FREE SAMPLE · THE OFF-GRID WORKSHOP

# Solar Load Audit Worksheet

Every off-grid solar design starts with one number: how much energy you use per day. Get it wrong and every later decision, from panels to batteries to inverter, inherits the error. This free sample gives you the load-audit method and a printable worksheet.

```
Daily Wh (one appliance) = Qty × Running W × Hours/day × Days/week ÷ 7
Daily total = sum of all appliances + inverter standby (W × hours switched on)
```

## Two numbers, two jobs

- **Energy (Wh per day)** sizes the solar array and battery bank.
- **Power (W)** of loads running together, plus the biggest motor start, sizes the inverter.

Keep them separate. A 1,500 W microwave used for 15 minutes adds only 375 Wh to your day, but it adds 1,500 W to the inverter load while it runs.

## Next steps

Use the free calculator at **theoffgridworkshop.com/guides/solar-sizing** for a first estimate. The full **Off-Grid Solar Sizing Workbook** takes this audit through month-by-month sun hours, array, battery layout, inverter surge and DC current, cold-weather string voltage and cable voltage drop, with a worked example and printable worksheets: **theoffgridworkshop.com/shop/solar-sizing-workbook**

> Planning information only. Follow equipment manuals and your local electrical code, and use a qualified, licensed electrician where required.

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STEP 1 · SHEET 1

# The load audit

Energy is power multiplied by time. A 100 W lamp on for 3 hours uses 300 Wh. A 1,500 W microwave used for 15 minutes uses 375 Wh. Both numbers matter, for different parts of the design.

## Filling in each row

- **AC / DC.** AC appliances run through the inverter. DC appliances run straight from the battery (often 12 V lighting, pumps, fridges and routers). This decides which loads count toward the inverter.
- **Running W.** Use the input power. Microwaves are a common trap: the label's cooking power (for example 1,000 W) is lower than the input power drawn from the supply (often around 1,400 to 1,600 W).
- **Hours per day and days per week.** Average them honestly. A washing machine used twice a week is 2 days, not 7.
- **Measured Wh/day.** For anything that cycles on and off, such as fridges, freezers and pumps on a pressure switch, a plug-in energy meter left in place for 48 hours or more gives a far better figure than label watts. Daily Wh = recorded kWh × 1,000 × 24 ÷ hours observed. If you enter a value here it overrides the estimate for that row.
- **Startup W.** Motors and compressors draw several times their running power for a moment. Take it from the manual or the maker's support line where possible. The sheet assumes one motor starts at a time and adds the largest start to the loads already running.
- **Same time? (Y/N).** Mark Y for loads that could realistically run together. This is the inverter's continuous load, so be realistic rather than optimistic.
- **Essential? (Y/N).** Mark what must keep running in a long cloudy spell. The sheet totals these separately, and you can size the whole system for essential loads only.
- **Source.** Measured, Label or Estimate. The sheet counts estimates so you know how firm the total is.

## Do not forget standby

An inverter that stays switched on draws power even with nothing plugged in. The data sheet calls this no-load or zero-load power. At 25 W for 24 hours it adds 600 Wh/day, which can be more than all your lighting. The sheet adds it to the daily total.

**Volts × amps is not always watts.** For AC appliances, a plate rating in volts and amps gives volt-amperes (VA), which can be higher than real watts. Use a watt rating or a measurement for energy; keep the VA figure in mind for inverter sizing.

PRINTABLE WORKSHEET 1 OF 3

# Load audit

Project: _____ Date: _____ Source key: M = measured, L = label, E = estimate

| Appliance | AC/DC | Qty | Running W | Hours /day | Days /week | Wh/day | Startup W | Same time? Y/N | Essential? Y/N | M/L/E |
|---|---|---|---|---|---|---|---|---|---|---|
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Wh/day = Qty × W × Hours × Days ÷ 7 (or a measured figure)

Inverter standby: _____ W × _____ h = _____ Wh/day

Total daily energy: _____ Wh/day

Simultaneous AC running: _____ W

Largest extra startup: _____ W