AUGUST 2026 CASE STUDY

Home Energy Arbitrage with a Sigenergy DC-Coupled System

A worked example showing how cheap overnight electricity, battery storage, EV bidirectional charging and a variable export tariff can create a positive energy spread.

MODELLED AUGUST ARBITRAGE OUTCOME

~£160 gross margin

Using the working estimate of 1.269 MWh of grid-derived export, a 4.99p/kWh overnight import rate, an achieved 17.98p/kWh average export price, and 93% round-trip efficiency.

1.27 MWh
working estimate of arbitrage export

17.98p
actual average August export price

4.99p
overnight import price

1.745 MWh
Grid electricity imported in August

1.650 MWh
Grid electricity exported in August

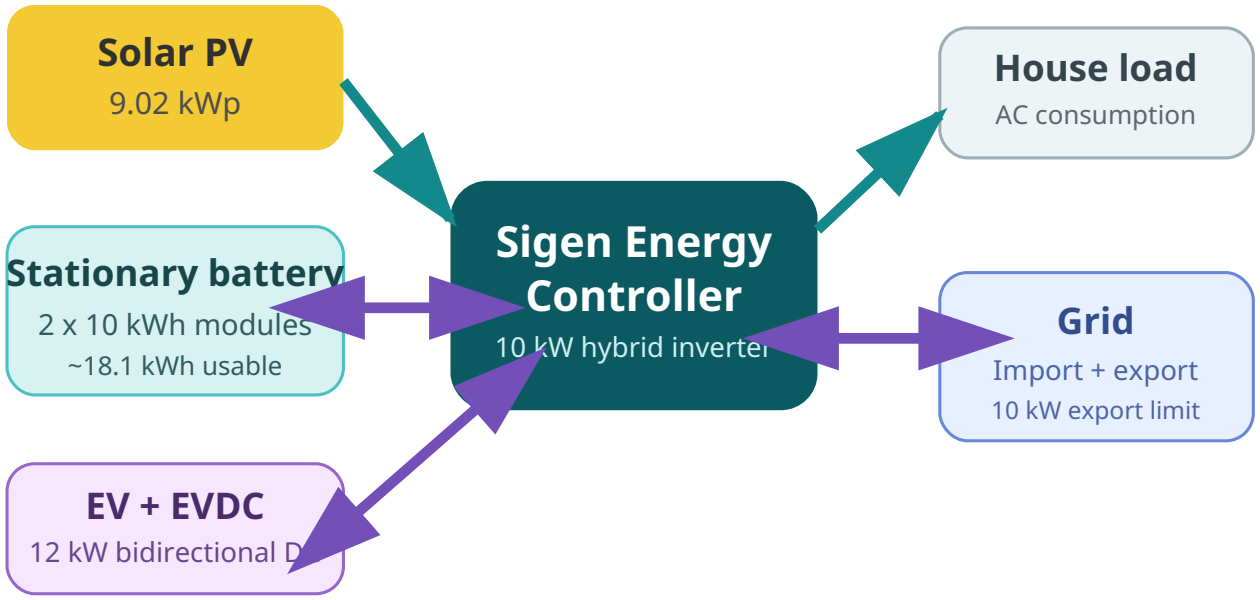
£189.86
Net electricity cash position: export income minus import bill

Important: the £160 figure is an analytical estimate of the arbitrage component, not a separately metered figure. The hard minimum is lower because the available monthly data does not identify the source of every exported half-hour.

1. THE SYSTEM

Equipment and energy architecture

The installation combines solar PV, stationary battery storage and a bidirectional EV connection around a common Sigenergy power-conversion platform. That makes it possible to buy electricity when it is cheap, store it, and export later when the export price is higher.



Why the DC coupling matters

The EV can exchange energy with the system's DC side rather than behaving only as a conventional AC car charger. A simplified export path is **EV battery DC -> DC bus -> inverter -> AC grid**.

Efficiency assumption used here

For modelling, this report uses about **96% one-way EV-to-grid** and roughly **93% full grid-to-EV-to-grid round trip**. These are working estimates, not independently metered test results.

System configuration used for this case study

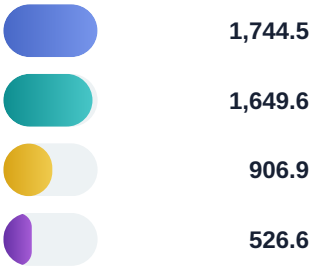
2. AUGUST EVIDENCE

What the system actually did

METRIC	AUGUST 2026
Grid import	**1,744.52 kWh**
Grid export	**1,649.55 kWh**
Solar generation	**906.94 kWh**
House load	**526.60 kWh**
Stationary battery charged	**793.41 kWh**
Stationary battery discharged	**761.03 kWh**
EVDC charged	**~1,390 kWh**
EVDC discharged	**953.84 kWh**
Import bill	**£106.73**
Export income	**£296.59**

Cross-check: the Sigenergy app showed about 1.74 MWh imported and 1.64 MWh exported, closely matching the supplier meter totals.

Energy volumes



Financial result

£296.59
export income

£106.73
import bill, including standing charge

+£189.86
net electricity cash position for the month

17.98p
actual average received per exported kWh

4.99p
cheap-rate import price, 00:30-05:30

~99%
of August import inferred to have landed in the cheap window

Measured monthly totals; prices from the owner's tariff and supplier app

How much of the export was bought cheap and sold later?

Monthly totals cannot trace the origin of every exported kWh. The cleanest way to present the result is therefore as a **provable lower bound** plus a **working estimate** based on a stated assumption.

Hard lower bound

742.61 kWh

Export exceeded the entire month's solar generation by this amount.

→

Working estimate

1,269.21 kWh

Assumes monthly solar first covers the 526.6 kWh house load, leaving 380.34 kWh of solar available for export.

Lower-bound calculation

```
1,649.55 kWh export - 906.94 kWh solar = 742.61 kWh
```

Even if every solar kWh had been exported, at least 742.61 kWh of export must have come from some non-solar source or from energy already stored at the start of the month.

Working-estimate calculation

```
Solar surplus after house load = 906.94 - 526.60 = 380.34 kWh

1,649.55 kWh export - 380.34 kWh solar surplus = 1,269.21 kWh
```

Why this is an estimate: the monthly figures do not show half-hourly source attribution or opening/closing EV and stationary-battery state of charge. Solar could also be exported while stored grid energy supplies the house. A definitive figure would require half-hourly import/export plus device-level charge/discharge and state-of-charge data.

Useful interpretation

August demonstrates at least ~0.74 MWh of storage/grid-driven export and supports a practical working estimate around ~1.27 MWh.

The report uses the 1.27 MWh figure for the financial worked example, while keeping the lower bound visible so the uncertainty is clear.

What the August arbitrage was worth

The basic economics are simple: buy energy at a low import price, accept conversion losses while storing and returning it, then sell the delivered kWh at a higher export price.

Working arbitrage export	**1,269.21 kWh**
Round-trip efficiency assumption	**93%**
Input energy required	**1,364.74 kWh**
Cheap import price	**4.99p/kWh**
Estimated charging cost	**£68.10**
Achieved average export price	**17.98p/kWh**
Revenue attributable to export	**£228.20**
Modelled gross arbitrage margin	**£160.10**

Gross margin excludes battery/EV degradation, financing, hardware cost, taxes and any tariff-specific restrictions.

The key formula

```
Gross margin = (exported kWh x
export rate) - ((exported kWh /
efficiency) x import rate)
```

The export rate does not need to be enormous. The economics become powerful when the import rate is very low, the spread is repeated often, and the system can move a large volume of energy.

Conservative range from the same month

Using the 742.61 kWh lower bound	**~£93.68**
Using the 1,269.21 kWh working estimate	**~£160.10**

Efficiency sensitivity

ROUND-TRIP EFFICIENCY	INPUT NEEDED FOR 1,269.21 KWH EXPORT	IMPORT COST @ 4.99P	GROSS MARGIN
90%	**1,410.23 kWh**	**£70.37**	**£157.84**
93% (used)	**1,364.74 kWh**	**£68.10**	**£160.10**
95%	**1,336.01 kWh**	**£66.67**	**£161.54**

Scale matters: this household exported almost 1.65 MWh in one month. A smaller battery can use the same principle, but the £ return scales roughly with the number of kWh that can be cycled through a profitable spread.

A practical template for another household

What is needed

1. **A time-of-use import tariff**
   Cheap periods must be low enough to leave room for losses and still beat the export price.
2. **Storage that can grid-charge and export**
   A home battery is sufficient. A bidirectional EV can add much more capacity where supported.
3. **An export tariff that permits the intended behaviour**
   Supplier rules differ; some SEG arrangements are aimed at renewable generation rather than deliberate grid-to-battery-to-grid trading.
4. **Smart metering and export permission**
   The installation must be metered correctly and stay within the DNO/export limit.
5. **Automation**
   The best results usually come from scheduling cheap charging and targeting the strongest export periods consistently.

Illustrative 10 kWh/day example

Import: 5p/kWh
Export: 18p/kWh
Round trip: 90%
Delivered export: 10 kWh/day

```
Energy bought = 10 / 0.90 = 11.11 kWh
Charging cost = 11.11 x £0.05 = £0.56
Export income = 10 x £0.18 = £1.80

Gross margin = £1.24/day
```

~£454/year if an equivalent profitable cycle were available every day.

This is an illustrative gross figure, not a forecast. Real spreads, availability, degradation and tariff rules vary.

How export price changes the result

IMPORT	EXPORT	EFFICIENCY	GROSS MARGIN PER 10 KWH EXPORTED
5p	12p	90%	**£0.64**
5p	15p	90%	**£0.94**
5p	18p	90%	**£1.24**
5p	25p	90%	**£1.94**

Before copying the strategy: check the battery and EV warranty, allowed cycle behaviour, supplier/export terms, DNO export limit, smart-meter configuration, and the effect of battery degradation. Dynamic export prices can also fall sharply, so automation should be able to skip uneconomic cycles.

Bottom line from this case study

The opportunity comes from the spread, not from solar alone. Solar improves the overall economics, while storage allows cheap overnight grid energy to be shifted into higher-value export periods.