

Case study: a hybrid plant in Hat Yai that produces more than enough energy for its shop

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Summary

The plant is working well. Its 12×580 W panels (6.96 kWp) produce more than enough energy for the shop's consumption, at about 3.4 kWh per kWp per day. Since the battery was added on 18 May 2026, the shop has covered 98% of its own electricity.

The inverter settings checked on 18 Oct 2026 suit the site. The main point to check is the array itself: its midday output and string voltage are lower than 12 such panels should give, which a site check could improve. Other points are using the midday surplus, the battery's energy readings, the inverter's temperature and the monitoring records.

Plant at a glance

Review of all monitoring data from commissioning on 29 Jan 2026 to 17 Oct 2026 (262 days), from SolisCloud.

Item	Value
Location	Hat Yai, Songkhla
PV array	12×580 W panels on MPPT1 = 6.96 kWp
Inverter	Solis S6-EH3P10K hybrid, 10 kW, three-phase; MPPT2 unused
Battery	One 48 V battery, added 18 May 2026
Total production	6,230 kWh (about 3.4 kWh per kWp per day)
Best day	36 kWh (25 Mar 2026), about 5.2 kWh per kWp
Total consumption	6,183 kWh (about 22–23 kWh/day)
Self-sufficiency since battery	98% (grid purchase 0.5 kWh/day, was 12.4)
Active alarms	None

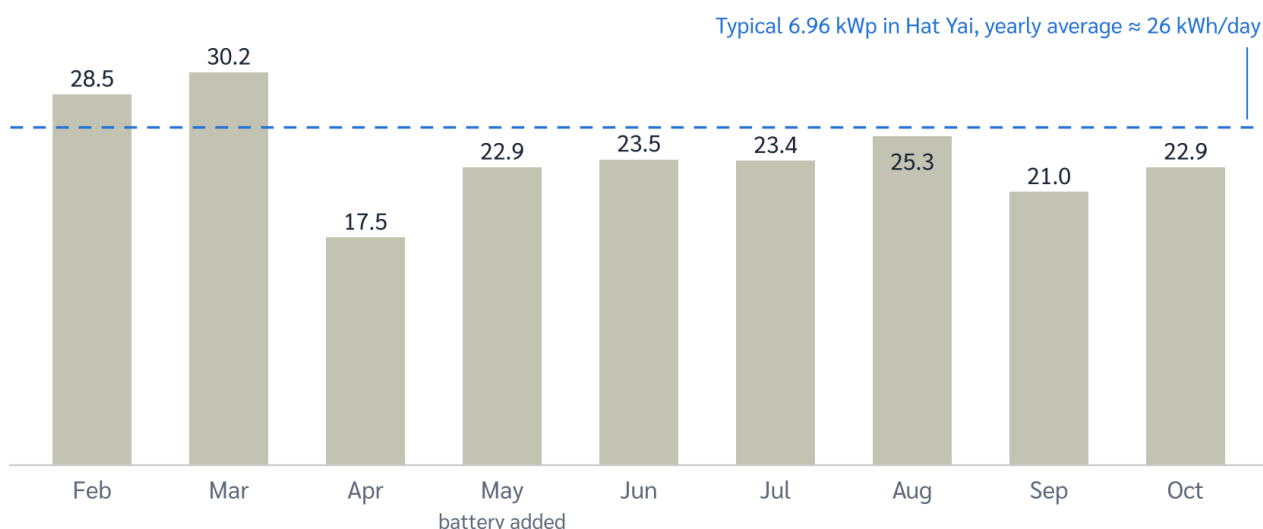
Inverter settings checked on 18 Oct 2026

Setting	Value	Comment
Storage mode	Self Use	Correct for this site
Unbalance Output	ON	Good: the shop's load sits mainly on L1 and L3
Allow Grid Charge	Enable	The battery may charge from the grid
Grid code	PEA	Correct for Thailand (read from the inverter)

Monthly performance

Production is about 92% of a typical 6.96 kWp plant, higher in the dry season

Average 23.9 kWh/day, Feb–Oct 2026, against about 26 kWh/day for a typical 6.96 kWp plant · unit: kWh per day



Source: SolisCloud daily totals, Feb–Oct 2026 (Oct = 1–17 Oct). The typical value is an approximate yearly average.

Production averages about 92% of a typical 6.96 kWp plant: above it in the dry season, below it in the monsoon months. On sunny days the battery is full by early afternoon.

Findings

1. String voltage and midday output are lower than expected

At midday on sunny October days the array delivers 4.6–5.3 kW, which is 66–76% of 6.96 kWp; 75–85% is usual in the heat. The string voltage is about 360 V at midday. Typical 580 W panels (about 42–44 V each) would put 12 in series at roughly 430–460 V. Part of the array may not be contributing fully, for example a panel with a failed bypass diode, a shaded or damaged panel, or a wiring fault. A site check could recover up to about 15% more production.

2. More energy than the shop uses

On sunny days the battery is full by early afternoon and the panels produce about 3 kWh a day more than the shop uses. Moving heavy loads to midday would put that surplus to work.

3. Battery energy counters do not add up

Since May the battery shows 1,832 kWh discharged but only 1,526 kWh charged. A battery cannot give out more than it takes in, so its readings are wrong. SolisCloud lists the battery maker as "OTHER". If the inverter misreads the battery's charge level, the battery can be over-discharged or never fully charged.

4. Steady overnight load

The shop draws about 0.7 kW all night, every night: about 8–9 kWh, close to 40% of daily use. Every 0.3 kW cut saves about 2.6 kWh of battery each night.

5. Inverter runs hot

The inverter's internal temperature was 58 °C at 2 kW and 58.3 °C at 3.3 kW (18 Oct 2026, 11:37 and 13:30). Inverters reduce output when they get too hot.

6. Monitoring records are incomplete

The plant capacity is set to 5.8 kWp instead of 6.96 kWp, and the number and wattage of the panels are not entered. No purchase tariff is set and every kWh produced is valued at a flat 4.7 THB, so the earnings shown in the app are not meaningful.

Recommended actions

Priority	Action	Expected benefit
1	Site check of the array: measure the string's open-circuit voltage and current, scan the panels with a thermal camera for hot spots or failed bypass diodes, and check connectors and shading	Up to about 15% more production
2	Move heavy loads to midday, once the battery is full	About 3 kWh a day more used on site
3	Check the battery brand setting and the battery-to-inverter communication; recalibrate the charge level	Correct charge readings and longer battery life
4	List what runs overnight and switch off what isn't needed	About 2.6 kWh of battery saved per night for each 0.3 kW cut
5	Check the inverter's ventilation and shading from direct sun	Avoids output cuts on hot days
6	Set the capacity to 6.96 kWp and enter the panel data (12 × 580 W) and the purchase tariff in SolisCloud	Correct earnings and performance figures

Notes on the data

- Source: SolisCloud daily totals since 29 Jan 2026, 5-minute inverter data for 1, 17 and 18 Oct 2026, and the inverter settings as shown in SolisCloud on 18 Oct 2026. No settings were changed.
- Array: 12 × 580 W panels, as advised. Expected open-circuit voltage for 12 in series is about 600 V at 25 °C, depending on the panel model. Typical values (about 26 kWh/day for 6.96 kWp) are approximate yearly averages for southern Thailand, not a site-specific simulation.
- Prepared by Solar ESS from remote monitoring only; findings 1, 3 and 5 should be confirmed on site.