ENERGY SMART

CITIZENS IN ACTION
PROJECT TRAINING MANUAL

THIS PROJECT WAS MADE POSSIBLE WITH FUNDING FROM THE EUROPEAN UNION

PROJECT 90 BY 2030

ENERGY SMART CITIZENS IN ACTION

BACKGROUND

About the ENERGY SMART Citizens in Action project

Project 90 by 2030 is working with eight communities in Gauteng, Eastern Cape, KwaZulu-Natal and Western Cape to support them in dealing with the daily energy challenges they are facing. The project aims to offer the communities knowledge related to the energy situation in South Africa, in particular, in relation to their communities, energy governance, and on how to engage with local government and practical alternative energy solutions that community members can use. At the same time, the project will gather vital data on the energy situation on the ground and communities' needs and concerns which will be used to support energy planning for the communities.

This project and this handbook was made possible with funding from the European Union as part of their "Energy SMART Citizens in Action" project.

About this training manual:

The purpose of this training manual is to:

- Improve energy access and engagement with local government
- Provide knowledge and cost management with respect to energy
- Provide tips and tools to improve energy access

Introduction

Electricity and energy use is part of daily life – from how much electricity we use to what kind of energy we use. To help save money, keep us healthy and protect our environment we can change how we use and access electricity and energy by becoming more aware of:

a) Where our electricity comes from

b) Other sources of energy are available and accessible

c How much electricity we use

d) How we can reduce our electricity and energy consumption

e) What we can do about our energy situation – local government engagement

This handbook provides ideas on how to do this.

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Energy is the ability to do work. Energy is invisible but we see it working away around us every day. We use energy every day in the form of electricity or petrol. Energy provides heat, light and power, which makes our lives more comfortable. But all energy comes at a cost. The cost is not only the money you pay monthly to buy units for the electricity meter or litres of paraffin. Energy that comes from coal, paraffin and petrol (which are also known as fossil fuels) are very damaging to the environment. Fossil fuels unlike the sun's energy are non-renewable and will eventually run out.

We use energy to meet most of our needs - from cooking, to washing, to getting home or to work. Most of the energy we use in our homes is electricity. Most of the electricity in South Africa (90%) is produced from burning coal, which gives off dangerous levels of gases such as carbon dioxide into our atmosphere that cause climate change while polluting our air and water.

The electricity in our home comes from the electricity grid. The electricity grid is made up of two key parts. 1) A network of power stations that produce electricity from mostly coal (and also nuclear) energy and 2) the power lines that transfer the electricity to the users. The money we pay for electricity is supposed to help pay to maintain this grid, as well as pay for new power stations.

This system doesn't always work as planned, and as most South Africans know very well, we have been experiencing load-shedding, and electricity price increases since 2008. The reason for these price increases and load-shedding are the following:

In most areas around the country, the local municipality buys electricity from Eskom and then sells it to the users - the businesses and residents. This means you could be living right next door to a coal-powered electricity generating station or wind turbine farm and still have load-shedding like the rest of the country, because that electricity from the station must first go through the grid, to your municipality and then to you. Eskom sells electricity to municipalities, the municipalities add a mark-up on the electricity and then sell electricity to you, resulting in electricity being more expensive than if you buy it directly from Eskom. This happens because most - if not all - municipalities in the country generate most of their income from the sale of electricity. This income, especially in smaller municipalities allows the state to be able to deliver much needed services to the community. It is important to note that while not common, in some areas Eskom provides electricity directly to residents, and in these cases residents will have a different electricity tariff structure to the rest of the municipality.

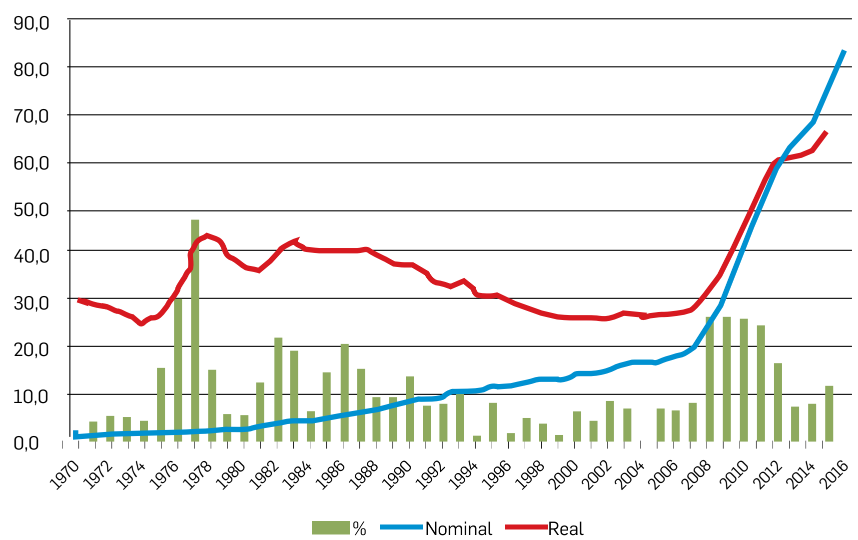


Figure 1. Eskom Electricity prices (1970-2016)

At the end of Apartheid, the South African government was trying to sell many of our State Owned Enterprises (Eskom, SAA, Transnet, Telkom, etc.) to private businesses because the government believed that private businesses would work better than state owned businesses. In the late 1990s, engineers at Eskom could see that there was a growing problem with keeping the grid and supplying the electricity the country needs at the same time. The plan at the time was to stop Eskom from building new electricity generation stations, and get private businesses to build the stations who would then sell the electricity to Eskom. Because the policy processes were problematic and South Africa had more than enough electricity to supply the demand from the stations constructed in the 1980s this never happened. But by the early 2000s supplying enough electricity to the country became a big problem, and in 2006 South Africa experienced a shortage of electricity which we call "load-shedding". Since that time, electricity prices have increased sharply to help pay for the maintenance of the grid, but also for building new (mostly) coal power plants to generate enough electricity to meet the growing demand.

The graph on the left (see the blue line) shows that since 1970 the electricity price increase has been steady, until 2008. Since then prices have been rising steeply.

Engagement with local government

The first step towards accessing better energy services is to know your legal rights. In South Africa, no government and no individual is above the law. The highest law in our country is the Constitution. Everyone in South Africa must act according to the Constitution and the laws passed by government.

When you engage with local government regarding an energy issues, you must ask yourselves:

What law gives the government the authority to act? Is government acting according to that law?

In South Africa there are three spheres of government: local, provincial and national government. Below are the most relevant laws for you in relation to local government:

- The Constitution with the Bill of Rights
- Municipal Systems Act
- Municipal by-laws
- Resolutions, regulations, frameworks and guidelines adopted in your area

When you read through the Constitution, you will find that you have the right "to an environment that is not harmful to your health or wellbeing" (section 26(1), section 24(a) of the Constitution), which you can relate back to adequate access to electricity and energy. Section 73 of the Municipal Systems Act gives you the right to basic municipal services which also includes electricity and/or energy.

According to the Constitution, the local government must give priority to the basic needs of the community. This means local government must provide basic services such as electricity or energy.

The Municipal Systems Act further says that each member of the community should have access to at least a minimum level of basic service. Local government has the duty to discuss with communities what kind of electricity and/or energy is appropriate in each community. This means that local government should not only consult with communities but also promote community participation in the decision making process.

One way to involve communities into municipal planning and decision making is through the strategic plan called the Integrated Development Plan (IDP) that is supposed to promote economic and social development in your community. The IDP sets out a five-year plan for the municipality which must be reviewed each year.

Something to remember is that municipalities are not entitled to unfairly discriminate in delivering electricity or energy services based on race, gender, HIV/AIDS status, disability or any other protected ground (section 9 of the Constitution).

Energy related processes:

The Municipal Systems Act (Section 73) states that local municipalities should have a policy to provide free basic electricity to people who cannot afford to pay for electricity. Municipalities can choose whether to give free basic electricity to everyone (universal allocation), or to low income households only - in that case, only specific households that qualify for the social grant. The national standard for free basic electricity is 50 kilowatt hours (kWh) per household per month, but you will find that every municipality has their own way of deciding the amount of free basic electricity. Some municipalities provide more free basic electricity than others, some don't provide this service at all. In many municipalities, you have to register on the indigence register to receive free basic electricity.

The South African national government has two policy processes in place that decide what electricity sources the government uses and invests in, and how much the government will charge their residents for electricity. These processes are the Integrated Resources Plan and the Multi-Year Price Determination.

The Integrated Resources Plan (IRP) is the National Electricity Plan which plans the expansion of the country's electricity supply for the given period. It is supposed to be updated by the Department of Energy every two years. During the updating process, all citizens have the opportunity to have a say on the decisions that are being made, and how the decisions might affect you.

The process to determine the electricity price is called the Multi-Year Price Determination (MYPD) process and is organised by the National Energy Regulator of South Africa (NERSA) every two to three years. Every time price increases gets discussed with Eskom, a public stakeholder consultation takes place where an opportunity is provided to hear the publics concerns.

The National Energy Regulator of South Africa (SA) sets the guidelines – also known as electricity reticulation guidelines or NRS 047-1:2002 – as to the quality and how electricity services are provided. These guidelines are then adapted by the different municipalities into local by-laws.

NRS: National Rationalised Standards.
Reticulation guidelines: Guidelines or rules in the trading or distribution (of electricity).

What this means is that there maybe some differences in how each municipality implements these guidelines. To find out what the specific rules and regulations are for your area - call your local electricity call centre. In the following section, the key guidelines are outlined:

Query

Location in reticulation guidelines document

FOR QUOTES FROM THE COUNCIL on the installation of a new meter or if you want to increase your electricity supply (guidelines section 4.2.2): Once you have submitted the required documents (the council will tell you what you need), the following time frames for quotation apply:
a) within 10 working days where existing infrastructure can be used;
b) within 1 month where network extensions are required.

For faults in electricity meters: Firstly to check if there is an actual fault – by following the steps in the energy audit guidelines section of this booklet to establish your actual electricity useage. If there is a fault with your meter, you can have your meter checked. Be aware that you maybe required to pay (guidelines section 4.1.1.g) a "cost-related fee in advance to cover the cost of the investigation. Such a fee will be refunded should the complaint be justified."

For new electricity connections

(guidelines section 4.2.3):

You will need to pay for the service and comply with the requirements for your site provided by your council electricity service provider. Once you have done this, the following timeframes apply for the provision of supply:
a) within 30 working days where existing infrastructure can be used;
b) within 2 months where LV network extensions are required and within 3 months where MV network extensions are required

As a prepaid meter user

It is within your right to request information from ayour local electricity office on the following topics:

a) the type of electricity token to be used and how to purchase and use the token;
b) the applicable tariff (which shall also be displayed at the vending stations);
c) the location of points of sale of tokens and the hours of business;
d) the contact telephone numbers and addresses of the licensee's service centres, where service queries and queries concerning the meter can be handled;
e) the process for dealing with meter accuracy queries and the fees charged for accuracy audits;
f) the process that the licensee will follow when it is impossible to gain access to a customer's premises, and therefore to the meter;
g) the process that will be followed when penalties are applied for tampering with, or bypassing, a pre-payment meter;
h) the process for disconnecting the service; and
j) where applicable, the process for the recovery of any electricity account arrears.

In addition to this section 4.9.2.2 says that the council must develop a process for reporting defaulters and people tampering that is confidential and it is their responsibility to communicate that to you.

If your ***prepaid meter is disconnected*** (guidelines section 4.4.7): the meter should be reconnected within 48 working hours of receiving a request and the payment of the reconnection fee (except in the case of hard disconnections or service removals after tampering has taken place – which means when they have taken out the box and the wiring).

For reporting faults or queries: According to section 4.6.3 of the guidelines - when you log the fault or query you will need to supply your name, a contact phone number, your physical address and the nature of the fault or query. If you live in an informal area, you will need to supply the electricity pole number along with the details of the site. Remember to keep the reference number for your reported fault or query.

For general customer requests (guidelines section 4.6.4): For example moving of meters, moving of street lighting, changing of meters and changing of tariffs) should be replied to in writing by the council within two weeks of receipt of a written request. The reply should include information on the cost to the customer, the customer's obligations and the time frame for the carrying out of the request.

It is your right as community members to communicate with electricity officials. If you feel that no forum exists for you as a community to talk with the council about electricity officials then you can demand that your electricity department take place in integrated development plan (IDP) meetings, or that they must set-up a new forum to make this happen. (guidelines section 4.9.3).

There are two groups of energy sources – non-renewable and renewable. Both groups of energy sources are available in South Africa.

Non-renewable energy can be a fuel (like oil) or solid material (such as coal) that we know will run out at some point in time. This means that at some point in the future there will be no more oil or no more coal left to use. Non-renewable resources cannot be replaced. As they become harder to find or extract from the ground they become more expensive.

Some examples for non-renewable energies are:

Coal:

Coal

Historically, South Africa has been dependent on coal as a source of energy. Coal is used in three ways: it is converted into electricity by Eskom, it is converted into liquid fuels by Sasol or it is used directly for cooking or industrial processes. Most of the electricity available in South Africa is generated from coal. The burning of coal to generate electricity is one of the main contributors to climate change, producing large amounts of carbon emissions. While the mining of coal provides many jobs, this does have negative impacts on our environment (high water usage and land degradation) and our livelihoods. Some of these negative impacts include lost jobs that could have been generated through technologies like solar and biogas that can create more jobs, or through lost farming opportunities that come about through polluted land and water sources (with the removal of farmland for mining; polluted water supplies contributing to malnutrition).

Nuclear

Nuclear:

Nuclear energy is promoted as a low-carbon alternative to coal powered electricity in South Africa. Only a small amount of uranium (a source of nuclear energy) is needed to create a large amount of energy. However there are many concerns around the production of electricity frof nuclear energy:

Impacts of nuclear: There might be less carbon emissions during the electricity generation process from a nuclear energy station, but the construction, mining, fuel preparation and transport produces a lot of carbon emissions.

Cost of nuclear: New nuclear power stations in South Africa come at a high cost, Which, in the end, will have to be paid for by the residents through higher taxes and higher electricity costs.

Political will: The nuclear industry has a lot of support from the South African Government, yet most of the plans for nuclear power stations are being made behind closed doors, making the process open for corruption. South Africa has the ability to provide enough sun and wind to generate a mix of electricity to feed the electricity grid but is poorly backed by the government in comparison to the nuclear industry.

Waste and safety: In the production of electricity from nuclear energy, highly toxic and radioactive waste is generated. It is not clear where to store the nuclear waste in the long term and we have no idea what future risks the waste may pose and what costs there are likely to be in the future to ensure our safety.

Renewable energy is energy that comes from natural sources that can be regenerated such as sunlight, wind, water movement and, to some extent, biomass (plants and waste). South Africa has a sunny and windy climate and large areas of unused land, which can be used to provide energy from wind and solar generation stations. Trees and waste from agricultural crops can also be turned into energy. Since plants and trees can regrow, this resource is considered renewable as long as we use less wood and plants as we grow.

Here are some of the common renewable energy forms explained:

Solar energy:

Solar energy is energy (heat and light) from the sun:

Solar water heating (SWH) uses sunlight for heating water in the same way that a black surface like the road gets hot in the sun. You can make use of these water heaters at home to save money on water heating instead of using a normal electric geyser. In most electrified homes, water heating is one of the biggest users of electricity and installing a solar water heater normally reduces electricity use for water heating by around 65%, so installing one of these can save you a lot of money over a few years.


Wind Turbine


Solar Water Heater

Photovoltaics (PV) turn solar energy into electricity by using a solar panel to create an electric current. The solar panels can be used on a large scale to make electricity for commercial purposes like Eskom, or they can be used on a small scale for home use. They are especially useful as a cheap alternative to lighting a home instead of using candles or Eskom power. Many of the commercially available solar home lighting systems can also charge other items like cell phones or small TV's. A PV portable light can cost under R100 and lasts for three to four years. Bigger solar PV systems can power many things in your home. While the initial investment towards the system will be much more than what you would pay for electricity now, as electricity prices continue to go up, the system will save you money over time. For people living in areas that do not have access to electricity from the grid, the solar energy system is an effective way of accessing electricity. It is very important to make sure that the appliances that you want to run from the solar system are as energy efficient as possible.

Wind energy:

A wind turbine is a generator that produces electricity by using the wind to turn a motor. While wind turbines can also be used for generating electricity for homes, it is less user friendly and reliable than solar PV systems. Currently, wind turbines are mostly used by Eskom to generate electricity. Wind energy is clean and cheap, and it is now being used more widely in South Africa and around the world.

Cost comparison (2016 prices) in electricity generation (per unit):

Technology	Cost per unit of electricity (kWh) in Rands
Coal	R1.1 - 1.2
Nuclear	R1.2 - 1.3
Solar	R0.6
Wind	R0.6

HOW MUCH ELECTRICITY DO WE USE?

Simple electricity audit

A SIMPLE ELECTRICITY AUDIT IN YOUR HOME CAN HELP YOU TO WORK OUT HOW MUCH ELECTRICITY YOU ARE USING ON A MONTHLY BASIS. YOU WILL ALSO BE ABLE TO FIND OUT IF THE ELECTRICITY METER READING MATCHES YOUR ACTUAL ELECTRICITY CONSUMPTION. **YOU WILL NEED TO COLLECT THE FOLLOWING INFORMATION:**

How many Watts (measured in W or kW) does your appliances use?

This information can be found on the appliance (on the side or the bottom of the appliance). It is the number followed by W (watts) or kW (kilowatts).

Note: 1kW = 1000W.

How many hours per day do you use these appliances for?

Note: Using 1000W (or 1kW) for one hour is 1 UNIT of electricity - 1 kW HOUR, or 1 kWh.

SIMPLE AUDIT CALCULATION – EXAMPLE FOR LIGHTING:

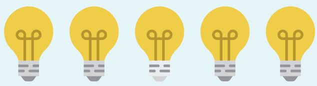
SCENARIO: In a house there are five 60W lightbulbs that are in use from 6pm-10pm (4 hours).

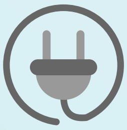
CALCULATION: Number of appliances multiplied by number of hours in use multiplied by the wattage (W).

5 lightbulbs multiply by 4 hours in use multiply by 60W equals: 1200Wh.

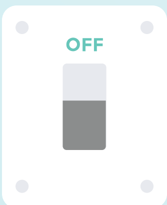
1000W is equal to 1kW, so 1200Wh is equal to 1.2kWh.

RESULT: The electricity usage of five 60W lightbulbs for one evening (4 hours) is: 1.2 kWh





If 1 unit of electricity costs R2.12 then using 1.2 kWh in one evening will cost: R2.54. Over a year, it would cost: R928.56 (R2.54 x 365 days in a year)



If your electricity usage calculations are largely different to the meter readings you are receiving, switch off appliances when they are not being used, look out for additional connections that may not be authorized or alternatively, contact your electricity department.

CONVERSIONS

Watts or "W" is a measure of power use or how much energy something needs in order to work

Watt hours or "Wh" is the amount of power used over a period of time – it is always measured in hours

One thousand watts is equal to **one kilowatt**

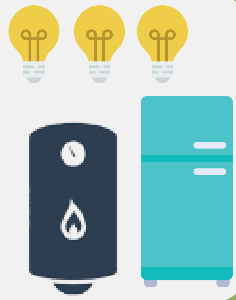
1 kilowatt hour is **one thousand watts of power used in one hour**

1 kilowatt hour or "1kWh" equals **one unit of electricity**

EXAMPLES FOR OTHER APPLIANCES

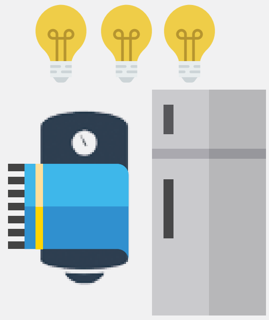
Calculate how many units of electricity you use in a day for the three scenarios below:

SCENARIO 1:
Geyser – not insulated; standard fridge; incandescent light bulbs x3
Geyser: 5 hours (2600W); Fridge: 2 hours (250W); x3 incandescent light bulbs (100W): 6 hours



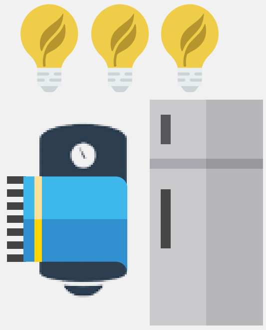
Electricity usage calculations:
Geyser: ☐ hours in use x ☐ wattage = equals ☐
Fridge: ☐ hours in use x ☐ wattage = equals ☐
Incandescent lightbulbs: ☐ number of lightbulbs x ☐ hours in use x ☐ wattage = equals ☐

SCENARIO 2:
Geyser – insulated; more energy efficient fridge; incandescent light bulbs x3
An insulated geyser can reduce the electricity use of the geyser by around 20 percent.
More energy efficient fridge: 2 hours (100W); x3 incandescent light bulbs (100W): 6 hours



Electricity usage calculations:
Geyser: 5 hours in use multiply by 2600W (wattage) equals 13 000Wh
– 20 percent reduction to 13 000Wh
Fridge: ☐ hours in use x ☐ wattage = equals ☐
Incandescent lightbulbs: ☐ number of lightbulbs x ☐ hours in use x ☐ wattage = equals ☐

SCENARIO 3:
Geyser – insulated; more energy efficient fridge; CFLs x3
An insulated geyser can reduce the electricity use of the geyser by around 20 percent
More energy efficient fridge: 2 hours (100W); x3 CFL (compact fluorescent lightbulbs (25W): 6 hours



Electricity usage calculations:
Geyser: 5 hours in use multiply by 2600W (wattage) equals 13 000Wh
– 20 percent reduction to 13 000Wh
Fridge: ☐ hours in use x ☐ wattage = equals ☐
Compact fluorescent lightbulbs (CFLs): ☐ number of lightbulbs x ☐ hours in use x ☐ wattage = equals ☐

SCENARIO 1 ANSWERS:
Geyser: 5 hours in use multiply by 2600W (wattage) equals 13 000Wh
Fridge: 2 hours in use multiply by 250W (wattage) equals 500Wh
Incandescent light bulbs: 3 lightbulbs multiply by 6 hours in use multiply by 100W (wattage) equals 1 800Wh

Total: 13 000Wh plus 500Wh plus 1 800Wh equals 15 300Wh

1 000Wh = 1kWh (1 unit of electricity)
So 15 300Wh divided by 1000 equals 15.30kWh (units of electricity)
Running the geyser plus fridge and three incandescent lightbulbs will use 15.30 units of electricity (and will cost 15.30 x R2.12 = R32.43) R32.43 in Rands per day.

SCENARIO 2 ANSWERS:
Insulated geyser: 5 hours in use multiply by 2600W (wattage) equals 13 000Wh (as above) • 13 000Wh x (20/100) equals 10 400Wh
Energy efficient fridge: 2 hours in use multiply by 100W (wattage) equals 200Wh
Incandescent light bulbs: 3 lightbulbs multiply by 6 hours in use multiply by 100W (wattage) equals 1 800Wh

Total: 10 400Wh plus 200Wh plus 1 800Wh equals 12 400Wh

1 000Wh = 1kWh (1 unit of electricity)
So 12 400Wh divided by 1000 equals 12.40kWh (units of electricity)
Running an insulated geyser plus energy efficient fridge and three incandescent lightbulbs will use 12.40 units of electricity (and will cost 12.40 x R2.12 = 26.28) R26.28 in Rands per day.

SCENARIO 3 ANSWERS:
Insulated geyser: 5 hours in use multiply by 2600W (wattage) equals 13 000Wh (as above) • 13 000Wh x (20/100) equals 10 400Wh
Energy efficient fridge: 2 hours in use multiply by 100W (wattage) equals 200Wh
Compact fluorescent lightbulbs: 3 lightbulbs multiply by 6 hours in use multiply by 25W (wattage) equals 450 Wh

Total: 10 400Wh plus 200Wh plus 450Wh equals 11 050Wh • 1 000Wh = 1kWh (1 unit of electricity)

So 11 050Wh divided by 1000 equals 11.05kWh (units of electricity)
Running an insulated geyser plus energy efficient fridge and three compact fluorescent lightbulbs will use 11.05 units of electricity (and will cost 11.05 x R2.12 = 23.43) R23.43 in Rands per day.

The rule is simple: If something feels hotter or colder than air-temperature then energy is being used to make it hot or cold. So if you feel around the edge of your fridge door and it is cold, then cold air is leaking out and you should replace the seals. If you feel your geyser pipes and they are hot, then heat is being lost through your geyser and the pipes, and you should insulate them. If you feel your light bulbs when the lights are switched on, and they feel hot, then the bulbs you are using are not energy efficient.

Keeping the lights on for less: Change your lightbulbs

Switching your lights on in your home at night should not cost a lot of money. Check: Take a look at the lights at your home. How many do you have? What lightbulbs are you using? How many hours per day/ night are they in use?

If you use incandescent lightbulbs (Image 1) there are affordable alternatives available in super-markets and hardware stores.

1

2

3

IMAGE CREDIT: WWW.FREEPIK.COM

Switch to:

1. Compact fluorescent lamps (CFLs) they can use over 75 percent less electricity than incandescent lightbulbs (Image 2).
2. LED or light-emitting diode lights (Image 3) use even less electricity than CFLs and last longer. LED lights are much more expensive than CFL and incandescent lightbulbs. But the price of LED lightbulbs is expected to go down as the technology improves.

Switch off lights when there is no one in the house or room to use it.

Keeping the warm air in: Insulate your ceiling and seal gaps in doors and windows

1) Ceiling insulation

Wearing a beanie on your head and a good jacket keeps you warm in winter. In the same way, you can keep your home warm by keeping the space above and around your home warm. Check: Look at your roof and windows and doors and feel if there is any cold air coming into your house.

Ceiling insulation

Draft protector from piping insulation

IMAGE CREDIT: ROBERT TYABJI

Insulate your roof or ceiling. You can buy insulating material for your ceiling and roof from your local hardware store. With a good ceiling and roof insulation your house can be up to 5 degrees warmer in winter. Stop the warm air from escaping and the cold air from entering your home. Seal your windows and doors by placing draught proofing strips in the gaps around your windows and doors, or place a rolled up towel (door sausage) at the bottom of your doors. The proofing strips can be bought at a hardware store.

2) Draft protector from piping insulation

Keep doors and windows closed at all times and your curtains closed at night. If you are using gas, keep at least one window open to stop build up of toxic gases and allow some air flow.

Materials and equipment:

- Flashband roofing waterproofing
- Wood nails
- Metal or rubber washers (flattened bottle caps also work)
- Hammer
- Craft knife
- Tape measure
- Radenshield or Sisalation ceiling insulation foil

Materials and equipment

Why this works?

Insulating your ceiling works in a very similar way to the insulated cooking box. In summer, the insulation material will help keep a room that is cool for longer. In winter, if you use heating to warm the room, the ceiling insulation will help keep the heat within the room for longer.


1

How to:

1. Measure the inside of your roof from roof beam to roof beam and then add on 20cm to the measurements.
2. Cut the insulation foil to this length (remember to include the additional 20cm to both the length and the width).
3. Use the washers to nail the sheet into place between the beams going from left to right (or right to left) on one side of the one beam before moving to the other beam making sure to keep it pulled tight all the way around.
4. Cover the whole roof leaving as few air-gaps as possible.


2


3


4

SOLAR WATER HEATING TO CONNECT GEYSER

Materials and Equipment:
- 10 metres of 25mm black water pipe
- 50 x 500mL plastic cool drink bottles
- Polycarbonate sheeting
- Tape for connecting and sealing connections

Why this works?
The main idea here is to heat the water as much as possible BEFORE it goes into your geyser because the hotter the water is when it goes in, the less energy you have to you to heat it up. Doing this is actually very simple.

It is advisable to seek the assistance of a trained plumber in setting up the solar water heating system.

1. Run the piping outside and on to the roof. The best location for the piping is on the north facing side of your roof where it will get the most sun.
2. Insulate the piping by either covering the pipe with polycarbonate panels, or by sliding 500mL empty plastic cool drink bottles over the pipe (this helps keep the heat around the pipe).
3. Connect the other end of the black pipe to the water container/small geyser.


1


2


3


Materials and equipment


Insulated pipe

Please be aware that the water in the geyser could be very hot and could be a burn hazard. Please take care.

SOLAR WATER HEATING

Materials and Equipment:
- 1 x pair of scissors or craft knife
- 1 x length of black pipe
- 1 x 25 litre water container (ideally with a tap connection)
- 2 x hose connectors
- 1 x roll plumbers tape
- 1 x tap
- Lots of 500mL clear cool drink bottles

How to:
Cut the top and bottom off the cool drink bottles, trying to keep the top as close to the size of the pipe as possible.

Slide the bottles over the pipe and connect the plastic bottles end to end trying to keep as few gaps as possible between the bottles. Then connect the pipe to the tank and the tap to the pipe using the connectors (the end of the pipe with the bottom of the bottles should be closest to the tank).

A. Cover the geyser with a blanket to keep the heat in the geyser – most hardware stores should have geyser blankets available. Alternatively, you can use any old blanket/duvet that is large enough.

Keeping the heat in: Cover your geyser and turn down the temperature

Keeping the water in your geyser hot can use up a lot of electricity.
Check: Put your hand on your geyser and if it is very hot it means that the geyser is not keeping the heat in well. A geyser that does not work well, uses more electricity and costs you more money.

B. The hot water from the geyser moves through the pipes from your geyser to your kitchen and bathroom taps. Cover the pipes with insulating material (material that keeps the heat in like a blanket) from a hardware store to prevent heat loss.

C. Turn down the temperature to 60 °C on your geyser at the thermostat on the side of the cylinder.

The Tshisa Box

The Tshisa Box is a low cost alternative to conventional solar water heaters. On a sunny day, it will heat 10 litres of water in 4 -5 hours (the sun's ultra-violet rays will also disinfect the water in the Box.
The Tshisa Box does not need any domestic plumbing system and requires no installation. Email info@tshisasolar.co.za

INSULATED COOKING BOX

Keeping food warm/cool

Materials and equipment:

- Large cardboard box with lid – large enough to place a large pot in
- Extra cardboard
- Scissors
- Insulation material – newspaper, straw, old blankets, old cushion/pillow/duvet stuffing
- Reflective material
- Tape

Why this works?

The insulation material traps the heat from the pot for longer. By placing the partly cooked meal in the pot from the stove into the insulated cooking box, it is possible to complete the cooking of the meal using less fuel. The insulated box can also keep the cold items like cool drinks colder for longer, as it traps the cold in.

1. Place insulating material at the bottom of the large cardboard box.

2. Place a piece of cardboard wrapped in reflective material on top of the insulating material.

3. Cut a piece of cardboard that can be bent into a circle and fitted into the cardboard box. Wrap and stick down reflective material around the bent cardboard circle.

4. Cut from the extra cardboard, a circle with the same diameter as the bent cardboard circle. Cover the one side of the circle with reflective material – this will act as a lid. Wrap and stick down reflective material around the cardboard circle out from the extra cardboard a circle with the same diameter as the cardboard circle. Cover the one side of the circle with reflective material – this will act as a lid.

5. Place the bent cardboard circle inside the box.

6. Fill the gaps between the cardboard circle and the cardboard box with insulating material.

The insulated cooking box is now ready.

Lighting cleaner indoor coal brazier fires is another way of improving household air and a good practice to adopt while making the transition to electricity.

The Department of Minerals and Energy (now known as the Department of Energy), the Nova Institute, a Pretoria-based NGO that promotes healthy household practices, and Sasol, have jointly developed a new method called Basa njengo Magogo ("light a fire like a grandmother").

It is named after Gogo Maria Nebelungu Mashinini from eMbalenhle on the Mpumalanga Highveld who is credited with perfecting the technique.

The method calls for covering the coal with dry twigs and paper and then lighting this kindling from the top, instead of from the bottom. By creating a hot zone at the top of the fire, less smoke is emitted per unit of coal combusted. First piloted in 2003 in Orange Farm, south of Johannesburg, the Department of Energy has since rolled it out to other areas.

There are other options for efficient cooking as well. Efficient cookstoves such as the Eco-Zoom (pictured below) can improve wood use by as much as 40% and reduce smoke by as much as 80%, helping to save time, money and your health.

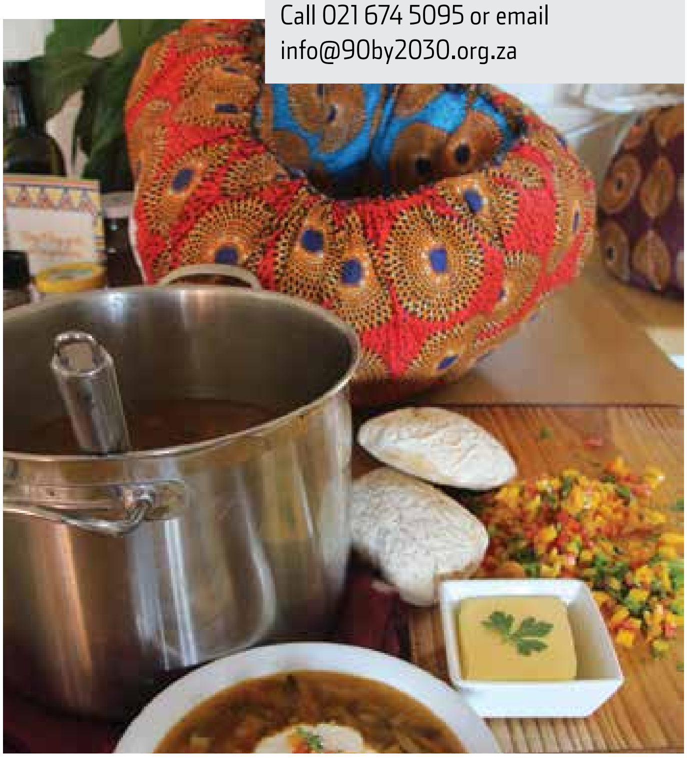
IMAGE CREDIT: MMATHABO MRUBATA

These stoves work by not only burning the wood, but by burning at a much hotter temperature which burns the smoke too. Another efficient cooking appliance is that of an induction cooker. It looks like a normal stove, but it is very different because it uses magnetic energy to heat magnetic metal pots and pans. This means that steel and iron pots and pans will work, but pyrex or aluminum pots won't work.

The Keep It Bag

The Keep It Bag is an alternative to the insulated cooking bag that works on the same principles – by keeping the heat from the partly cooked food in the pot for longer to allow the meal to complete the cooking process without using fuel.

The Keep It Bag can be purchased from:
Project 90 by 2030
for R300 (plus postage)
Call 021 674 5095 or email
info@90by2030.org.za



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