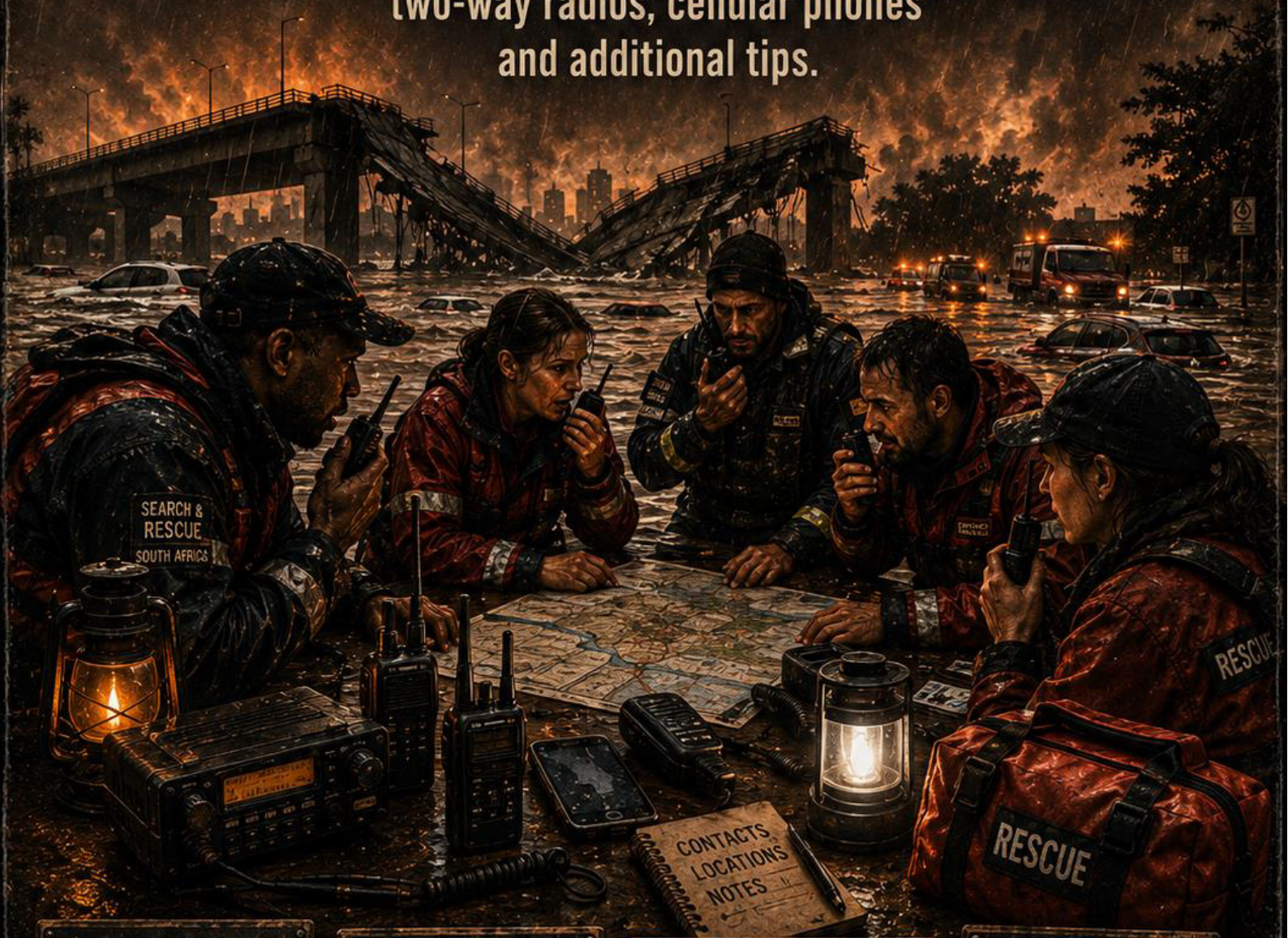
EMERGENCY PREPAREDNESS FOR SOUTH AFRICA

COMMUNICATION

Alternative communication resources, two-way radios, cellular phones and additional tips.



ALTERNATIVE COMMUNICATION

- TWO-WAY RADIOS
- CELLULAR PHONES
- SATELLITE PHONES
- WHISTLES / SIGNALS

COMMUNICATION RESOURCES

- BATTERY RADIOS
- CHARGERS
- POWER BANKS
- SPARE BATTERIES

ADDITIONAL TIPS

- KEEP CONTACT LISTS
- AGREE MEETING POINTS
- MONITOR EMERGENCY ALERTS
- TEST DEVICES REGULARLY

RESCUE PRIORITIES

- CALL FOR HELP
- SHARE LOCATION
- STAY TOGETHER
- CONSERVE BATTERY

"A lack of communication between the firefighters during the attack on the World Trade Centre, 9/11, was directly responsible for the death of 300 firefighters.

A lack of communication during the earthquakes that caused the tsunami in the Indian Ocean in 2004 cost thousands of people's lives because they couldn't warn people in time to evacuate the low-lying areas.

A lack of communication during the aftermath of hurricane Katrina caused more than 5,000 children to be separated from their families.

A lack of communication after the earthquake in Kobe in Japan left tens of thousands of people without shelter in freezing temperatures and delayed rescue attempts for over a week."

One thing that all these disasters have in common is a loss of communication with the outside world. A lack of communication between rescue teams causes delays for these teams because they don't always know where help is needed immediately. Loss of established communication systems occurs for three reasons:

1) The physical damage of network components
2) Disruption of the Supported Infrastructure (Backup)
3) Overload on cellular networks.

4.4 ALTERNATIVE COMMUNICATION RESOURCES

During a natural or man-made disaster, you cannot rely on your normal communication methods such as landlines or cell phones. Having alternative communication devices at hand can give you a link to the outside world. News over a portable radio can help you determine the size and impact of the disaster so you can warn your family in advance if evacuation is needed.

Each family must have at least one of the following alternative means of communication at their disposal:

- ✓ A portable radio (a wind-up radio is the most appropriate)
- ✓ Email (if there is a power source)
- ✓ Prepaid phone card
- ✓ SMS messages / SMS (WhatsApp requires data)
- ✓ Amateur Radio
- ✓ Two-way radio (walkie-talkie)
- ✓ Police scanner
- ✓ Whistles
- ✓ Air torches and flashy beacons

4.5 TWO-WAY RADIOS

A two-way radio can assist you to obtain first aid from first aid teams. It can also help the family communicate with each other, coordinate routes, and encourage each other in difficult times.

BUYING A TWO-WAY RADIO

When deciding on a two-way radio system, consider the following criteria.

- ✓ Is it simple to set-up and operate
- ✓ Should not be dependent on electricity (battery or dynamo operated)
- ✓ Rechargeable batteries – Must have at least one solar or motor charger socket for the device to recharge batteries.
- ✓ Effective range (distance)
- ✓ Preferably be water proof and shock resistant
- ✓ Protection against interference
- ✓ Affordable (low initial costs, low maintenance costs and preferably no monthly fees)
- ✓ Spare parts, accessories and support must be readily available.

4.6 CELLULAR PHONES

There is virtually no person today who doesn't own a cell phone. However, most of us limit our children usage by purchasing prepaid airtime and data to prevent us from getting an exorbitant account at the end of the month.

This limitation also has its disadvantages, especially when it comes to an emergency. Your child may have insufficient airtime or data to call a parent. Here are some tips to keep in mind when it comes to your child's cell phone.

The emergency number 112 can be dialled for free from any mobile phone at no cost. Your service provider will connect your child with an emergency Centre. Make sure that this number is saved in your child's phone's contact.

If an emergency occurs, it is advisable to immediately purchase airtime and data for your child. Also, buy an airtime voucher of at least R100 and place it in your child's wallet for emergencies.

Load one of the emergency applications on your child's phone so that you can keep track of your child. There are several of these applications available where your child can simply press a panic button and the

application will send an emergency response with the GPS coordinates to an emergency Centre. By loading your contact numbers on the application, you, as parents, can be notified at the same time.

Today, children mostly use WhatsApp. In emergency situations when network towers are overloaded, voice and SMS gets priority over data calls. In many cases, text messages might go through when voice is not available. So, teach your child to send SMS messages.

4.6.1.1 ADDITIONAL TIPS

- ✓ **LIMIT NON-EMERGENCY CALLS** - This will prevent network congestion to allow for emergency communication. Keep your calls short. If you need to use a cell phone, just use it to convey the essential information to emergency personnel and / or relatives;
- ✓ **SAVE YOUR BATTERY** –By disabling Bluetooth and Wi-Fi can save you battery power. Just enable these in case of emergency. Also keep lithium-ion battery banks and car chargers available for backup power for your phone.
- ✓ **STORAGE OF VARIOUS EMERGENCY NUMBERS** – If possible, try to reach different emergency services if your call is unsuccessful. Alternatively, try a landline if you have one available.
- ✓ **BE PATIENT**– Wait 10 seconds before you retry a number. On the cell phones, to recall a number you can just press 'call'.
- ✓ **STOP IF YOU ARE DRIVING** – If you are making a call in a moving vehicle, your phone will switch over from one network tower to another as the signal becomes stronger and weaker as you move. If a consecutive network tower is out of order or overloaded, your call may be cut off. Thus, it is advisable to stop your vehicle to retain your call.

4.7 SHOPPING LIST

- ✓ Signal flares, flashing emergency beacons or light (Available at most outdoor stores)
- ✓ Two-way radio
- ✓ Portable radio (FM/AM)
- ✓ Solar charger with rechargeable batteries
- ✓ Extra set batteries for all communication devices

4.8 SUMMARY

- ✓ Do an amateur two-way radio course.
- ✓ Make time to understand how your communication device works. Carefully study the manual.
- ✓ Get to know people in your community who can provide tips on emergency communication.
- ✓ Make sure your child, as well as the elderly, is aware of the emergency procedures when using a cell phone.

EMERGENCY PREPAREDNESS FOR SOUTH AFRICA

FUEL PREPAREDNESS AND STORAGE

The one habit that could save your family, safe home fuel storage, how much can you legally store, container requirements, storage location rules, fuel degradation and stabilisers.

The one habit that could save your family

- Keep a small emergency fuel reserve
- Rotate stored fuel regularly
- Label every container with the date

Safe home fuel storage

- Store fuel only in approved containers
- Keep petrol and diesel separate
- Never store fuel inside living areas

How much can you legally store?

- Check local by-laws and fire regulations
- Keep only sensible household quantities
- Ask your municipality if unsure

Container requirements

- Use sealed, purpose-made containers
- Protect containers from heat and sunlight
- Inspect lids, vents and seals often

WHEN THE WORLD'S OIL TAP WAS TURNED OFF

Farmers Review Africa — Johannesburg, 31 March 2026

The war involving Iran has moved from a geopolitical story to a supply chain shock — and fast. At the centre of it all is the Strait of Hormuz. In normal times, roughly a quarter of global seaborne oil flows through that narrow channel. Today, it is partially blocked, militarised, and unpredictable. That matters more than most people realise, especially in Africa.

This is not just an oil story. Yes, oil is the headline. The International Energy Agency is already calling this the largest disruption in oil market history, with up to 30% of global oil flows affected. Prices are responding accordingly. Analysts are openly discussing $150 to $200 per barrel scenarios if disruption persists into the next four to eight weeks.

But if you stop at oil, you are missing the real risk. Because Hormuz does not just move fuel. It moves fertiliser, petrochemicals, plastics inputs and liquefied natural gas.

Diesel is the bloodstream of African logistics. As oil spikes, transport costs rise almost instantly. Across East and Southern Africa, dependence on Middle Eastern supply chains is structural, not optional. Countries like Kenya, Tanzania, Ethiopia and Zambia are already implementing emergency measures. In parts of East Africa, over 50% of fertiliser imports come via these routes — and globally, up to one-third of fertiliser trade moves through Hormuz. Urea prices are already up by 50% since the conflict began. That translates directly into higher food prices, lower yields and increased inflation.

The brutal reality is that Africa is a price taker. Most African economies are net importers of fuel and fertiliser and are highly exposed to global shipping routes — which means there is very little control, only response.

South Africa's position: According to the South African government, imports were still arriving as planned, with current arrangements covering requirements through mid-April 2026. That is a useful assurance. But it is a near-term position, not proof that the underlying system is secure. A country can still receive fuel while remaining exposed to a chokepoint whose disruption raises insurance, freight and pricing risks across the entire economy.

The uncomfortable truth is that the businesses and households which act early will appear paranoid today — and exceptionally well-positioned in thirty days.

5.1 WHAT HAPPENED – AND WHY IT MATTERS TO YOU

On 28 February 2026, the United States and Israel launched a military campaign targeting Iran's nuclear sites and military installations. Iran's response was immediate. The Islamic Revolutionary Guard Corps declared the Strait of Hormuz — the narrow waterway between Iran and Oman through which approximately one fifth of the world's daily oil supply flows — effectively closed to commercial shipping.

Within days, the world's largest shipping companies suspended operations in the area. Tanker traffic through the strait collapsed by approximately 70 percent. Over 150 ships anchored outside the strait, unable to proceed. Oil prices surged faster than at any point in recorded history.

The Strait of Hormuz is a channel barely 33 kilometres wide at its narrowest point. In normal times, approximately 20 million barrels of oil pass through it every single day — representing around 20 percent of all global petroleum consumption. There is no practical alternative. When it closes, the oil simply stops moving.

For South African households the impact was visible within days. Fuel prices began rising sharply, with diesel price increases of up to R10 per litre forecast. Panic buying triggered localised shortages at petrol stations across the country — not because supply had stopped, but because demand surged as people rushed to fill tanks and jerry cans simultaneously. Fertiliser prices increased globally. Freight costs rose as ships were rerouted around the Cape of Good Hope, adding days and significant cost to every delivery.

The lesson is not new. This guide has been preparing you for exactly this kind of scenario from the very first chapter. The Hormuz crisis simply made visible what was always true: South Africa is structurally dependent on global supply chains that are vulnerable to events entirely beyond our control.

5.1.1 THE ONE HABIT THAT COULD SAVE YOUR FAMILY

Of all the supplies you will need in a crisis, fuel is the one that disappears first and is the hardest to replace once it is gone. Within hours of any emergency being announced — whether a national disaster, civil unrest, a power crisis or a global supply disruption — petrol stations across South Africa run dry. The queues form before most people have even heard the news. If you do not already have fuel, you are already too late.

The single most effective fuel preparedness habit requires no special equipment and costs you nothing extra. It is simply this:

NEVER LET YOUR FUEL TANK DROP BELOW HALF!

Make it a personal rule — a non-negotiable. The moment your gauge crosses the halfway point, you fill up at your next opportunity. This one habit gives you a meaningful head start in any emergency. While your unprepared neighbours are sitting in a three-hour queue at a petrol station that will run dry before they reach the pump, you already have enough fuel to drive 300 to 400 kilometres without stopping.

5.2 SAFE HOME FUEL STORAGE

Beyond your vehicle tank, it is wise to maintain a small reserve of fuel at home. This should be treated with the same discipline as your food and water storage — rotated regularly and stored responsibly.

5.2.1 HOW MUCH CAN YOU LEGALLY STORE?

In South Africa, the legal limit for storing fuel at a private residence is allowed in approved containers. For most families, a single 20 to 25 litre approved metal jerry can is a practical and affordable starting point. Two or three cans give you a meaningful reserve without requiring a dedicated storage structure.

The exact "safe" amount you can store without applying for a registration certificate from the Chief Fire Officer varies significantly:

MUNICIPALITY	PETROL (CLASS I)	DIESEL (CLASS II/III)
CITY OF JOHANNESBURG	40 litres	210 litres
CITY OF CAPE TOWN	200 litres *	200 litres *
CITY OF TSHWANE	200 litres	400 litres
ETHEKWINI (DURBAN)	210 litres	500 litres
EKURHULENI	100 litres	420 litres

** Total combined flammable liquid limit for Cape Town is often cited as 200 litres total.*

5.2.2 CONTAINER REQUIREMENTS

- ✓ Use only approved metal fuel containers that comply with SANS standards. Never store fuel in plastic
- ✓ bottles, glass containers or unapproved drums — these are a serious fire hazard and are illegal.
- ✓ Containers must be clearly labelled with the fuel type. Petrol and diesel must never be mixed or stored in the same container.
- ✓ Keep containers tightly sealed at all times to prevent evaporation and contamination.
- ✓ Always store a fire extinguisher in the same location as your fuel containers.

5.2.3 STORAGE LOCATION RULES

- ✓ Store fuel in a cool, well-ventilated area — a detached garage or outbuilding is ideal.
- ✓ Never store fuel inside your home, in an attached garage, or near any heat source, open flame or electrical equipment.
- ✓ Keep fuel away from direct sunlight — heat accelerates degradation and increases pressure inside containers.
- ✓ Store containers on the ground, never stacked or on shelves.

5.2.4 FUEL DEGRADATION AND STABILISERS

Petrol begins to degrade within 30 days under normal storage conditions and can become unusable within three to six months. Degraded fuel causes engine problems and may prevent your vehicle from starting when you need it most.

Add a fuel stabiliser. Products such as Sta-Bil, added at the time of storage, extend the usable life of petrol to 12 to 24 months. This is a small investment that protects your entire fuel reserve.

Rotate your stored fuel. Use your stored fuel in your vehicle every three months and replace it with fresh fuel. This ensures your reserve is always fresh and that your vehicle runs on stored fuel regularly without issue.

Date your containers. Write the storage date on each container with a permanent marker so you always know how old the fuel is.

Diesel is more stable. Diesel can be stored for up to 12 months without stabiliser under good conditions. If your emergency vehicle or generator runs on diesel, your storage management is somewhat simpler — but rotation is still important.

5.3 WHEN PETROL STATIONS RUN DRY

If you find yourself in a situation where petrol stations in your area are empty, apply the following principles without exception:

- ✓ Do not drive from station to station consuming your remaining fuel in the search for more. Stay disciplined. Use your vehicle only for essential trips.
- ✓ Monitor community WhatsApp groups and neighbourhood watch communications for reports of which stations have been resupplied.
- ✓ If you have a fuel reserve at home, use it sparingly and only when absolutely necessary.
- ✓ Consider whether your destination can be reached on foot, by bicycle or by other means to conserve fuel for genuine emergencies.

PRIORITISE FUEL USE IN THIS ORDER:

1) Medical emergencies first
2) Evacuation second
3) Essential supply runs third

5.4 FUEL PREPAREDNESS CHECKLIST

Use this checklist to assess and strengthen your current fuel readiness:

- ✓ My vehicle tank is always kept above half full — without exception
- ✓ I own at least one approved metal fuel container (20–25 litres)
- ✓ My stored fuel is treated with a fuel stabiliser
- ✓ I rotate my stored fuel every three months and replace it with fresh fuel
- ✓ Each container is dated so I know exactly how old the fuel is
- ✓ My fuel is stored in a cool, ventilated, detached structure away from my home
- ✓ I have a fire extinguisher located with my fuel storage
- ✓ I know the location of at least three petrol stations in my area
- ✓ I have cash available to pay for fuel if card machines are offline
- ✓ My family knows the rule: we do not drive unnecessarily during a fuel crisis
- ✓ I have considered reducing fuel dependency through solar power or a gas generator

5.5 IN CLOSING

The world does not wait for us to be ready. The Hormuz crisis of 2026, the COVID lockdowns of 2020, the July 2021 unrest, the Cape Town Day Zero water crisis — every one of these events caught the majority of South Africans unprepared. Every one of them was survivable — and in many cases, barely inconvenient — for those who had prepared in advance.

Fuel is not a luxury. It is the lifeblood of every other preparation you have made. Without fuel you cannot evacuate. You cannot reach a hospital. You cannot transport supplies. You cannot run a generator. Take your fuel preparedness as seriously as your food, your water and your faith.

EMERGENCY PREPAREDNESS FOR SOUTH AFRICA

LOSS OF ELECTRICITY

The preparation of food without electricity, alternative energy (solar and wind power), different kinds of lighting and energy saving tips.

FOOD WITHOUT ELECTRICITY

- Gas stove
- Braai / fire cooking
- Camping stove
- Keep fuel safely stored

ALTERNATIVE ENERGY

- Solar panels
- Battery backup
- Wind power
- Recharge devices wisely

DIFFERENT KINDS OF LIGHTING

- LED lanterns
- Torches
- Candles
- Rechargeable lights

ENERGY SAVING TIPS

- Switch off unused devices
- Use LED lighting
- Keep fridges closed
- Charge essential items first

REPORT SUGGESTS THAT LOAD SHEDDING IS ABOUT TO GET MUCH WORSE

by Tom Head | The South African | 2019-04-08

As Eskom's old units go offline and the cost to replace generational capacity soars, the severity of load shedding may well increase over the next decade.

If we think we've had it bad with load shedding this year, we should brace ourselves for the decade ahead. That's the message coming from Bloomberg on Monday after they published the results of their investigation into Eskom's generational capacity. Change is on the horizon, but things aren't looking up.

Why load shedding may get worse in South Africa

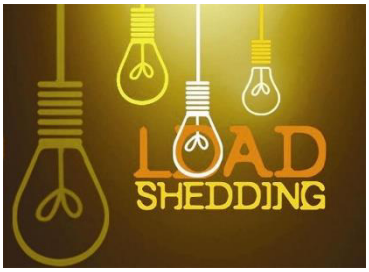
According to the publication, the oldest power stations still in operation will have to be shut down over the next 10 years. Both Komati and Camden are over 50 years old, with Grootvlei, Arnot and Hendrina fast-approaching that mark. Taking these stalwarts off the grid will dramatically reduce capacity quicker than it can be restored.

For those pinning hopes on the new builds, they aren't exactly the "silver bullet" solution that is often touted by energy officials. Medupi and Kusile are both running behind schedule and have both experienced major maintenance issues in their two-year existences. The plants don't boast the capacity of Komati and Camden, either.

How much power Eskom could lose by 2030

As the old units go offline and Eskom – who are hamstrung by an estimated R419 billion debt – attempt to plug the gap, there could be a shortfall of 25% by 2030. South African would, therefore, have to manage with about a quarter of its power supply lost to the ages.

The cost of correcting the output imbalance is estimated to total $71 billion. At the current exchange rate, that would break the R1trn mark. Despite the recent receipt of generous loan agreements from BRICS, their amounts are just a drop in the debt-filled ocean. And, of course, Eskom will be expected to return the money owed to their creditors."



South Africa is still largely dependent on electricity generated from coal. The situation is unlikely to change in the short term. The inconvenience of recent load shedding and the possibility of a total blackout made one realise that such an event can have drastic consequences if we are not prepared for it. In this chapter alternative energy solutions are discussed as well as its practical application.

6.1 THE PREPARATION OF FOOD WITHOUT ELECTRICITY

So, you have all the necessary wheat, flour, dried foods, canned foods as well as enough water. The big question is - when a major disaster happens, would electricity be at your disposal? How are you going to prepare food?

In this modern era in which we live, most people haven't looked for alternative methods to prepare food without electricity. The majority of us rely on microwaves, electric stoves and toasters to prepare most meals.

6.1.1 ALTERNATIVE METHODS

1. **Gas stove** –Replacing your electric stove with a gas stove is a good option. However, it is important that you keep a sufficient supply of gas bottles to see you through the crisis period.
2. **Camp stove or gas burner** – If a gas stove is beyond your budget, a camping stove or a gas burner will always be a likely alternative. Gas is dangerous and it is always advisable to use it outside or in an open window
3. **Fireplace** - Most of us have a fireplace or indoor braai to cook food. Try to cook bread and other foods on sticks in your fireplace or indoor braai. Besides using a pot, you can always wrap potatoes and other vegetables in foil and cook it on the open fire. Don't forget about the marshmallows.
4. **Campfire** - Campfires and open braais are always very cosy and form an important part of our South African culture. With a braai grid or a clay pot, everything can be warmed or cooked. Maybe it's time for you to get yourself a new recipe book and explore alternatives than just having a braai or baking bread.
5. **Pizza oven** - A pizza oven is very popular choice when an electric oven is not an option. Everything you can cook or bake in an electric oven can also be prepared in a pizza oven. From cooking a whole chicken, legs of lamb, to the baking of rusks or bread are options to name a few.
6. **Coal Stove** - Many of us grew up in front of Grandma's coal stove. This is an adequate option for heating drinks, canned foods, as well as spaghetti and soup.
7. **Kerosene heaters** - Kerosene heaters are usually used for heating a room. It is also an alternative way to cook beans, pasta, other foods as well as making coffee and tea.

SAFETY TIPS

- Gas or coal stoves should be handled with caution not to get burned. Always keep a first aid kit nearby with the necessary ointment and bandages if an incident occurs.
- Gas is highly explosive and must be treated with due respect. Always ensure that gas bottles are properly closed to prevent gas poisoning.
- If you use a fireplace or indoor braai, make sure that the chimney vents adequately. Be careful with the wood you use. Treated wood like pine contains pesticides and chemicals that are detrimental to your health and can also affect the taste of food.
- Never ever pour flammable liquids such as petrol, paraffin or gasoline on an open fire.
- If you make a fire on the ground, make sure you use rocks to contain the fire from spreading.
- Never leave a fire or candle without adult supervision.
- Keep water handy if an accident happens.

6.2 ALTERNATIVE ENERGY (SOLAR AND WIND POWER)

Renewable energy is energy derived from sources that are constantly renewing themselves or not being exhausted for all practical purposes. Hydraulic (water) power, solar power as well as wind power is seen as renewable energy sources.

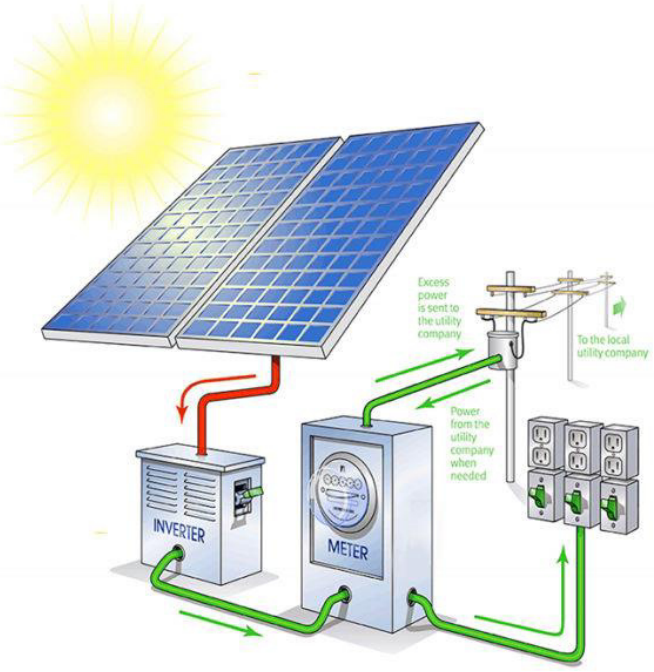
Solar energy is generated by the bright light and heat of the sun. It is an important source of renewable energy and is used by a whole range of innovative technologies. The most popular ones are the solar heating of water (solar geyser) as well as the generation of electricity by using photovoltaic solar panels.

6.2.1 SOLAR SYSTEMS

For the amount of sunlight available in South Africa, solar panel systems are a highly attractive source of electricity supply. A solar system is designed according to your household's energy requirements. The energy consumption of electrical appliances measured in Watt is added together and by using a formula, the size of the system is scaled according to a period of time. It is also advisable to reduce your energy consumption by purchasing equipment that is more energy efficient. Examples are a gas stove, a gas kettle for your gas stove, as well as a solar geyser.

6.2.1.1 INVERTERS

It is extremely important that you have the right solar inverter for your needs. A five (5) kVa inverter is the minimum size recommended for a household. If you want to connect refrigerators, freezers or pumps to your system, it is extremely important that you purchase a pure sine wave inverter. Square wave inverters can overheat and cause damage to fridge and pump motors.



Solar systems are usually classified into three categories;

- ✓ **Grid-tied solar systems** - directly connected to the electricity grid. The system does not have batteries. The household is powered by solar panels during the day and by Eskom at night.
- ✓ **Hybrid Solar systems** – These systems have batteries and are charged by both electricity and / or solar panels.
- ✓ **Off-grid or standalone solar systems** – These systems also have batteries but only get charged by solar panels. These systems are mostly used in remote areas where electricity is not available.

6.2.1.2 SOLAR BATTERIES

Solar batteries are rechargeable batteries that are used to store energy for later use. There are a large variety of solar battery types available on the market, but for the purpose of this manual I will only quickly touch on the best-known types.

6.2.1.2.1 SEALED LEAD ACID BATTERIES

There is a wide variety of sealed lead acid batteries available including 1 Ah, 2 Ah and single cell draw batteries. Sealed batteries are ideal because they don't require maintenance. However, they are more expensive than other types of batteries. The load management needs must be accurate and consequently they have a shorter life span. In situations where the use for long periods of time without proper maintenance, sealed lead acid batteries are the most appropriate choice.

6.2.1.2.2 DEEP CYCLE BATTERIES

Deep cycle batteries are more commonly used for camping and caravans. They look like a car battery, but the lead plate construction inside the battery is different. Their storage capacity usually ranges from 60Ah to 120Ah at 12V. The life span of these batteries is quite short giving you a few hundred cycles and is therefore not the best option for solar power.

6.2.1.2.3 GEL BATTERIES

Another type of solar battery is the absorbed glass mat (Absorbed Glass Matt or AGM) also known as Gel batteries and is highly resistant to vibrations. The type of batteries contains rechargeable cells and is equipped with a monoblock catalyst to improve performance and longevity. The battery storage capacity is measured in amp hours associated with the number of amperes that can deliver a battery in one hour.

6.2.1.2.4 LITHIUM-ION BATTERIES

Lithium-ion batteries are the most effective option in the long run. This battery type works quite differently from its lead acid counterparts. The batteries offer much more performance and efficiency benefits. However, lithium-ion batteries are still not the perfect solution, but they are very popular for various reasons.

ADVANTAGES

- ✓ **Lightweight and small** – In terms of the volume, the lithium-ion models are half the size.
- ✓ **More efficient** – With quality lithium batteries, charging and discharging is close to 100%. This means they can load and unload completely without losing amps.

- ✓ **Increased cycles** – Lithium-ion gives you the most possible cycles on average, about 5000 plus cycles (5 - 10 years)
- ✓ **Consistent discharge voltage** – The charge of lithium-ion batteries remains consistent throughout the discharge process, making it much safer for electrical equipment.
- ✓ **Low maintenance** – Chances are you will forget about the battery for it requires very little maintenance.

DISADVANTAGES

- ✓ **Cost** – The initial investment for a lithium battery is more than the lead acid alternative. But if you consider this battery's life span, capability and performance then lead acid batteries will eventually cost you much more in the long run.
- ✓ **Overheating** – You don't want lithium-ion batteries to overheat as it shortens efficiency and longevity.

6.2.1.3 SOLAR PANELS

The solar cell or photovoltaic cell converts photons into electricity. The silicon solar cell is the magical component that transforms the ultra-violet rays into direct current (DC) energy. There are mainly two different types of solar panel available:

6.2.1.3.1 MONOCRYSTALLINE SOLAR PANELS

Monocrystalline solar panels are made of a single crystal structure. From the different variants,

monocrystalline panels are the oldest of the solar cell technologies and this type of panel can be identified by the cells having a uniform dark grey (almost black) colour. They are more expensive per watt than polycrystalline panels, but they are more efficient. Comparing the output - you can install less monocrystalline panels in comparison to polycrystalline solar panels.

6.2.1.3.2 POLYCRYSTALLINE SOLAR PANELS

The polycrystalline panel is the newer technology of the two. Silicone panels have a less uniform appearance and are darker blue in colour. These panels tend to be the more affordable option of the two,

offering the lowest price per watt. Although they generate a little less power, their efficiency is still acceptable in comparison with the price difference.

6.2.2 WIND TURBINES

A wind turbine, or alternatively referred to as a wind energy converter, is a device that converts the wind's kinetic energy into electricity. On cloudy days when your solar panels are less effective, turbines can be used to charge your batteries.

Wind energy is one of the fastest growing elements of the alternative energy movement. What this means is that the cost of installing and maintaining this type of system is becoming increasingly more affordable. High quality wind generators can be found at a fraction of the cost compared to a decade ago. These newer models are more efficient and therefore can produce more energy.

Wind turbines as an option must be thoroughly investigated to determine if it meets your energy requirements. When an evaluation is made, it is usually measured against the quality of available wind sources. Generally, an average wind speed of at least 6 km / h is needed for a small wind turbine to generate enough electricity and to be cost effective option. Study the wind patterns in your area and determine how the weather, climatic conditions and seasons affect the winds in your area.

6.2.3 SOLAR GEYSERS

Solar geysers are well known and have been used commercially worldwide for over 50 years. In many countries it is mandatory to have a solar geyser installed in each and every home. About 40% of average household electricity costs are attributed to water heating. This percentage is even higher in low-income households.

A solar geyser consists mainly of solar panels or glass tubes connected to a hot water tank (geyser). In South Africa, the system is installed on the northern roof of the home or building's roof. There are mainly two types of solar geysers available on the market.

VACCUUM TUBE

This system is the most efficient of all the solar geysers systems. A glass or metal tube containing the water is surrounded by a larger glass tube. The space between the two tubes contains a vacuum and, due to the thermal siphon effect caused by the tubes, the hot water in the tubes flows to the cooler water in the geyser. The process recirculates the hot water in exchange for colder water and becomes sufficiently hotter as the process repeats itself over and over. Vacuum tubes are so efficient that it can even work during cloudy conditions and low temperatures. Individual tubes are replaced if and when necessary.

6.2.3.1 STEEL PANEL SOLAR GEYSERS

Steel panels are less effective than vacuum tube systems, but are more suitable for areas where extreme weather conditions occur. Steel panel heaters are more efficient in areas where very high temperatures as hail occur. To prevent the storage tank from bursting due to overheating, it is always advisable to install a pressure release valve for both types.

6.2.3.2 SYTEM MAINTENANCE

The maintenance cost of solar heating systems is generally very low and a SABS approved system will come with at least a 5-year warranty. With the installation, most vendors provide a manual that covers some simple maintenance tests to ensure that the system is working properly. However, by far the most important thing is to make sure there are no leaks.

6.3 LIGHTING

For the purpose of this guide, lighting is basically classified into two categories:

- ✓ Fuel-based lamps (candles, kerosene and gas)
- ✓ LED lights and lamps

FUEL BASED LIGHTING (CANDLES AND LAMPS)

6.3.1.1 CANDLES

Candles are still the simplest and cheapest option to provide lighting. Although candles are more environmentally friendly than lamps, it remains an unacceptable choice for general lighting. Because candles generate limited light, one has to be very careful not to place them too close to flammable objects.

6.3.1.2 LAMPS

Electric lamps are in most respects better and safer than fuel-based lamps. When Eskom is available, candles, kerosene and gas lamps are unacceptable for most lighting tasks and are suitable for emergency or aesthetic purposes only. However, in cases like load shedding, fuel-based lamps play a much more important role and have many benefits. These lamps are portable and usually have a low maintenance cost. Lanterns and various types of fuel are freely available and most of them are manufactured locally.

Fuel-based lighting technologies use the flame of burning fuel to produce light. Lighting quality varies depending on the type of lamp technology used. These lamps release carbon dioxide into the atmosphere and should preferably be used in a ventilated room. Due to the fact that lamps hold a potential fire hazard, it should never be left alone with adult supervision.

6.3.1.3 OIL LAMPS

The use of oil lamps dates back thousands of years ago and are still in use today. Although not commonly used, they are known to create a specific atmosphere. Oil lamp fuel sources include a wide variety of plants (olive oil, sunflower oil) as well as animal fats such as fish oil, and shark liver oil.

6.3.1.4 KEROSENE LAMPS

Kerosene lamp (also known as a paraffin lamp) is a type of lantern that uses paraffin as fuel. The flame is protected by a glass bulb guarding the flame against blow out. Kerosene lamps are also a portable option and like oil lamps, it is suitable for power outages, camping and boating.

6.3.1.5 GAS LAMPS

Gas lamps use propane gas as fuel (LP gas). However, gas lamps are very dangerous if the bottle is leaking or not properly closed. As in the case of candles and kerosene lamps, gas lamps should also never be left unattended.

6.3.2 LED LIGHTING AND LAMPS

LED is the latest technology when it comes to lighting and is environment-friendly. LED lamps have a brighter light when compared to ordinary light bulbs, have a longer lifespan and are 70% more efficient than ordinary light bulbs. Because LEDs are so effective, it remains a popular choice for battery-powered torches and lights.

LED lights can last for many years before they need replacing. According to statistics, a typical LED light that averages three hours per day can last for 22 years. Today, there is an LED light available for virtually any application, from the smallest flashlight to blinding sports lighting.

6.4 ENERGY SAVINGS TIPS

The following table is a summary of different ways that you can save electricity.

DEVICES	DESCRIPTION OF TIP
SOLAR GEYSER	- Solar geysers can reduce electricity consumption by 40% to 50%. - This will save you about 200kWh to 250kWh of electricity every month.
LIGHTING	- Replace bulbs with LED lighting where possible. - Turn off the lights when not in use. - Dimmer switches also reduce electricity consumption. - Use compact fluorescent lamps (CFL) in kitchen instead of ordinary light bulbs.
HEATING AND COOLING	- Avoid using heaters or air conditioners as much as possible. - Isolate your ceiling and close any gaps. - Make sure that your heating and cooling equipment has a thermostat installed. - If you need to use an electric blanket, make sure you turn it off when you get into bed.
DISHWASHER	- Fill the dishwasher completely before use to save electricity and water. - Switch off the dishwasher before the drying cycle and rather dry by hand.

DEVICES	DESCRIPTION OF TIP
	- Keep the dishwasher's filters clean. - If you buy a new dishwasher, make sure its energy efficient.
DRYING OF CLOTHES	- If possible, at all, avoid using a tumble dryer. - Dry cloths by hand before placing it in the tumble dryer. - On sunny days, take the opportunity to hang your clothes outside on the washing line.
AUTOMATIC WASHING MACHINES	- A front loader uses less water and costs less to operate. - Choose the shortest possible washing program. - The use of cold-water washing powder also reduces electricity consumption.
STOVES	- Replace your electric stove with a gas stove. - Use pressure cookers when preparing food that takes a long time to cook. - Small pots on large plate waste electricity. - Keep the oven door closed until food is cooked. - Glass and ceramic pans retain heat better than metal pans.
MICROWAVE OVEN	- When you want to defrost food, leave it in the fridge overnight. You will use less electricity than trying to defrost in the microwave. - Use the microwave to cook small to medium quantities of food. For larger portions of meat, it is better to use a conventional oven or pressure cooker.
FRIDGE	- Do not open the door unnecessarily and make sure the seal is intact. - Turn off and empty refrigerator when you go on holiday. - Allow hot food to cool before placing in the refrigerator. - Defrost your fridge regularly. A build-up of ice reduced the operational efficiency and raises operation costs.
FREEZER	- Do not open the door unnecessarily and make sure the seal is intact. - Defrost the freezer regularly. Freezers work harder to remove heat and need more power. - Only 90% of the freezer capacity must be used for freezing.
GENERAL	- Don't buy larger or more powerful devices that you don't really need. - Do not buy an electrical appliance if you can do it by hand. - Use the correct device e.g. Do not make toast in the oven. - Do not fill a kettle to the top if you only need a small amount of boiling water. It is enough to just put enough water in the kettle to cover the element. - It is more economical to boil water in a kettle compared to boiling it in pot on the stove.

6.5 SUMMARY

- ✓ **SOLAR ENERGY SYSTEMS** – Do thorough research on different solar energy systems. Determine the type of system you need based on your energy requirements. Get quotes and build the system in stages if you can't afford to buy it once-off.
- ✓ **SOLAR GEYSERS** – It is recommended to replace your electric geyser with a solar-powered geyser, if you can afford to.
- ✓ **WIND TURBINES** – Determine whether the weather conditions are suitable enough for you to consider a wind turbine.
- ✓ **LIGHTING** – Replace ordinary bulbs with LED lights where possible. As a backup, buy the necessary alternative lighting such as candles and lamps for when electricity is not available.
- ✓ **GAS STOVE** – Replace your electric stove with a gas stove. Keep a few spare full gas bottles.

- ✓ **ADDITIONAL INFORMATION** – In this chapter, we only scratched the surface. It is strongly recommended that you do further research on the internet by visiting forums and talking to experts in the field.