

FT Energy

— Solar PV detailed analysis.



System assumptions

- PV production: 6,000 kWh / year (16 panels facing south)
<https://www.ftenergy.ie/solar-calculator>
 - Electricity day price: €0.27 / kWh
 - Electricity night price: €0.13 / kWh → day–night delta = €0.14 / kWh
 - Export price: €0.20 / kWh
 - Battery round-trip efficiency: 90% (10% loss) — stated and applied
 - Load-shifting available assumption: 70% of battery capacity (conservative)
 - Solar full-charge days used for battery: 300 days/year
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Step 1 — Baseline PV (no battery) — fixed baseline

(These numbers show PV value without a battery and remain the reference.)

- Self-consumed (25% baseline): $6,000 \times 25\% = 1,500 \text{ kWh} \rightarrow 1,500 \times €0.27 = €405$
 - Exported (75%): $6,000 - 1,500 = 4,500 \text{ kWh} \rightarrow 4,500 \times €0.20 = €900$
 - Baseline PV value (no battery) = $€405 + €900 = €1,305$ / year
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Step 2 — PV + Battery (self-consumption increases to 50%)

- Self-consumed (50%): $6,000 \times 50\% = 3,000 \text{ kWh} \rightarrow 3,000 \times €0.27 = €810$
- Exported (50%): $6,000 - 3,000 = 3,000 \text{ kWh} \rightarrow 3,000 \times €0.20 = €600$

Load-shifting (conservative 70% of usable battery capacity, using 90% efficiency):

- 5 kWh battery: usable = $5 \times 0.90 = 4.5 \text{ kWh/day} \rightarrow 70\% = 3.15 \text{ kWh/day} \rightarrow$
annual $3.15 \times 365 = 1,149.75 \text{ kWh} \rightarrow \times €0.14 = €160.97$ / yr
- 10 kWh battery: usable = $10 \times 0.90 = 9.0 \text{ kWh/day} \rightarrow 70\% = 6.3 \text{ kWh/day} \rightarrow$
annual $6.3 \times 365 = 2,299.50 \text{ kWh} \rightarrow \times €0.14 = €321.93$ / yr

Total Value (Self-consumption + Export + Load-shifting):

Battery Size Self-Consumed (€) Export (€) Load-shift (€) Total Value (€ / yr)

5 kWh €810 €600 €160.97 €1,570.97

10 kWh €810 €600 €321.93 €1,731.93

Note: Total Value = Self-consumption value + Export income + Load-shifting benefit.

Step 3 — Increase vs baseline (how much extra the battery brings)

- **Baseline (no battery): €1,305 / yr**
- **With battery totals:**
 - **5 kWh: €1,570.97 → Increase = €1,570.97 – €1,305 = €265.97 / yr**
 - **10 kWh: €1,731.93 → Increase = €1,731.93 – €1,305 = €426.93 / yr**

Explanation: these increases reflect (a) higher self-consumption (50% vs baseline 25%) which reduces exports and grid imports, and (b) the load-shifting benefit of using stored energy at higher day rates.

Step 4 — System cost & payback (PV + battery)

- **PV system cost (no battery): €7,500**
- **Battery costs: 5 kWh = €1,800, 10 kWh = €3,400**

Total investment and payback:

Battery Size	Total Investment (€)	Total Annual Value (€)	Payback (yrs)
5 kWh	€7,500 + €1,800 = €9,300	€1,570.97	9,300 ÷ 1,570.97 ≈ 5.92 yrs
10 kWh	€7,500 + €3,400 = €10,900	€1,731.93	10,900 ÷ 1,731.93 ≈ 6.29 yrs

- **With battery and self-consumption=50%, total system value becomes: €1,570.97 / yr (5 kWh) or €1,731.93 / yr (10 kWh).**
- **The battery therefore adds €266 / yr (5 kWh) or €427 / yr (10 kWh) above baseline.**

- **Example payback (PV + battery): roughly 5.9 years (5 kWh) or 6.3 years (10 kWh) under these assumptions.**
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Notes & caveats

70% load-shift is a conservative, “mild” estimate. If the battery can cycle more than once per day (depending on solar profile & demand), the load-shift benefit can be larger.

- **Battery efficiency = 90% is applied to usable battery energy (i.e., losses are accounted for).**
- **Export income reduces when battery is fitted because stored PV replaces exported kWh — this is shown above (export falls from baseline 4,500 kWh to 3,000 kWh).**
- **All figures are estimates — actual results depend on consumption timing, real PV production profile, inverter controls, weather, and future tariff changes.**