596
1	31,813	£7,031	£0	£7,031	-£360	£6,671	-£59,925	£6,540
2	31,610	£7,405	£0	£7,405	-£371	£7,034	-£52,891	£6,761
3	31,407	£7,799	£0	£7,799	-£382	£7,417	-£45,474	£6,989
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5	31,007	£8,651	£0	£8,651	-£405	£8,246	-£29,408	£7,469
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8	30,415	£10,107	£0	£10,107	-£443	£9,664	-£1,883	£8,248
9	30,221	£10,645	£0	£10,645	-£456	£10,189	£8,306	£8,526
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11	29,835	£11,808	£0	£11,808	-£484	£11,324	£30,372	£9,108
12	29,644	£12,436	£0	£12,436	-£498	£11,938	£42,310	£9,413
13	29,454	£13,098	£0	£13,098	-£513	£12,585	£54,895	£9,729
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