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Sizing a Solar System for a Zimbabwean Home

Methodical walkthrough of sizing PV, battery, and inverter capacity for a typical Zimbabwean household, accounting for grid outages, geyser loads, and daily sun-hours.

Intermediate | 30 min | Solar Power | Jun 26, 2026 | blitztechelectronics.co.zw/learn/sizing-solar-system-for-zimbabwean-home/

Solar sizing is where most installations go wrong before the first panel is mounted. Under-sized = your fridge dies during a long grid outage. Over-sized = you spent $3,000 you didn't need. Right-sized = lights, fridge, TV, WiFi, and one fan run 24/7 through any outage, and you can boil a kettle when there's sun. This guide covers the calculations end-to-end.

1 Step 1. Audit your daily energy use

List every appliance that needs to run during a grid outage. Multiply each appliance's wattage by the hours per day it runs. Sum the watt-hours.

Realistic example for a 4-bedroom Harare home:

- 5× LED bulbs × 9 W × 5 h = 225 Wh

- Fridge, 100 W average × 12 h compressor duty = 1,200 Wh

- TV, 80 W × 4 h = 320 Wh

- WiFi router, 12 W × 24 h = 288 Wh

- Phones + laptops, 200 Wh

- 2× fans, 50 W × 6 h × 2 = 600 Wh

Total: ~2,800 Wh/day

Geyser, AC, and electric stove are deliberately excluded, those are very large loads that should run on grid or have separate solar sizing.

2 Step 2. Size the PV array

Zimbabwe averages 5.5 sun-hours / day. PV array Wp = daily energy / sun-hours / 0.8 (system losses).

Worked: 2,800 Wh / 5.5 / 0.8 = **636 Wp**, round up to 800 Wp (e.g. 2× 400 W panels).

Add 30% headroom for cloudy days: round to **1 kWp** (3× 330 W or 2× 540 W panels). Cost roughly $300-450 in panels alone.

3 Step 3. Size the battery

ZESA outages in 2024-2025 commonly lasted 8-14 hours. Plan for 24 h backup minimum.

Battery capacity (Ah at 12 V) = daily energy ÷ system voltage ÷ depth-of-discharge.

Lithium (LiFePO4, 80% DoD): 2,800 ÷ 12 ÷ 0.8 = **292 Ah at 12 V** (or **146 Ah at 24 V**, or **73 Ah at 48 V**). A 100 Ah 48 V LiFePO4 (≈ 5 kWh usable) is a clean fit and costs roughly $900-1,200.

Lead-acid (50% DoD): you need almost twice the rated capacity, plus shorter cycle life. We rarely recommend lead-acid anymore unless budget is the absolute constraint.

4 Step 4. Size the inverter

Inverter continuous rating should cover the largest simultaneous load. Add up the wattages of everything that might run at the same time. For the example above the peak is fridge + TV + WiFi + 2 fans + some lights = ~400 W continuous. A 1 kW pure-sine inverter is plenty.

If you want a kettle / iron / microwave on solar, jump to a 3 kW hybrid inverter with MPPT charge controller built in, this also lets you run grid-tied when ZESA is up.

5 Real-world BlitzTech installation

Our 5 kW installation in Ridgemount Heights, Gweru uses:

- 12× 410 W panels (4.92 kWp)

- 10 kWh LiFePO4 battery bank (48 V, 200 Ah)

- 5 kW hybrid inverter with MPPT, grid-feed-in capability

Total cost (panels + battery + inverter + balance-of-system + installation): ~$6,800.

Payback at current Zimbabwe electricity rates + outage frequency: ~3.5 years.

See the [Solar 5 kW Gweru case study](/case-studies/solar-5kw-gweru-ridgemount-heights/) for the full system breakdown.