

13.8kW Solar PV & 40kWh Battery Storage Case Study

A complete home-energy strategy designed around high consumption, large evening demand, resilience and access to low-cost overnight electricity.

13.8kW

SOLAR PV ARRAY

40kWh

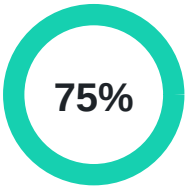
BATTERY STORAGE

75%

ESTIMATED BILL SAVING

7y 7m

ESTIMATED ROI



Estimated annual electricity bill saving
Using solar generation, 40kWh battery storage and low-cost overnight tariff charging.

Estimated ROI: 7 years and 7 months

CUSTOMER PROFILE	High-use domestic property consuming approximately 13,235kWh of electricity each year.
CUSTOMER OBJECTIVES	Materially lower bills, increase energy independence, improve winter performance and retain useful power during outages.
ENGINEERED SYSTEM	13.8kW solar PV array across south- and east-facing slate roof sections, 40kWh battery storage, 12kW single-phase inverter and backup gateway.
INVESTMENT	£36,558 total project cost with a projected 75% annual electricity bill saving.

The opportunity was not simply to install more panels. Green Energy Systems combined generation, storage, tariff optimisation and backup capability into one operating strategy built around how the household actually consumes electricity.

The Customer Challenge

The customer used substantially more electricity than a typical household. A conventional solar-only proposal would have left much of the evening and winter demand exposed to expensive grid electricity.

Reduce annual electricity expenditure materially

Store more solar energy for evening and overnight use

Use low-cost overnight electricity during lower-generation months

Maintain useful system value throughout winter

Provide selected backup power during grid outages

Create capacity for future electrification and EV charging

What Our Analysis Identified

Consumption Timing

A large share of demand occurred outside peak solar hours, so panel capacity alone would not deliver the best financial outcome.

Roof Orientation

South- and east-facing roof sections extend generation across more of the day rather than concentrating output around midday.

Battery Requirement

A small battery would cycle quickly and leave substantial evening demand supplied at peak tariff rates.

EXPERT ENERGY DESIGN

We challenged the idea that solar generation alone should determine the design. The stronger solution was to size storage around evening demand and combine it with a tariff strategy that remains useful in winter.

The Green Energy Systems Strategy

We engineered the installation as a controlled home-energy platform. Each component was selected for its contribution to the customer's stated objectives, rather than treated as an isolated product.

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|-----------|---------------------------------|---|
| 01 | Extend Solar Production | A 13.8kW array across south- and east-facing roof areas captures generation across a broader part of the day. |
| 02 | Store Meaningful Energy | 40kWh of battery capacity stores surplus solar and materially reduces evening and overnight grid imports. |
| 03 | Exploit Off-Peak Tariffs | During winter, the battery can charge during a compatible low-cost overnight window and discharge when electricity is more expensive. |
| 04 | Add Resilience | A backup gateway supports selected household circuits during a grid outage, adding practical resilience as well as financial value. |

How The System Works Through The Year

WINTER OPERATING STRATEGY

When solar generation is lower, the battery is charged with low-cost overnight electricity and used to avoid peak-rate imports during the day. Daytime solar supplements the stored energy.

SUMMER OPERATING STRATEGY

Solar generation becomes the primary energy source. Daytime surplus charges the battery for evening and overnight use, reducing reliance on the grid.

OUR EXPERT INSIGHT

A compatible plug-in hybrid or electric vehicle can open access to tariffs offering an extended low-cost overnight charging period. Used intelligently, that window can benefit both the vehicle and the whole home.

The Outcome

The completed design creates a high-capacity domestic energy system intended to reduce imported electricity, improve resilience and provide a year-round operating strategy.

75%

Estimated Annual Bill Saving

The projected return is driven by the combined value of solar generation, large-scale storage, low-cost overnight charging and reduced peak-rate imports.

Financial, Practical And Strategic Benefits

● Estimated ROI	An estimated return on investment of 7 years and 7 months based on the project assumptions.
● Year-Round Battery Value	Solar-led operation in summer and tariff-led operation in winter.
● Reduced Peak Imports	Stored solar and low-cost overnight electricity replace a substantial share of expensive daytime grid consumption.
● Backup Capability	Selected circuits can remain supported during a grid outage.
● Future-Ready Platform	Capacity to support further electrification, EV charging and changing tariff opportunities.
● High-Capacity Design	The 40kWh battery was sized around real evening and overnight demand rather than a standard package.

We design complete energy systems - not isolated solar installations.

TRUSTED, CERTIFIED AND PROTECTED

MCS Certified Installer | RECC Member | CPA Approved Craftsman | £5m Public Liability | 2-year IBG

REQUEST A DESIGN

Green Energy Systems Ltd

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Figures are project-specific and based on customer usage, tariff strategy, system design and estimated annual savings. Actual savings vary with consumption pattern, tariff, export rate and system operation.