Home Solar Decision Check

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Solar alone, or add a battery?

A worked example for a fictional household near Bristol. The solar resource is modelled from historical PVGIS data; household use, tariffs, equipment and prices are illustrative assumptions.

Decision in this example: solar alone has the shorter simple payback. Adding a battery reduces grid imports further, but its extra savings are small compared with its extra cost. This is a demonstration of the decision method, not a recommendation for your home.

First-year comparison	No installation	Solar only	Solar + battery
Upfront installed budget	GBP 0	GBP 7,600	GBP 11,100
Net variable electricity cost / year	GBP 1,125	GBP 434	GBP 283
Saving vs no installation / year	GBP 0	GBP 691	GBP 842
Simple payback	-	11.0 years	13.2 years
Grid electricity bought / year	4,500 kWh	3,212 kWh	1,921 kWh

The battery must earn its own cost back

Extra installed cost: **GBP 3,500**. Extra saving beyond solar alone: **GBP 151/year**. Incremental simple payback: **23.2 years**.

That long payback does not prove a battery will recover its cost within its service life. Warranty, ageing, replacement and time value of money must be reviewed before purchase.

Net cost = imported electricity cost minus export revenue. Standing charges are excluded equally in all options. No finance costs, maintenance, replacements, subsidies or tariff changes are included.

What this example assumes

Input	Value	Evidence status
Location / roof	Near Bristol; 35-degree south-facing roof; building-integrated mounting	Fictional property and roof
Solar array	4.5 kWp; 14% PVGIS system loss setting	Illustrative design, not a surveyed roof
Solar production	4,362 kWh for 2023	PVGIS model output, not measured or forecast
Household demand	4,500 kWh/year; synthetic hourly profile	Assumption, not a smart-meter export
Electricity prices	Import 25p/kWh; export 12p/kWh	Flat-price assumptions, no live tariff offer
Battery	5.0 kWh usable; 2.5 kW charge/discharge; 90% round-trip efficiency	Assumed AC-coupled equivalent; no brand selected
Operating rule	Store spare solar; discharge to serve household demand	No grid charging, backup or dynamic tariff optimisation

Two fictional quote options, reconciled

Scope	Option A	Option B
Same 4.5 kWp PV scope	GBP 7,600	GBP 7,600
Battery increment	Not included	GBP 3,500
Total payable	GBP 7,600	GBP 11,100
Included for this illustration	Equipment, standard labour and scaffolding	Same PV scope plus battery supply/install
Excluded in both	Roof repairs, abnormal electrical upgrades, future maintenance	Same exclusions

These are invented quote options, with all applicable tax assumed already included for arithmetic. They are not installer offers or a statement of tax eligibility. GBP 7,600 is consistent with a published Energy Saving Trust average, but is not a Bristol price. Battery cost is an unsupported scenario assumption.

Where the electricity goes

Annual energy, kWh	Solar only	Solar + battery
Solar generation	4,362	4,362
Solar used directly	1,288	1,288
Solar sent into battery	0	1,434
Battery delivered to home	0	1,291
Battery conversion losses	0	143
Export to grid	3,075	1,640
Import from grid	3,212	1,921

Why storing a kWh is not worth the full import price

A kWh put into the battery could otherwise have been exported. At 90% round-trip efficiency, its extra value in this example is 0.90 x GBP 0.25 - GBP 0.12 = **GBP 0.105 per kWh charged**, before ageing or maintenance. The calculation deducts this lost export income.

Sensitivity: one assumption changed at a time

Illustrative assumption	PV saving/year	Extra battery saving/year	Battery payback
Import 20p/kWh	GBP 627	GBP 86	40.7 years
Base	GBP 691	GBP 151	23.2 years
Import 30p/kWh	GBP 755	GBP 215	16.3 years
Export 18p/kWh	GBP 875	GBP 65	54.2 years
PV GBP 6,000; battery +2,500	GBP 691	GBP 151	16.6 years

These scenarios are not confidence intervals. Real demand timing, shading, export limits and future prices can change the outcome. This example does not establish a best battery size.

How to use this review

Before committing to an installer

• Obtain matched solar-only and solar-plus-battery cash prices. Check scaffolding, electrical upgrades, roof work and export restrictions.

• Confirm the actual import and eligible export tariff. If the offer relies on cheap overnight charging or dynamic prices, this model is outside scope.

• Supply a full year of interval consumption if possible. If only annual totals are available, the battery result must stay conditional on several assumed demand profiles.

• Ask the installer to survey roof condition, shading and mounting, and confirm equipment, warranties and network requirements. This report does not replace those checks.

What is calculated and what is manual

Calculated: interval electricity balance, battery limits and losses, flat-tariff bills, savings, simple payback and sensitivity tables.
Manual: checking your files, interpreting the roof information, reconciling up to two quotes, verifying source assumptions, checking the results and writing the decision summary.

Method and limits

PVGIS hourly power for calendar 2023 is converted from W to kWh over one-hour intervals. SARAH3 HH:10 labels are assigned to the matching HH:00 bin without interpolation; this approximation can affect coincidence. Synthetic consumption is aligned to those bins, not measured alongside the solar series. Battery state of charge is cyclic and bounded, with charge/discharge power limits. No free initial energy is counted. Demand is not calibrated to an English household sample.

The model excludes finance, inflation, discounting, degradation, replacement, tax incentives and incremental maintenance. It is a first-year comparison, not a whole-life investment appraisal. The weather year is illustrative, not a typical-year guarantee. Hourly aggregation can overestimate direct use compared with finer measurements.

Sources and audit trail

PVGIS / European Commission: re.jrc.ec.europa.eu/pvg_tools/en/
API v5.3: lat 51.45, lon -2.58; 2023; peakpower 4.5; loss 14; angle 35; aspect 0; mountingplace building. Raw output retained in delivery pack.
Energy Saving Trust cost reference: energysavingtrust.org.uk/advice/solar-panels/
Retrieved 9 November 2026. All other household, price and equipment inputs above are demonstration assumptions.

Proposed pilot service

England only. GBP 79 total pilot price per home; up to two quotes; five working days after complete data are accepted; one written clarification. Scope and service terms are confirmed in writing before payment. Delivery starts after complete-file acceptance, confirmed payment and the agreed permitted start date. Tramevolt is a project name used by Alae Rokhou in Morocco, not a claimed incorporated company. No technical certification, installation design or guaranteed saving is provided.