



HOW TO BEAT LOAD-SHEDDING

Is frequent load-shedding leaving you in the dark? This guide provides some easy and affordable ideas to protect your home.



DO THE CHEAP AND EASY THINGS FIRST

1. Check the [load-shedding schedule](#) to plan your electricity usage. Download the [City of Cape Town's app](#) to get the latest information.
2. Charge essential appliances before load-shedding and if possible, make sure cellphones and laptops have sufficient battery life.
3. Buy a solar cellphone charger (about R300), a car phone charger, or a cellphone power bank.
4. Buy a small gas cooker if you don't already cook with gas. A small portable cooker can cost you R300 - R600. Make sure that the gas cooker meets safety standards.

5. Buy rechargeable lights (about R200 - R300). They last for up to 10 hours when fully charged. Light bulbs with built-in batteries are now available. They fit into normal fittings and can last between 2 and 5 hours.
6. Switch off your lights and sensitive equipment during load-shedding to prevent damage from a power surge when the power comes back on.
7. Use a surge protector plug for your television, computer or laptop and fridge to protect your appliances when the power comes back on. Depending on the number of sockets, these cost R100 - R400.

RESEARCH WAYS TO "LOAD-SHED PROOF" YOUR HOUSE

Calculate the daily minimum amount of electricity needed for the household. Do you need the wifi/internet, lights, fridge and TV on? Or only the wifi/internet and TV?

You can then find out how much electricity each appliance needs.

- With lights, identify the wattage of your lights (it is usually printed on the globe itself).
- With appliances, find the labels on the appliance that state the power usage in watts.

Note: Kettles and electric stoves have high power ratings which means they use a lot of electricity over a short period of time, so it's best not to include these.

If in your budget, you can rather use a gas stove to cook your food and heat water. Make sure your gas stove is installed by a qualified person and that you receive a CoC. An insulation cooker is a good way to retain heat and continue cooking even after the power has gone. If you have an electric geyser, it is best to exclude it from your calculation, as it uses a lot of electricity.

Now that you know how much power you will need, find out what the different options will cost you.

BATTERY BACKUP SYSTEM

Load-shedding can last for between two and four hours at a time. Therefore, an ideal battery system capacity of five hours should be sufficient. A battery backup system consists of the following components:

UNINTERRUPTED POWER SUPPLY (UPS)

Provides temporary power and surge protection to switch over to an alternative power supply such as a battery.



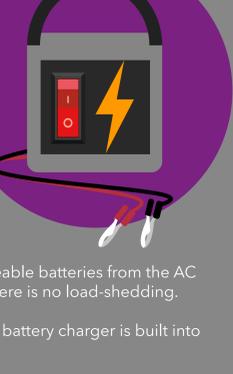
BATTERY

Stores the electrical power for later use. There are two kinds of batteries:

- Lithium-ion (Li-ion) batteries have a high upfront cost but are highly efficient and last longer.
- Lead acid batteries are relatively inexpensive but the more they are used, the shorter their lifespan.

Note: Lead acid batteries generally cannot discharge as deeply as Lithium-ion batteries; this means you will require more lead acid batteries to power the same load as that of a lithium-based battery system.

BATTERY CHARGER

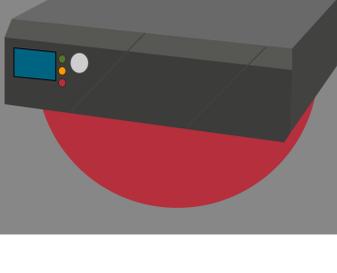


Charges the rechargeable batteries from the AC mains power while there is no load-shedding.

Note: Sometimes the battery charger is built into the inverter.

INVERTER

Converts the DC battery power into usable AC power during load-shedding.



COMPLIANCE REQUIREMENT

If your battery system is a stand-alone appliance that you plug devices into, there are no compliance requirements.

If your battery system (including inverter) is interconnected with the wiring of your house, it must be authorised via the municipality's small-scale embedded generation (SSEG) process to ensure it is safe and legal. Use an inverter approved by the City of Cape Town and signed off by the appropriate professional.

The size of the battery system will depend on the equipment to be powered during load-shedding.

A qualified electrician can install the battery and connect it to certain circuits, so that only some items are powered during load-shedding.

Alternatively, you can buy a stand-alone uninterruptible power supply (UPS) backup battery system, which allows you to plug in one or more items (similar to a generator).

CHOOSING BETWEEN A BATTERY BACKUP AND DIESEL GENERATOR

In the long term, it may be better to invest in battery backup or a solar PV battery hybrid system, rather than investing in a generator.

Although a generator may cost less initially, it requires diesel to operate and creates air and noise pollution. Remember that you may not have more than 20 litres of fuel for your generator on your premises. This fuel should be locked in a separate area and you must have a fire extinguisher of at least 4.5 kg on the premises.

Generators that are interconnected with the wiring of your house must be authorised as a standby generator via the following

<https://www.capetown.gov.za/City-Connect/Apply/Municipal-services/Electricity/Apply-for-a-standby-generator/Apply%20for%20a%20standby%20generator>

BATTERY BACKUP AND ELECTRICAL INSTALLATIONS

The table below includes a summary of some plug-and-play battery backup options (1 and 2) as well as battery backup electrical installation options (3,4 and 5). See 'key notes' for additional details and useful tips.

Option	Price	Inverter	Battery				Average load		Appliances supplied	Notes
			kVA	Type	Ah	V	Energy (kWh)	2.5hrs Off		
1.1. WiFi only	R800 - R1 500	DC-DC	Lithium-based	7.2	12	0.0864	29W	15W	WiFi router	Specifically for WiFi router backup only.
1.2. WiFi only	R1 000 - R1 500	0.85	Lead acid	7.2	12	0.0864	17W	9W	WiFi router	Mainly used as a PC safe shutdown device.
2.1. Plug-and-play	R8 000 - R10 000 (package deal)	1.2	Lead acid	100	12	1.2	240W	120W	Can supply an office laptop charger and WiFi router.	Generally, only suitable for stage 1 load-shedding. 1 kVA may not be powerful/fast enough to recharge batteries for additional load-shedding stages. These are typically plug-and-play trolley solutions.
2.2. Plug-and-play	R13 000 - R17 000 (package deal)	2.4	Lead acid	100	12X2	2.4	480W	240W	WiFi router, DSTV and LED TV.	
3.1. Key appliances	R20 000 - R30 000	3	Lead acid	200	12X2	4.8	960W	480W	Appliances listed in 2.2 + some lights and fridge/freezer.	Options from 3.1 onwards, generally are not portable and require a qualified electrician's approval for the electrical installation. Lithium is usually more expensive than lead acid batteries but has a longer lifespan.
3.2. Key appliances	R20 000 - R30 000	3	Lithium-based	200	12	2.4	816W	408W	Can power slightly less than 3.1 above.	
4. Average home	R50 000 - R75 000	5	Lithium-based	100	48	4.8	1632W	816W	Can power a typical 2-bedroom home, excluding high power devices.	For systems at this price or above, it is generally preferred to consider lithium-based batteries due to their longer lifespan.
5. Large home	R90 000 - R105 000	5	Lithium-based	100	48X2	9.6	3264W	1632W	Can power a larger home; still best to exclude high power appliances.	This system has 9.6kWh of stored energy so will cover multiple stages of load-shedding depending on load.

SOLAR PV AND BATTERIES

The table below includes a summary of Grid-tied Hybrid solar PV options. All solar PV systems connected to the building's wiring must use City-approved inverters, have professional sign-off and be authorised by the City of Cape Town as per CCT SSEG Requirements.

See 'key notes' for additional details and useful tips. The systems proposed here assume all solar PV energy is either consumed or stored by the customer's battery, hence no export or feed-in values are factored into the payback period.

Please note, a grid-tied solar PV system without batteries is designed to turn off when there is no power on the grid so will not protect you from load-shedding.

Some basics about energy and sizing your backup system:

1. Kilowatt (kW) is an instantaneous power rating often used for inverter and solar PV sizing. For estimation purposes kVA (kilovolt-ampere) and kWh are used interchangeably in this guide.
2. Kilowatt hour (kWh) and Ampere hour (Ah) refer to energy and are metrics used to measure battery capacity. Remember **kWh = Ah x Voltage**. It is important to look at both when buying a battery.

Option	Price	Inverter	Battery		Solar	Energy saved	Payback period	Appliances and notes	
			kVA	Energy (kWh)					
6. Average home backup and some solar PV	R80 000 - R100 000	5	Lithium-based	4.8	2.7kWp	Saves approx. R10 000 per year	11	1632W	Can supply a typical 2-3 bedroom home, excl. high power devices.
7. Average home backup and larger solar PV	R115 000 - R140 000	8	Lithium-based	4.8	5.9kWp	Saves approx. R24 000 per year	7	1632W	Can supply a typical 2-3 bedroom home, excl. high power devices.
8. Large home backup and larger solar PV	R150 000 - R185 000	10	Lithium-based	9.6	5.9kWp	Saves approx. R24 000 per year	10	3246W	Will comfortably supply a large home. However, the payback period is increased as the example used the same size solar but larger batteries.

KEY NOTES

1. All prices are high-level estimates for indicative budgetary purposes only. Technologies and prices are as of 2022.
2. All option's components and design serve as a guideline and will depend on customer preferences and load requirements.
3. Total costs provided here exclude labour, design, installation and certificate of compliance (CoC) or ECSA registered persons sign-off fees. Refer to CCT SSEG Requirements [here](#) for more authorisation details.
4. Battery lifespan will typically depend on number of battery cycles (how often it charges and discharges) and depth of discharge. Typical lifespan of lithium-based batteries are 8-12 years while lead acid (LA) is 2-4 years under frequent load-shedding conditions.
5. The solar PV examples (options 6-8) make use of monocrystalline panels; these are more efficient and require less roof space than polycrystalline to achieve similar performance. SANS/IEC 61215 compliance is recommended.
6. Solar energy production values provided are based on a specific production value of 1600 kWh/kWp per annum. Actual solar power produced will be influenced by location, system design, shading, roof angle, panel orientation and other factors.
7. The estimated savings for solar PV installations in options 6-8 are based on the CCT 22 / 23 Home User Block 1 Energy Charge Tariff at 262.84c/kWh (2022/23). Energy costs saved and consequent pay periods will be dependent on user tariff.
8. Estimated payback periods provided do not account for electricity price inflation, replacement, maintenance and AMI meter costs, amongst others.
9. Payback periods are calculated with a conservative 15% markup to account for design, installation, balance of systems and sign-off fees. However this value is likely to increase depending on, for example, the installation complexity.
10. Proposed design options do not include cost variations for those who would like to feed excess energy into the CCT grid and assumes all solar energy produced will either be consumed or stored in batteries. The payback period for the solar battery hybrid options will vary if energy feed-in (export) is considered. For more information on AMI meter installation, service fees, and the CCT feed in tariff and feed-in incentives, see [here](#).
11. Where applicable, your inverter size must comply with CCT SSEG Requirements. See Residential SSEG Generation Size Limits in section 3.1 [here](#).

PLEASE NOTE:

All electrical generation and storage equipment connected to the wiring of your house must be authorised by the City of Cape Town prior to installation. This includes solar PV with or without batteries as well as standalone battery systems with inverters connected to the house's wiring.

Connecting without approval is illegal and dangerous as it could compromise the safety of those in the building, the grid and those working on the grid. Unauthorised systems can also lead to extended power outages after load-shedding or localised power trips.

Visit www.capetown.gov.za/solarPV for more information. To ensure that your PV installation is safe and legal, the City of Cape Town has developed a [guideline](#) to help you through the process.

Visit www.savingelectricity.org.za for tips on how to become energy efficient and for more information on solar PV.

