

MyGreen Home Guide

Based on the experience of the Ngewana family

FOREWORD

KADRI NASSIEP, CEO OF SANEDI



‘The best time to start is now’

Reading through this guide, it won't take long before you find these words from Lutholuthle Ngewana. It's not a quote from a renowned African poet, or a scientist or a politician. It's advice from Lutho, the 17-year-old son of the Ngewana family who took on the My Green Home challenge.

There are no better words to describe the spirit of this unique project that turned a fairly ordinary South African suburban home into a much more sustainable home, which halved energy and water consumption within a few months, and reduced their waste going to landfill by over 80%.

As the CEO of South Africa's National Energy Development Institute (SANEDI)¹, I believe that this has been a fantastic demonstration project for energy efficiency and SANEDI has taken pride in participating and sharing the outstanding results of My Green Home.

South Africa is still undergoing energy generation challenges which would be easier to overcome if every one of us helps to relieve the national

power grid by saving energy at home (and at work).

My Green Home has shown that every one of us can save a substantial share of electricity, waste and water by simply being aware of high-consuming appliances in our everyday life, and by using them consciously.

Our country is blessed with gifts from nature, such as solar irradiation and biomass. So it is equally interesting to see that certain cost interventions pay for themselves over time, and this is a showcase of some of the renewable energy and corresponding technologies of the future in South Africa.

It is my great honour to introduce you to the My Green Home Guide which has been compiled by the Green Building Council of South Africa with diligence, passion and expertise and co-funded by the German Government through the South African German Energy Programme (SAGEN).

We can only sustain our life on this planet if we join the Ngewana family on the journey to change our homes to help change the world. Let us also heed Lutho's words and start changing some life habits rather right now than tomorrow. This guide will show us how.

Kevin
CEO, South African Energy Development Institute (SANEDI)

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¹ SANEDI is a state owned entity which was established under South Africa's 2008 National Energy Act.

EXECUTIVE SUMMARY [Webisode: <https://vimeo.com/101516989>]

This guide is for South Africans who know they want to go green at home, but are not sure where to start. It offers practical advice organized into No-Cost, Low-Cost and Invest-to-Save categories. The ideas are chosen for maximum impact at minimum expense and effort, using the experience of My Green Home.

The Ngewana family took on the My Green Home challenge and succeeded in reducing their electricity consumption by 53 percent, water by 44 percent, and waste to landfill by 81 percent in their suburban home, all in a few months. These were the effects of No-Cost, once-off actions and daily behaviour changes combined with a major retrofit that supplied the house with technology for energy and water efficiency. The steps recommended here will help other households that also wish to save money by going green.

For those who want to approach the greening process methodically, measuring their results, the first step is to establish a baseline. Ideally, gather a full year's worth of records to calculate annual or, even better, seasonal average daily or monthly consumption of electricity in kilowatt hours and water in kilolitres. An eco-audit, using our recommended free tools, can help identify where most of that power and water is being used.

No-Cost changes are an obvious starting point, and allowed the Ngewana family to save 32 percent on electricity and 26 percent on water before a cent had been spent upgrading their home. Three actions that might take an hour or so can make a big impact, potentially saving the Ngewana family R4 500 over a year.

1. Lower the thermostat on an electric geyser to 55° or 60°.
2. Reduce pool pump hours to 4 to 6 hours in summer and 2 to 3 in winter.
3. Discuss with whomever does the household ironing which items truly must be wrinkle-free and which could be just smoothed and folded.

Daily behaviour changes with the greatest potential for saving are:

- Set the washing machine to use cold water for all colours of clothing.
- Avoid using a tumble dryer.
- Switch off lights and televisions when leaving a room.
- Take short showers, ideally 2 minutes long.

My Green Home defines Low-Cost changes as those requiring an outlay of less than R1 000. Two extremely cost-effective purchases are low-flow shower heads and LED light bulbs. A simple bucket test to determine whether more than 2 litres of water is caught under the shower in 12 seconds indicates whether a shower head needs to be replaced with a more efficient version. LED lights — including motion sensor lights for outdoor security — were used throughout the Ngewana home, resulting in 74 percent savings on the electricity used for lighting so far.

Other examples of important Low-Cost actions:

- Purchase and use electric blankets, hot water bottles and other targeted heat sources instead of heating an entire room or house.
- Set up a compost heap and/or worm farm at home or use municipal composting to reduce the impact of household organic waste on both landfills and the atmosphere.
- Choose low-VOC and no-VOC paints to avoid the toxic fumes from ordinary paint.

Invest-to-Save actions may cost the most, but they often save the most, too. The Ngewanas sharply reduced their electricity use for hot water and the pool pump with the help of two important investments. A 300 litre, flat-panel solar water heater replaced the geyser in the house and helped cut water-heating costs by 61 percent, comparing March to September. (An efficient heat-pump was also installed to provide water to a shaded outbuilding with no solar potential.) And a variable-speed pool pump using just 300 watts — less than half the wattage of their previous pump — helped bring down the annual cost of running the pool by about R3 500.

The Ngewanas enjoyed major winter savings as they stopped using electric heaters entirely with the help of two investments: insulation and a closed-combustion, wood-pellet stove.

My Green Home has made ample resources available for those who want to learn more. In addition to the complete guide that follows, an [abridged summary guide](#) describes the most effective actions, and the website www.mygreenhome.org.za has a wide range of resources. The lesson of My Green Home is clear: With well-targeted changes, any South African home has the potential to become significantly more energy efficient and greener, generating savings for both the household and for the environment.

Join the family that changed their home to help change the world.

My Green Home is made possible with main co-funding from the German government through the South African-German Energy Programme (SAGEN). It is also supported by the 49M campaign, Karebo Systems, the South African National Energy Development Institute (SANEDI) and a range of product sponsors and partner organisations.

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1 Introduction

"Humanity is increasingly living beyond our means - we currently consume 50% more natural resources than the Earth's ecosystems can replenish."

Worldwide Fund for Nature (WWF)²

Throughout the world, the unsustainable production of waste and pollution weighs heavily on the Earth and its inhabitants. Industry and businesses most often shoulder the blame. But middle-to-high-income households, where well-meaning citizens try to create safe and healthy environments for their families, are also responsible for a disproportionate share of the pollution, depleted resources and waste that threaten the wider environment.

South Africa is faced with multiple challenges that highlight the importance of energy efficiency in homes. Electricity tariffs have more than tripled since 2008. The threat of load shedding looms regularly, with households being asked to reduce demand on the strained national grid. And the government has committed the country — one of world's most carbon-intensive economies — to address climate change with a 40 percent reduction in greenhouse-gas emissions by the year 2025, compared to a 'business-as-usual' trajectory.

For these reasons and more, South Africans want to find ways to make their homes more efficient and lighten their environmental footprint. But where to start?

"The best time to start is now."

Lutho Ngewana

To address the gap between the desire to 'do the right thing' and the knowledge and action required, representatives Green Building Council of South Africa, the South African National Energy Development Institute and the South African-German Energy Programme developed a plan for a green living challenge. My Green Home was inspired by the German Efficiency Plus House project in Berlin, (Appendix 1) in which a family moved into Germany's most efficient model house to test it for 18 months. Their energy consumption as well as the renewable energy generated at the house was monitored very closely and gained a lot of media attention.

But in the case of My Green Home, with no super-efficient pilot house available in South Africa, a typical suburban family and their existing home were used, with a focus on achieving efficiency through education, behaviour change and retrofitted efficient technology. Their journey would be made public through social media, traditional media and the My Green Home website.

The Ngewana family, headed by two successful professionals and living in a five-bedroom suburban home, accepted the challenge. Like many South Africans, they had a strong interest in making a more positive impact on the environment and in reducing utility costs, but had not taken any major steps in that direction. Over six months in 2014, they made a remarkable transformation.

² wwf.panda.org/what_we_do/how_we_work/conservation/one_planet_living/

- **Electricity consumption:** ↓ **53%**
- **Water consumption:** ↓ **44%**
- **Waste to landfill:** ↓ **81%**

The choice of a family with incomes and a lifestyle above the South African average was intentional. Mid-to-high income households generally use the most electricity, consume the most environmental resources and generate excessive waste and pollution — and therefore have the greatest potential to make a significant impact. The Green Building Council had previously completed a project in Cato Manor demonstrating the opportunities for efficiency improvements in low-income households. (See [Case Study](#))³

This guide summarizes the best lessons learned in the process of helping the Ngewana family to green their home, with an emphasis on actions that have the greatest impact for the least effort and cost. The practical steps outlined here can help any South African household to share in Ngewanas' success, to join them as a family that is changing their home to help change the world.

1.1 The My Green Home process, March to September 2014

The project was divided into three main stages:

- **Stage 1:** The first month (March 2014) was 'business as usual' for the family, to establish a baseline by measuring household consumption in detail. Eight electricity meters were installed to monitor usage by lights, geyser, etc., with live updates provided on the [Dashboard](#) of the My Green Home website.⁴
- **Stage 2:** During the second month (April 2014), the focus was on behaviour change. The family receiving training on No-Cost interventions and was challenged to see how much they could reduce their consumption through behaviour change alone. They rose to the challenge, reducing electricity consumption by 32 percent.
- **Stage 3:** The retrofit took place during the third month (May 2014), installing energy efficient technologies—such as new lighting, appliances and a solar water heater—as well as other greening interventions. Results were monitored closely through September 2014.

³ www.gbcsa.org.za/knowledge/case-studies/?cat=87 (scroll down)

⁴ mygreenhome.org.za/webisode/count-the-savings/

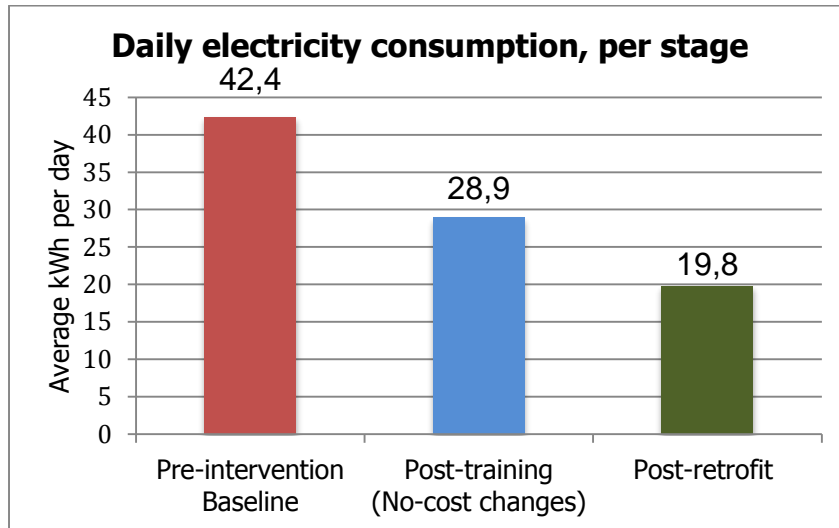


Figure 1: Average daily electricity consumption in the three stages.

1.2 Meet the family

[Webisode: <http://vimeo.com/91935425>]

The Ngewana family are a stylish, clever, fun-loving, open-minded South African family of leaders, selected in part for their potential as role-models.



The parents (Bulelwa and Zwelethu) are professionals in high-profile jobs, with two children (Thulisa, aged 22 and Lutho, 17), and a niece (Unam, 14) who spends weekends with them. A domestic worker, Vanessa, works in the home six days a week. She also received training and was requested to actively participate in the project.



Their home is a double-storey house with five bedrooms, three lounges, a dining room, a kitchen and two bathrooms. There is a swimming pool, an outbuilding (laundry, storeroom and separate flatlet), as well as a double garage, on property of about 880m². The Ngewanas have lived in their Cape Town home for 11 years, and it had significant scope for retrofit and upgrade options.

South Africans came to know the Ngewana family and to follow their journey through the website (www.mygreenhome.org.za), on Twitter, and on video clips ('webisodes') that showed the family taking action to save energy and live in a more environmentally conscious way.

"I'm quite keen for the family to see it as moral as well as social obligation to make a change."

Bulelwa Ngewana

2 Greening your home: Where to start

[Webisode: <http://vimeo.com/92144568>]

The Ngewana family indicated that they, like many other families around the country, were keen to “go green”, but were simply not sure where to start. Most of us know that it is important and that we can save money, but we are unsure what should be done first and how to go about it all.

An important phrase to remember is that ‘if you can’t measure, it you can’t manage it’. We recommend the following main actions taken by the Ngewana family:

1. Understand your consumption and costs
2. Set your goals
3. Take action to save

2.1 Understand your consumption and costs

Get your consumption data

To set your goals and monitor your progress, you first need to know how much electricity and water you have been using — your baseline.

For billed electricity accounts

All Eskom or municipal accounts show your monthly consumption in kWh units. (A kilowatt hour, or kWh, is equal to using 1000 watts — a kilowatt — for an hour.) This is the amount of electricity you are paying for.

The monthly figures over 12 months will be useful for tracking your savings in the coming year and beyond. It’s best to compare usage to the same month or season in previous years, since winter heating demands greatly increase consumption in the colder parts of South Africa. Take note of any months that are billed based on estimated, not actual readings. To fix estimates, you may want to calculate a monthly average from one actual reading to the next.

For pre-paid electricity meters

Some pre-paid vouchers do not mention kWh, but only ‘units’. A unit is always a kWh.

If you have not kept a year’s worth of receipts to add up, phone your electricity supplier. They should be able to tell you how many kWh (‘units’) you purchased in the past 12 months. Customers who always buy pre-paid vouchers online can get the payments website to generate a history of past purchases.

For water bills

A 12 month record of water consumption is useful, since it can vary so much from dry to wet seasons. On utility bills, monthly water consumption is counted in kilolitres. A kilolitre, or kl for short, equals 1,000 litres of water. Compared to kilowatts, kilolitres are easy to visualize. Picture the water that

would fill a square cube that is 1 meter wide, 1 meter tall and 1 meter deep — which is why many other countries call it a cubic meter (m³) rather than a kilolitre.

For waste

If you want to know your baseline before you start reducing waste sent to landfill, note the number of bins of rubbish you put out on the pavement each week, and how full they are. Also check whether they contain much in the way of garden refuse that can be composted or recyclable paper and packaging.

Calculate your kWh/m²/year number:

How does the electricity consumption of your home compare with the Ngewanas'? Houses come in different sizes, so a good way to compare total consumption from one home to another is to use a simple calculation that takes into consideration your annual consumption and the size of your home. Overall electricity consumption is broken down to a per-square-meter calculation so that allows comparisons across different properties.

A few simple steps to calculate your number:

1. Add up your electricity consumption for the past year. (kWh)
2. Calculate the usable space of your home. (square meters, or m²)
3. Divide your electricity consumption by your usable space. (kWh/m²)

The Ngewana family's electricity use for the year before making changes to their home and lifestyle was 8 880 kWh. They divided this by the size of their house, 218 m², to get their number, which came to 41 kWh/m²/year. (This number is lower than it might have been in other years, because the pool pump was not operating for much of 2013, and they were traveling frequently that year.) For more details on making this calculation, see [How to calculate your kWh/m²/year energy rating](#).⁵

There are other ways to quantify the energy rating of your home. One is to divide the annual kWh by the number of people in the household. Your raw annual kWh number is important too, especially because it highlights the efficiency benefits of a small house. Living in a home no bigger than you need is a first step towards having a green home.

Finally, if you want to monitor your daily consumption, first divide your annual consumption (kWh) by 365 days so you have a benchmark for comparison. The Ngewana family were using 42 kWh per day in the month before they began greening. (At the end of the baseline period, it was discovered that the pool pump had been running 24 hours day on override. If this number were recalculated using their more usual routine of running the pump 10 ½ hours a day, their daily consumption would have been 36 kWh.) After making several No-Cost changes, consumption fell to 29 kWh/day. And since the house was retrofitted with a solar water heater, LED lights and more, consumption per day has fallen much further. From May through September, the family averaged 20 kWh daily, and that included the worst of winter. Looking at the most recently measured month alone, September, they averaged less than 15 kWh/day!

⁵mygreenhome.org.za. (Click on Where to Start, then under Useful Tools click “calculate your home’s annual number”)

Get your cost data

If you know your tariff per kWh, you can work out how much you will save if you reach your target, or estimate your savings from a particular change or investment. Various calculators, such as [Eskom's Comprehensive Energy Audit Calculator](#)⁶ or the [Eurolux Energy Saving Calculator](#),⁷ require your tariff per kWh to estimate your savings from going green.

Electricity tariffs for residential consumers in South Africa generally range from R1,20 to R1,90 per kWh in late 2014. With Eskom and most municipalities, the more you use, the higher the rate you pay for each extra kilowatt hour. This is called an 'inclining block' or 'step' tariff. If you receive monthly bills, look for the highest rate listed on your account and add 14% VAT to the given rate to know your real cost. (Calculator shortcut: tariff x 1.14) That's what you will save for each kWh you save above the highest tariff threshold.

Pre-paid tariffs per kWh usually do not appear on vouchers. Most South Africans can find their prepaid tariffs listed [here](#)⁸. Again, you will need to add VAT.

Do an eco-audit:

Where are the energy hogs hiding that are pushing your utility bills higher? In the kitchen? At the pool? In the roof space? Every home is different, and it helps to understand your unique situation. The Ngewanas sought the answers by doing a manual eco-audit at home so that they could know which lights and appliances used the most energy. Another option is to use an online calculator to do the eco-audit calculations for you. Either way, you will learn where to target your efforts to maximize savings and return on investments.

Option A: Manual audit

To do a manual audit, you check the wattage of all the lights and appliances and estimate the hours each of them is used per day to see where your energy use is concentrated. The Ngewana family went through each room, making a list of all the appliances and recording their wattage.

For example they counted all the lights and checked on each light bulb to see how many watts it used. They then noted how many hours a day each light was used. In the lounge there were six downlighters, rated at 50 watts each. These lights were used on average for about four hours a day. By comparison, the 1900 watt kettle is switched on about 20 minutes a day. The calculations and results are shown in the table below. (Watts are divided by 1000 to convert to kilowatts.)

⁶ www.eskom.co.za/sites/idm/Pages/Home.aspx. (Click on "Calculate your energy costs".)

⁷ www.eurolux.co.za/calculator.php

⁸ www.prepaid24.co.za/ (Click on "Help", then "FAQ", then "Tariffs and Charges".)

Appliance	Power (watts)	Usage (hours/day)	Number of items	Average kWh per day	Average kWh per month
Downlighters	50w	4 hours	6 lights	$50 \times 4 \times 6 = 1200 / 1000 = 1,2 \text{ kWh / day}$	$1,2 \times 30 = 36 \text{ kWh /mo.}$
Kettle	1900w	0,3 hours	1 kettle	0,57 kWh /day	17,2 kWh /mo.

The kettle has a higher power rating, but is used for only short periods. The lights use fewer watts than the kettle, but consume more kilowatt hours of energy per month because they are on for more hours. (By comparison, the Ngewanas' geyser was using 12,7 kWh per day.)

You will need to look at all the lights and appliances in your home to make a complete table, like an expanded version of the table shown above. Further instructions for a manual eco-audit begin on page 65 of the downloadable [Cape Town Smart Living Handbook](#).⁹

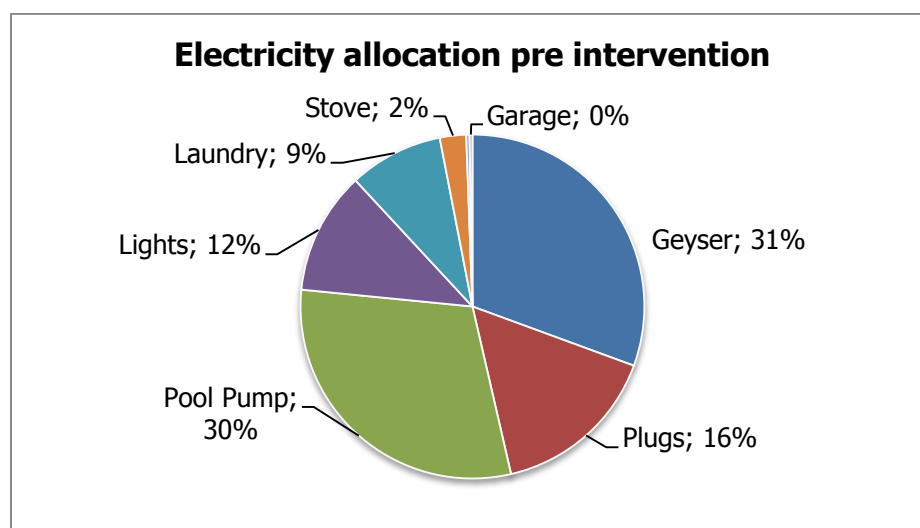


Figure 2: Electricity consumption at Ngewana home as a percentage of total, in Phase 1, before interventions. (Metered)

Option B: Eskom's Audit Calculator

Alternatively you can perform a similar energy audit online, saving time by leaving the calculations to Eskom's Comprehensive Energy Audit Calculator. It will spot the highest areas of electricity use in your home and help you target savings.

To prepare to answer the calculator's questions, first walk around your home with a pen and paper, taking notes on the following:

- The number of lights in each room and their wattages

⁹ www.capetown.gov.za/smartliving

- The approximate size of your fridge in litres
- If you have a pool — the wattage of the pump and the hours it's set to run on the timer
- Your electricity tariff in rands per kWh.
- The size of your home's floor space. (For help in calculating this, see [How to calculate your kWh/m²/year energy rating.](#))¹⁰

The calculator first asks you to create an Eskom user account with your email address, then you begin filling in answers about appliances, lights, and other things that use electricity. The calculator can guess the wattage of most appliances. At the end of the process, a pie chart shows approximately how much electricity in your house goes for lighting, geyser, kitchen, laundry, pool, etc. On a table, you will also see suggestions for where you can save.

Don't be surprised if no single category dominates your home's energy consumption. Greening a home requires making changes in several different ways. Even in a usage category that accounts for only 10 percent of your electricity bill, you may be able to make significant savings. The Ngewanas found that the geyser and pool pump were each using about 30 percent of their total consumption. (Which helped them realize that someone had left the pool pump on 24-hour override for weeks!) Since then, they have cut their geyser and pool-pump consumption significantly. But they have also made dramatic savings in other areas that used less than 20 percent of the total, such as lighting.

2.2 Set your goals

Once you know how much electricity and water you are using — and where — then you can make informed decisions in setting your goals and deciding where you should improve. Setting specific goals and even timeframes for reaching those goals will inspire your family to action and help you to monitor your progress.

One obvious goal that maximizes rands saved is to push your household electricity use down to a lower electricity tariff level. Eskom and the municipalities have different tariff block rates for providing electricity. Tariffs often step up once a household has used 500 or 600 kWh in a month. Find out what your local tariffs are and see if you can set your goal for the most effective tariff block rate.

The Ngewana family found that in 2013 and early 2014 their tariff jumped from R1,42 to R1,73 per unit whenever they used more than 600 kWh units in a month, as they usually did. So they set a goal of staying under that threshold each month. This would require keeping below 20 kWh per day on average.

Their other goals were to save 15 percent on electricity use for the first, 'behaviour change' stage, and 40 percent after the technology upgrade. (The 600 kWh target was an incentive to stretch a little beyond 40 percent.) They aimed to reduce their water consumption by 20 percent — to 36 kilolitres per month — and reduce their waste going to landfill by 75 percent, recycling and composting the rest. Within three months, they had exceeded all of their percentage-reduction goals.

¹⁰mygreenhome.org.za. (Click on Where to Start, then under Useful Tools click "calculate your home's annual number")

Even if the baseline electricity consumption is reduced to compensate for the fact that the pool-pump had been on 24 hours a day, they met their electricity-savings goal — and the 600 kWh target — by September.

2.3 Start saving and make a difference

Once you know your baseline and have set your goals, you can start to taking action to achieve those aims and make a difference. On the My Green Home website and throughout this guide, we divide greening actions into three categories:

- **No-Cost:** Behaviour-change actions that you can do without buying anything. By simply changing your habits and taking some simple, once-off actions you can save 10% or more.
- **Low-Cost:** Buying products that cost less than R1 000 each, which can typically increase savings to around 30%.
- **Invest-to-Save:** This is for maximum savings of 50% or more and will have the biggest impact, but will cost over R1 000 and should be seen as an investment.

If you want to conveniently monitor your progress, various devices on the market will keep track of your electricity consumption for you, providing continuous readouts inside the house and storing records of your usage that you can see in charts and tables online. International studies have shown that when people have regular feedback on energy use inside the house, this awareness causes them to save 5 to 20 percent. The Ngewana home was supplied with a [HomeBug](#) monitor that will continue to track their consumption after the My Green Home meters have been removed.

The Ngewanas also have a similar device that keeps track of water consumption, the [Aquatrip](#). Installed on the water main by a plumber, the Aquatrip monitors and reports consumption wirelessly to an indoor display. It also detects leaks and will shut off the water automatically if a pipe bursts.

Text box:

If you're building a new home . . .

Make it a certified green home by using the green building rating tool called EDGE all the way from the design stage through the construction process. It will also help you calculate upfront costs and potential long-term savings. The EDGE residential tool is available on the IFC website www.ifc.org/edge. Contact the [Green Building Council SA](#) on edgepilot@gbcsa.org.za if you wish to have your home certified.

3 No-Cost changes

[Text box: My Green Home's top 5 No-Cost ideas:]

Turn your geyser down to 55°-60°

Shorten pool pump hours

Take a short shower

Reduce the ironing pile

Wash clothes in cold water

Without spending a cent, the Ngewana family managed to cut their electricity consumption by 32 percent in one month, just through changing the way they did things. (Even if the pool pump had been running normally during those stages, No-Cost savings would have been 27 percent.) They had the advantage of training sessions with their own sustainability consultant to show them how to save, but everything they learned is contained in this guide. Research shows that anywhere from 4 to 40 percent can be saved simply through behaviour change at no additional cost, with a typical range of 10 to 30 percent for those making a serious effort.¹¹

They also reduced water consumption by 26 percent and their waste to landfill by 81 percent through recycling and composting.

Here are some of My Green Home's most effective No-Cost actions.

3.1 Hot Water

[Webisode: <http://vimeo.com/95253105>]

Turn your geyser down to 55°–60°

Most electric geysers are set to a scalding 65° or higher. Every 5° drop in the thermostat setting saves about 10 percent on water heating, improves the cylinder's lifespan and protects your family from accidental burns.

Remember to first switch off the electricity to the geyser at the distribution board to ensure your own safety. (If you are doing any DIY electrical work on an appliance or lighting fixture, disconnect it from power before you start.) You will need a torch, screwdriver and ladder to get up into the roof space where your geyser is kept. For some homes, the geyser may need to be set at 60° in winter to provide enough hot water, but test to see if you can drop it to 55° — especially in warmer periods. However, do not set it below 55° to prevent breeding unwanted bacteria and possible diseases like Legionnaires'. For detailed advice, see this illustrated explanation of [how to turn down a geyser thermostat](#).¹²

Lutho Ngewana climbed into the roofspace and found the geyser had been set to 70 degrees. He turned it down by 10 degrees, having an instant impact on the family's consumption. The lower thermostat setting combined with short showers (see below) helped the Ngewanas reduce the electricity used by the geyser by 40 percent.

Take a short shower

A bath typically uses 80 to 120 litres of water. (Up to 240 litres if it's totally full.) A two-minute shower with a low-flow shower head uses at most 19 litres of hot water, consuming just a fraction

¹¹ European Environment Agency (EEA) Technical Report No 5.2013, 'Achieving energy efficiency through behavior change: what does it take?' ISSN 1725-2237

¹² handytechtips.blogspot.com/2008/05/wheres-my-geysers-thermostat-how-do-i.html

of the water and energy needed for a bath. That could save a few thousand rands worth of water and electricity per year for a family of four. The Ngewana family held a competition among the family members to see who could shower in the shortest time. Lutho won the contest with his two-minute showers.

Switch off the geyser when you go away

If you go away from home for a few days, a flick of the wrist at the distribution board is one of the easiest ways to save electricity. The element heats up a few times daily if you leave it on, to ensure that the water stays at a certain temperature. When you get back, you will need to give the geyser a couple of hours to heat up again. With a geyser timer, you can also automatically switch off for periods of the day, especially during Eskom's peak hours of 5 to 9 pm.

3.2 Lighting

Switch your family on to switching off

The Ngewana family cut the electricity needed for lighting by 11 percent just by becoming more conscious of turning lights out whenever they left a room. In fact, Thuli now says, "It's become like an itch you have to scratch if some of the lights are on in a room when nobody is using it." If your family is not yet in the habit of switching off as they walk out of a room, look for ways to make them more aware of wasted lighting. For example, try taping a piece of string from the top of each doorway to eye-level as a reminder for a month. Or start your dinner only once they have switched off the lights in unoccupied rooms.

"It's become like an itch you have to scratch if some of the lights are on in a room when nobody is using it."

Thuli Ngewana

Let the sun shine in

It may seem obvious, but make it a habit to reach for the curtain or blind cord in the morning rather than the light switch. Studies have shown that natural light can reduce stress and improve health and productivity, on top of energy-saving potential. In the summer, however, watch out for heat build-up. In the afternoon, close curtains on northwest- and west-facing windows to help keep your home cool in the summer, but open up in winter to warm up.

If you paint your walls a lighter colour they will reflect more of the natural light coming through the windows and reduce the need for switching on electric lights. There are also paints with light-reflective particles that boost reflectivity significantly.

3.3 Heating and Cooling

Put your windows to work

Ideally, all South African homes should be north-facing, so that windows can take in the winter sun, with an overhanging roof to shade those windows from the summer's high sun. This is called 'passive

solar heating'. Even if you have a north-facing house, however, you have to help it to take full advantage of solar heat. As soon as the winter sun is shining, open all curtains to let the warm sunshine in. But leave windows and doors tightly shut until temperatures peak in the afternoon. (If the day warms up at all.) That's the time for fresh air. Seal up again before it gets cool in the evening, with heavy curtains or blinds on windows so you don't lose precious heat. In summer, close curtains of western-facing windows against the hot afternoon sun, but you can open the windows to allow airflow.

Dress for winter success

Cottons are cool, but in winter, wool, fleece and insulating synthetics trap heat much better, keeping you warmer for longer. Use layers for added warmth and control. Slip on another layer before you switch on the heater. We lose a lot of heat through our heads, so get that covered. Scarves also make a big difference. Why spend money heating the whole room, when it's just your body that needs to be warm?

Give your air conditioner a winter job

Though air conditioners are best avoided if possible, they do have a quirk that you can put to use in winter if you already own one: they are more efficient at heating than at cooling. Compared to ordinary electric heaters, most air-conditioners can generate two or three times more heat per watt. If located high on a wall, make sure their louvers direct the air towards the floor. Also make sure your air conditioner is serviced regularly.

3.4 Appliances

[Webisode: <http://vimeo.com/96069923>]

Keep your clothes out of hot water

No matter which model of washing machine you own, selecting the coldest water setting will use just a fraction of the power consumed by a hot wash. Don't be surprised if your whites start to look whiter. That grey look often comes from colours that have bled in hot water.

Reduce the ironing pile

A steam iron is one of the most energy-hungry appliances. The solution is not a higher-tech iron; it's a smaller pile of ironing. Avoid pressing wrinkles that will never be seen anyway. Underwear, fitted sheets, pajamas and exercise gear don't usually need the energy wasted on them. At the Ngewana home, Vanessa used to iron all of the laundry on their instructions. When the family scrutinized their weekly ironing pile, they found that only about a third of the laundry items really needed to be ironed. You can watch them laughing their way through this sorting exercise on the [Appliances](#)¹³ webisode at the My Green Home website.

Wait for the sun, don't tumble dry

Along with your oven and geyser, the tumble dryer is the appliance most likely to boost your utility bill. Rather check the weather forecast and wait for a sunny day to use the washing line. If a domestic helper makes the laundry decisions, consider an incentive for lowering electricity consumption during work hours.

¹³ mygreenhome.org.za/webisode/appliances/

Cook without using the oven

An oven-cooked meal can use two or three times the electricity of a stove meal and takes longer to cook. Try to incorporate some of your family's favourite stove-cooked or cold meals into your meal planning. Every time you rest the oven and stove in the summer, your house will stay cooler too.

Set your fridge

Check your refrigerator to make sure that it is set to the optimal temperature, because for every degree colder than necessary, its electricity consumption by goes up by about 8 percent. If your fridge has a built-in thermometer, 4° Celsius is the lowest possible setting you might need, but you can probably set it higher. If you store raw chicken and meat, you need to keep them at 4° in the coldest section of the fridge. This will be at the back of the bottom shelf or at the back of a higher shelf near the vents where cold air enters the fridge.

Built in thermometer or not, you can use an outdoor thermometer, a refrigerator thermometer, or better yet a thermometer in a glass of water in the fridge to check the temperature. Keep a shelf for raw meat at 4° Celsius, but any colder and you are wasting electricity. Processed meats, fruits, vegetables and bottled drinks don't need to be any colder than 6°. If your refrigerator is colder than needed, increase the temperature setting, or if it has a control dial with index numbers, turn it to a lower number. This simple change can reduce the energy consumption, while still keeping your food fresh. The freezer can be set to -18° rather than -24°.

Tip: Whenever you defrost items from your freezer, use your fridge to defrost them. It might take a longer — so put it in the fridge at least the night before — but it supports the cooling in your fridge and reduces electricity consumption. It's also safer than defrosting at room temperature, which can allow bacteria to grow.

3.5 Waste and Toxics

Reduce, reuse and recycle — in the right order

The first step is to see how you can create less waste in the first place, so consider if you really need something or not. Consider buying re-usable or returnable items and packaging and avoid disposable items. This has to happen when you are selecting products in the shop, and places importance on 'eco-procurement'. Once you have considered how you can reduce and reuse, then look at what you can recycle.

Help the recyclers by separating your waste

[Webisode: <http://vimeo.com/96078463>]

Some municipalities offer recycling bags or bins for kerbside collection. (The Ngewana family is lucky enough to have this option and has used it to reduce their waste to landfill by 81 percent.) Some communities have private businesses that will pick up your recyclables for a fee. But nearly all South African neighbourhoods have an army of informal recyclers working hard to process our waste. Whichever recyclers are collecting from you, give them a hand.

- **Separate.** Valuable paper and corrugated cardboard becomes worthless if dirty. So even if informal hawkers are taking your recyclables, separate them to place beside your bin. Putting

aside plastic bottles, food tins and aluminium cans also spares hawkers from digging in your bin, so separate them to place beside your bin. Next to the house, keep a dedicated recycling bin or bins with your normal waste bin. A kerbside recycling service may allow you to mix all recyclables in one bin, or you may need to separate paper from cans and bottles. In the kitchen, a small, sealed bin on or under the counter makes it easy to collect peels, tea bags, etc. to be emptied later into your compost heap or bin. The Ngewana family empties these scraps into their worm farm.

- **Decontaminate.** Dirty recyclable materials produce odours in your recycling bin and spoil paper and cardboard. Toss cheesy pizza boxes into the rubbish. Give cans and bottles a quick rinse — but don't waste hot water on them — and leave the lids off since they may be made of a different recyclable material. Vases and drinking glasses belong in the rubbish. They will contaminate the recycling of jars and bottles because they are made from different glass.
- **Accumulate.** Recyclables that are heavy or low in value, such as glass or newspapers, may not get collected at the kerbside. They're still worth recycling, however. Save them up until you have a load to carry to a recycling bank.
- **Locate** Use the resources below to find the nearest drop-off locations. MyWaste has locations for a wide variety of recyclables, including unusual items such as car batteries and used cooking oil. For bottles, cans and paper, it may help to check MyWaste in combination with the other websites for those items, since the lists on all websites are often incomplete.

[MyWaste¹⁴](#)

[Mpact Recycling paper banks¹⁵](#)

[Glass banks¹⁶](#)

[PETCO, for plastic bottles¹⁷](#)

Keep toxics out of your cupboards

The list of unhealthy chemicals in cleaning products is very long, and few labels list every ingredient, but you can make a start at greening your cleaning with a few basic guidelines. First, buy and use only what you really need. Fabric softener and furniture spray for dusting are relatively easy to live without. Second, avoid a few common ingredients: ammonia (ammonium hydroxide), formaldehyde (or formalin) and bleach (sodium hypochlorite). Third, look for unscented and low-odour products;

¹⁴ www.mywaste.co.za

¹⁵ www.mpactrecycling.co.za (Click on Paper Bank.)

¹⁶ www.theglassrecyclingcompany.co.za

¹⁷ www.petco.co.za (Click on Collection Points.)

if it has a strong smell or fragrance, it's better not to breathe it in. Fourth, avoid sprays, which increase the quantity of chemicals you can inhale.

For more information, see the consumer guidelines for healthy cleaning and choosing appropriate cleaning chemicals by the US based [Environmental Working Group](#).¹⁸

3.6 Outdoor and Transport

Don't work the pool pump overtime

Whoever told you to run the pump 8 or 12 hours a day doesn't pay your electricity bill. With such long run times, your pool could be one of your biggest power users, as the Ngewana family found out. Research shows that 4 to 6 hours is enough in summer for most pools and just 2 to 3 hours in winter. Zweli Ngewana usually had his timer set to 10 ½ hours. He brought that all the way down to 3 hours for winter and will increase it to 4 or 5 in warmer weather. Even if he hadn't switched to a more efficient pump, reducing hours by making two seasonal timer adjustments would have saved him R2 500 in electricity over the next year. A pool cover further reduces the number of hours needed, especially if it blocks the light. Every pool is different, so monitor it and adjust the hours if the water does not stay clear.

Table: Potential savings from changing the Ngewanas' pool pump running time

	kW	Hours/day	kWh/day	R/kWh	R/day	Days	R/year
Original setting	0.62	10.5	6.51	1.868	12.16	365	4439
New settings, lower hours							
Winter	0.62	3	1.86	1.868	3.47	90	313
Spring, summer, autumn (est.)	0.62	5	3.1	1.868	5.79	275	1592
Total							1905
Savings							2533

Water wisely

Clever gardeners save water and keep their plants beautiful by limiting when and where they water. Young plants need water while taking root, but most established plants and lawns can go dormant and live without water in South Africa's dry-winter regions. In wet months, rainfall is usually sufficient. You need to water only if a finger pushed 5 cm into the soil finds no moisture. Then soak the bed deeply every other day at most. Watering in the heat of the day causes evaporation losses and is illegal in some municipalities; water the garden only before 10am or after 4pm. Focus your irrigating on just the most visible and thirsty patches of your garden.

Get on your bike and ride (or walk)

Short car trips contribute significantly to pollution and fuel consumption per kilometre because the engine hasn't warmed up. Consider walking or cycling for shorter trips, which could even save you time if you use it to replace other exercise. If hills, distance or sweaty weather are keeping you from

¹⁸ www.ewg.org/guides/cleaners/

cycling, consider an electric bicycle. Lutho's social life really benefitted during the months he used the Octave electric bike, on loan to the family from [Cycology](#).

4 Low-Cost purchases

[Text box: My Green Home's top 5 Low-Cost ideas:]

Replace your bulbs with LEDs

Install a low-flow shower head

Stay secure with motion-sensor lights outside

Use targeted heat sources in winter

Compost your greens

In general, major investments like solar water heaters, heat pumps and variable-speed pool pumps yield the largest savings, but many examples of green technology are affordable enough for any budget. In fact, some Low-Cost purchases — such as LED lights and low-flow shower heads — are obvious starting points when greening any house. At My Green Home, an investment less than about R1000, including installation, is categorised as Low-Cost.

The Ngewana family made a whole range of Low-Cost additions to their home. The best ideas are described below.

"It starts off small, and it spreads, by you making a conscious decision to make a change. It doesn't have to be something huge, but it does have to be something."

Thuli Ngewana

4.1 Hot Water

Install a low-flow shower head

Replacing your shower head is a cheap and easy way to save both water and the electricity used to heat it. It is surprisingly simple to replace a shower head without the help of a plumber. (This [YouTube video](#)¹⁹ shows you how.) And with modern, aerated shower heads you will feel a blast of water, not just a trickle.

To see if you need a more efficient shower head, first do the 'Bucket Test'. Hold a bucket under the shower spray for 12 seconds and see if you collect more than 2 litres. If so, your current shower is using more than 10 litres a minute. Low-flow heads use less than 10 litres.

¹⁹ www.youtube.com/watch?v=fiv4Zq9v4co

The Ngewanas did the Bucket Test on their three showers and found that the flow rate ranged between 12 and 20 litres per minute. All three were replaced with water-efficient options, with flow rates of 6 to 9 litres per minute. A single-lever thermostatic mixer was installed in the newly renovated bathroom shower — to get to the ideal temperature more quickly — and they made use of a shower timer. The shower heads and efficient bathroom and kitchen aerator taps were sponsored by [HansGrohe](#). The family also decided to do a renovation of the downstairs bathroom to remove a bath and replace it with a shower, with tiles sponsored by [Saint-Gobain Weber Tylon](#).

Text box: Counting the savings

If the Ngewanas had never gone green, and used an average of 15 litres per minute during four, three-minute showers each day, over the course of the year they would use about 66 kl of water, at a cost of R1 719. They would also have to pay a sanitation charge to the municipality for a portion of that water, adding another R881. On top of that, to heat the water with electricity would require more than 2 000 kWh at a cost of R3 852, for a grand total of R6 452. Cutting that in half with shower heads that use just 7.5 litres per minute would save R3 226 in a single year, all as a result of shower heads costing just a few hundred rand each!

Connect a timer to your geyser

A geyser timer is essential for managing a solar water heater, and can even help with an ordinary geyser, especially by keeping your geyser off during Eskom's peak hours of 5 to 9 pm. You will need an electrician to do the installation. The Ngewanas use [Geysewise](#), a South African product, to control not only operating hours but also the thermostat temperature for the electric element in the geyser. It can be set with different temperatures for four separate segments of the day, allowing maximum control to minimise the use of the electric element while still supplying adequate hot water to the family. And since the panel is inside the house, Lutho will never again have to crawl in the roof space to adjust the thermostat!

Keep the heat inside your geyser

To check whether your geyser is wasting electricity by letting heat escape, do the Geyser Hand Test. By simply putting your hand on top of the tank, you can get an indication whether it needs added insulation or not. If you feel heat, it's being wasted and you paid for it. Also check the surrounding pipes and ensure that any warm pipes are insulated.

Installation of a geyser blanket and hot water pipe insulation is quick and easy to do yourself and costs between R300 and R500. The geyser insulation products provided by [Saint-Gobain Isover](#) for the Ngewanas' home come in a DIY kit.

4.2 Lighting

[Webisode: <http://vimeo.com/96056933>]

Replace your bulbs with LEDs

Light-emitting diodes (LEDs) are the lighting of the future, but you can start saving with them today. While they are still relatively expensive, they are already much cheaper than in the past and the return on investment is significant, often paying for themselves in less than a year. They also last

much longer than incandescent globes or even compact fluorescent lamps (CFLs). LEDs are best suited to replace halogen downlighters, but you can now find them in nearly any shape or reflector angle, in most wattages and warm colours.

Banking on LEDs (Text box)

Say Mr Banks and Mr Green each have R1 000 to save or invest, and each has ten 50 watt lights in his home that could be replaced by more energy-efficient LED globes. Mr Banks leaves his old bulbs in place, putting his R1 000 in a 5 year fixed-deposit bank account that pays 8 percent annual interest. Mr. Green rather invests his R1 000 in 7 watt LEDs to replace those ten older globes.

Five years later, the R1 000 that Mr Banks deposited has grown to R1 490. But Mr. Green is now much richer than Mr Banks. He has saved R5 525 on electricity and another R316 on replacement bulbs, since LEDs last much longer. The new globes were such a good investment, it's as if Mr Green had earned nearly a 32 percent annual interest rate.

The Ngewanas' house was switched entirely to LED lighting, inside and out. The biggest impact came from upgrading the energy-intensive downlighters with 7-watt GU10 LED lamps to replace the 50-watt halogen bulbs. They are rated to last 30 000 hours — or about 30 years! In other rooms, A-type globes (the classic bulb shape) and candle-shaped LED globes were fitted in both existing and new fixtures. All lighting was sponsored and installed by [Eurolux](#).

The results were dramatic, as can be seen in this chart. It shows that the electricity flowing to the lights in the house dropped off somewhat during the behaviour-change period (blue) and then was slashed to a minimum after the LED retrofit (green). In all, electricity for lighting fell by 74 percent, even as the seasons shifted into the darkest weeks of winter, which meant longer hours of lighting.

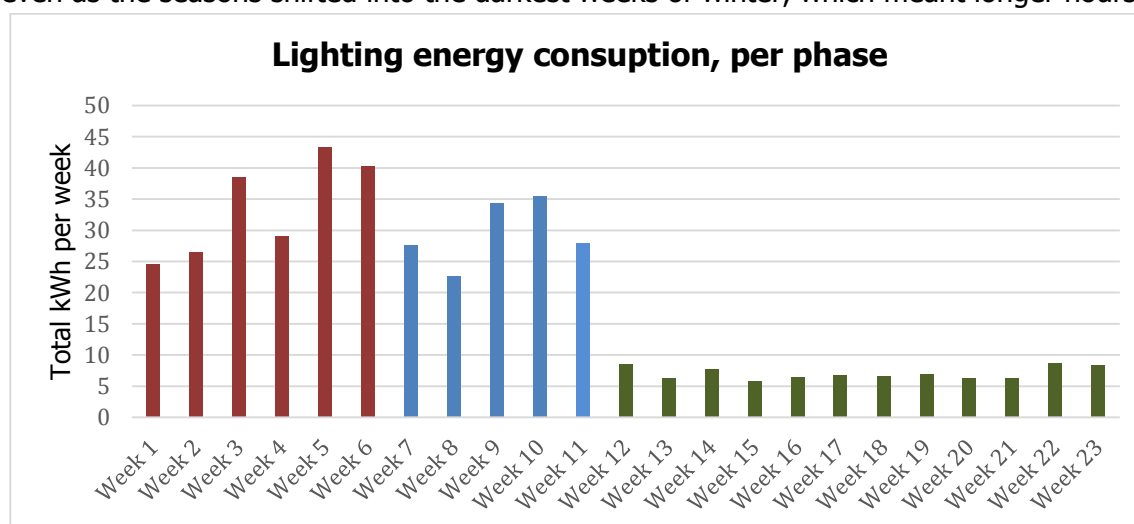


Figure 3: Weekly total energy consumption (kWh) required for lights in the three phases: pre-intervention baseline (red), post-training (blue) and post-installation of the LED lights (green).

Text box: **My Green Home's bulb buying advice.** (Taken from the My Green Home [Guide to Globes](#).)²⁰

²⁰ mygreenhome.org.za. (Click on Lighting and then on Guide to Globes under Resources at bottom of page.)

Just select your lighting need from the eight options below and follow the suggestions.

1. Starting from scratch, buying new ceiling fixtures



Purchase fixtures that use mains-voltage GU10 bulbs. (Like the bulb on the right.) For every room where the lights are on for an hour or more per day, buy major-brand LED bulbs for between R50 and R150 in the equivalent to 35 watt or 50 watt halogens. Equations such as '7w = 50w' should be prominently displayed on the packaging.

2. Replacing 60 watt incandescent bulbs in table lamps, pendants, etc.

LED equivalents in this wattage are a little harder to find and more expensive — R140 to R250 for reputable brands — but they will pay for themselves within a couple of years if the light is on two hours a day or more. Be aware that in this shape, LED globes shine more of their light upward, away from the base. So the bulb will seem brighter hanging with the base up, such as in the pendant on the right, than it will base-down, like in a table lamp. If the upfront cost is more than you can afford or you don't use the light much, twist-shape CFLs work well in these fixtures.



3. Replacing 100 watt incandescent bulbs in floor lamps, pendants, etc.

If you need the brightness of a 100 watt globe, your only current options for improving energy efficiency are a halogen bulb using about 75 watts or a CFL that uses 20 watts. Switch to one of these while waiting for LED technology to improve. Brighter, better LEDs are being developed every year.

4. Replacing mains-voltage, GU-10 halogen downlighters

Buy major-brand LED bulbs for between R50 and R150. Even if you use the lights for just an hour a day, they can pay for themselves in about a year. 35 watt equivalent LEDs are often less expensive and easier to find. If you currently use 50 watt halogens, and the room is too brightly lit, consider these.

5. Replacing low-voltage, MR-16 halogen downlighters

Low-voltage bulbs (like the one on the left in this photo) go into fixtures with transformers, which are not necessary with LEDs. If you have an electrician already involved in upgrading your lighting, ask about changing your low-voltage connections to mains-voltage. The parts are inexpensive and it's a fairly simple process. If you would rather not involve an electrician, buy low-voltage, MR16 LED bulbs from major brands for between R50 and R150. Phone around first because they are a little harder to find. As with



GU-10s, above, you can expect to save enough to pay for the bulbs in about a year and might want to consider 35 watt equivalent LEDs.

6. Replacing downlighters on a dimmer



Buy dimmable LED replacements for halogen downlighters. The symbol for a dimmable globe is at the left. If you see the image with an X across it, the CFL or LED bulb is not dimmable. The word dimmable should be prominently displayed on the packaging. If your dimmer is the old rotary style, buy a push-button electronic dimmer designed for LEDs and have it installed by an electrician.

7. Replacing standard bulbs in enclosed fixtures

If your bulb is glassed in with no way for hot air to escape, a CFL is a better replacement than an LED, because the lamp life of an LED will shorten if it gets too hot. If buying fixtures, avoid enclosed lights to prevent this problem.

8. Installing security lights

Buy motion-sensor lights. Even with incandescent floodlamps, if they turn on only when someone walks past, they will use little electricity. If you may leave them on for longer periods, buy LED motion-sensor lights.

Conserve cash with CFLs

Though LEDs have advantages in lighting colour and longevity, compact fluorescent lamps remain a somewhat more affordable way to save energy. And if you need to replace a standard 60 or 100 watt incandescent globe, the equivalent 'twist' CFLs are easier to find than LEDs. Here's a thrifty plan: Make a list of your globes, their wattage and the hours per day they are used. Replace the most heavily used ones, especially downlighters, with LEDs, and the rest with CFLs. With the savings on your utility bills you can buy more LEDs next year.

Stay secure with motion-sensor lights outside

Outdoor lights burning overnight will certainly lead to higher utility bills, but numerous studies suggest they may also light the way for criminals to do their deeds, particularly if high walls shield the property.²¹ Infrared motion-detector light fittings, which switch on when something moves and stay on for a pre-set time, are more likely to surprise unwanted visitors, while using less electricity. The Ngewanas replaced their exterior lights with LED motion-sensor floodlights, reducing electricity consumption further.

Put light only where you need it

Desk lamps, reading lamps and eye-level, under-cabinet fixtures for the kitchen will help you to see what you are doing better, allowing you to turn off unnecessary room lights. Ceiling fixtures tend to over-light rooms, often because too many downlighters are placed in areas where they're not really

²¹ <http://www.newyorker.com/magazine/2007/08/20/the-dark-side-2>,
<http://www.britastro.org/dark-skies/crime.html?00>

needed. Dimmers can help, but they save less energy than you might expect. Try 'de-lamping' by removing a bulb or two if there are too many downlighters.

The Ngewanas had additional 'task lighting' added at the kitchen counter and in bedrooms (table and desk lamps) to give them targeted light.

4.3 Heating and Cooling

Dodge the draft

If you like fresh winter breezes, leave your windows open and bundle up. If you prefer a warm house, hunt down the drafts blowing under doors and around windows. Trace their edges with a burning stick of incense or the palm of your hand to find air leaks and block them with self-adhesive foam tape, often called 'weatherstripping'. Attach a 'sweep' to the bottom of a door to close the gap to the floor, or use a beanbag 'snake' or 'sausage'. Check the ceiling for gaps where heat escapes, such as the attic hatch. These are all cheap and easy ways to improve comfort and contribute to the insulation of your home. The Ngewanas bought some weatherstripping tape from their local hardware store for less than R100 and installed it to block drafts coming in through some quite big gaps around their wooden windows and doors before the winter cold set in.

Put heat where you need it

If you must use electric heat in the winter, make sure it goes only where you need it, especially because our homes in South Africa are generally not very well insulated. An electric blanket, hot water bottle or fan heater all direct the heat to warm you up quickly. Infrared or quartz bar heaters are also efficient as long as you are in front of them. They don't heat the air, so switch them off as soon as you move away. Avoid underfloor and wall heating, which waste by warming indiscriminately. If you need to keep a room warm, an oil-fin heater works well, but make sure you close the doors and windows to keep the heat in. Buy heaters with timers and/or thermostats to avoid wasting energy. For large spaces like a lounge, gas is even better. (See '[Go green with gas](#)' and '[Give your fireplace a window](#)', below.)

4.4 Appliances

Try the coolest stove — an induction cooker

Induction stoves are the latest in kitchen appliances. They're popular with chefs because they save time by heating so quickly, but they are also energy efficient. For high-temperature cooking, an induction stove uses about 30 percent less energy than an ordinary hob. Since magnetic fields heat the pots, the stove plate stays cool, but you'll need iron or steel cookware. Take a magnet along if you need to shop for new pots. You can buy a counter-top, single-plate induction cooker for about R1000, to supplement a less-efficient ordinary electric stove. [Snappy Chef](#) installed a two-plate induction stove and two-plate gas stove to replace the old electric hob in the Ngewanas' kitchen.

Add a rainy-day drying rack

When there's nothing but rain in the forecast, resist the urge to resort to the tumble dryer and rather invest in an indoor drying rack. Consider the wide range of possibilities shown [here](#).²² First use a high-speed spin in the washing machine to reduce drying time, then shake out each item and smooth it before hanging, so that much of the laundry dries without wrinkles and won't need to be ironed.

Switch the stove off and keep cooking

A very cost effective and easy way to cook is by using an insulation cooker. Bring your food to the boil, turn the stove off and pop the pot into an insulated bag or box. The food slow-cooks using the retained heat, so you save up to 60% on energy. Your meals won't burn, and the safety risk is reduced. Insulation cookers are great for rice, porridge, soups or stews. They cost R200 to R400, and free recipes are available online. Bulelwa Ngewana now uses a [Wonderbag](#) insulation cooker.

4.5 Waste and Toxics

Keep your greens in the garden

When you throw biodegradable refuse like food and garden waste in the bin, it goes to the landfill where it breaks down into methane gas, which has a global warming potential 21 times greater than that of carbon dioxide. Rather keep your grass clippings and other greens in the garden by turning them into fertilizer. You can start a compost heap at home at a nominal cost for your kitchen fruit and vegetable offcuts and garden refuse. Keep the composting vegetation damp and regularly turned to speed up the process. Or you might let worms do the turning for you by starting a worm farm. Many South African municipalities also have drop-off sites for garden refuse to be composted. The Ngewana family reduced their waste to landfill by four-fifths in part by using their compost heap and a small, R600 worm farm sponsored by [WizzardWorms](#).

Use micro-fibre instead of chemicals for cleaning

The purest cleaning chemical of all is H₂O, and a relatively new kind of cloth makes water an effective cleaner too. Micro-fibre cloths are made with fibres 100th the diameter of a human hair, split to make them grab hold of dust, oils and dirt better. The smoothest micro-fibre cloths, slightly dampened, can clean windows, TVs and PCs without any chemicals. Follow up with a dry micro-fibre cloth to polish. Micro-fibre mops and dusting cloths can reduce or eliminate the need for chemicals for most of your other household cleaning. They can be washed repeatedly, but not with fabric softener. Find them alongside dish cloths in most supermarkets.

Breathe easy with low-VOC paints

Your nose knows volatile organic compounds, even if you've never heard of VOCs. They create the 'new car smell', most 'air freshener' type scents and the odour of fresh paint. Many VOCs are also responsible for smog and irritation or damage to eyes, lungs and other organs. Some cause cancer. The general rule is: When you open a tin of paint and it takes your breath away because of the smell instead of the colour, then you have colourful poison in a can.

²² www.pinterest.com/laundrylist/diy-laundry-drying-structures/

Until recently there were not many options for avoiding VOCs in paint, but today most manufacturers sell low-VOC or no-VOC versions of their paints. Some companies sell only VOC-free products.

The Ngewana house was painted with Breathecoat EcoGuard exterior paint, which contains no VOCs and thus does not contribute to indoor-air health problems or smog formation outdoors. The paint also has no formaldehyde, another important chemical to avoid. The bathroom ceilings and selected interior walls were painted with mould guard. The paint and its application was sponsored by BreatheCoat, [Eco Afrika Lifestyle Paints](#).

4.6 Outdoor and Transport

Grow some of your own food

Here's a scary thought: Much of the money you spend at the shops on food is used in ways that harm the environment. It pays for chemical fertilizers, pesticides, irrigation, truck transport, refrigeration and more. The food you grow in your garden, nourished with your own compost and pesticide-free, carries virtually none of that burden. Ask your kids if they would like to help. What is the cost? For the price of a bag of tomatoes, you can buy a seed packet for a summer's worth of tomatoes.

Use public transport and save

Once you have a car you might as well use it, right? Not so fast. For most cars, the AA Vehicle Rates Calculator will tell you that each kilometre costs well over R1,50 just for petrol, tyres and maintenance. Switch over to a daily commute of 30km each way from that costly car, to the Rea Vaya in Johannesburg, MyCiTi in Cape Town or People Mover in Durban and you could save more than R15 000 a year. Even the Gautrain saves that much when you factor in e-tolls for commuting between Pretoria and Johannesburg. The savings for the air that our children breathe are priceless.

5 Invest-to-Save purchases

[Text box: My Green Home's top 5 Invest-to-Save ideas:]

Install a solar water heater

Consider a heat pump for hot water

Buy a variable-speed pool pump

Use a closed-combustion wood stove or fireplace

Protect your home with adequate ceiling insulation

Some greening options might cost more up-front but can pay themselves off over time from the savings you'll make. Such expenditures should be seen as investments, in both a future of lower utility costs and a healthier environment.

In fact, an analysis conducted by My Green Home in conjunction with financial planners shows that the returns through savings on some green investments can be much higher than the best interest rates paid by banks. For example, a 5 year investment in a variable-speed pool pump can 'pay' a return equal to an annual 21 to 31 percent interest rate, depending upon whether the pump needed replacing anyway or not.

5.1 Hot Water

Install a solar water heater

The question is not: "Can I afford solar?" It's: "Can I afford to keep paying 40 to 60 percent of my electricity bill for a job the sun can do very well for most of the year?" If the cash is not at hand, talk to your bank about using your access bond or a loan. For a family of four or more, the savings should cover the investment in about 4 to 6 years.

The Ngewanas now have a high-pressure solar hot water system consisting of two 2.5 m² flat panels with a 300 litre tank, mounted horizontally, immediately above the panels. The water is heated indirectly; a glycol solution flows into the water tank without an electric pump, using the thermosiphon effect. The tank has an electrical element to top-up the temperature during cloudy weather or when extra hot water is needed.

Savings started out small. A 200 litre system was first installed, which was undersized for this family, and the coldest winter weather hampered performance. But as the sun began to strengthen in September, the replacement 300 litre system was reducing their hot-water electricity spend by well over half, compared to the baseline month, saving them more than R400 a month. If this performance continues, the R28 000 price tag — after a R9 000 Eskom rebate advanced by the installer — will be covered within the expected 4 to 6 year payback period.

The solar water heater was sponsored and installed by [SolarTech](#), a national service provider accredited by the City of Cape Town. The system carries a 10 year warranty.

Text box: Choosing a solar water heater, step by step

When considering installing a solar water heater, follow these simple steps to help you through the decision-making process: (Summarised from the [My Green Home Step-by-Step Guide to Solar Hot Water](#).)²³

- Chose a SESSA-accredited installer, or one accredited by yourcity if you live in Cape Town or eThekweni.
- Decide between **flat-panel** and **evacuated-tube** systems. Flat panels tend to be more durable and trouble-free, but evacuated tubes can create more hot water with limited sun. In general, with a north-facing roof in full sun, flat panels can provide most of your hot water needs. If your roof gets limited sun, evacuated tubes may be necessary.

²³ mygreenhome.org.za (Click Hot Water, then on Guide to Solar Water Heaters under Resources at bottom of page.)

- Choose between a **direct** and an **indirect** system. If you tend to get frost in winter, it would be best to go for the indirect system, in which then sun heats tubes of glycol, which then heats the water.
- Ensure that you select the right **size** tank — a minimum of 50 litres per person and an extra 50 litres for general household use, so a family of four will need at least a 250-litre tank. Two tanks with water flowing between them in series is ideal for high efficiency.
- Decide between a **close-coupled** or **split system**. Because a close-coupled system uses the thermosiphon effect of rising heat to circulate the water, it is less expensive to buy and most commonly used. If you prefer to have the tank inside the ceiling or in the house, a split system can be highly efficient, but it requires a circulation pump.
- An electrical back-up element in the tank is standard in high-pressure systems, but should be managed by a **timer** to control when the back-up element kicks in.
- If your roof pitch is not ideal (flat, not steep) consider installing **brackets** to ensure the optimal angle for your latitude. This can increase winter heat gain by up to 20%.
- Once you have decided on what you want, **get some quotes** for the system and installation. Don't grab the lowest quote without considering quality. Make sure the selected product is SABS approved and ask about warranties, service fees and maintenance intervals. Some installers, banks or short term-insurers even provide financing options.
- Visit the [My Green Home](#), [Eskom](#)²⁴ or [SESSA](#)²⁵ websites for more guidance on choosing the best option for your home.

Consider a heat pump for hot water

If your home is shaded by large trees or the roof is not north-facing, it may not be suitable for a solar water heater. A great alternative is a heat pump, which works like an air conditioner in reverse, using less than half the electricity of a normal geyser. The cost is similar to or slightly cheaper than a solar water heater, and it also pays for itself in a few years. Bear in mind that a heat pump needs annual maintenance, doesn't last as long as most solar panels and makes some noise. It is however much greener and more efficient than an ordinary geyser. With both solar and heat-pump options available, almost no home should have to use an old-fashioned geyser.

The Ngewana home has an outbuilding that required hot water, but a solar was not suitable due to the surrounding trees, which blocked the sun. The existing geyser tank could be used, and an [Alliance](#) heat pump was installed by SolarTech and sponsored by Fourways Air Conditioning. The geyser tank was insulated to reduce heat loss with a geyser insulation kit provided by Saint-Gobain Isover.

***I feel very happy with the amount we're going to save.
Annually we'll save about R18 000; that's a huge savings.***

Zweli Ngewana

²⁴ www.eskomidm.co.za/form/find/A_guideline_to_choosing_a_solar_system.pdf

²⁵ sessa.org.za

5.2 Lighting

Let the sky light dark rooms

Consider installing a light tube or skylight in areas of the home that are dark, such as passageways. It is a simple and effective way to lighten up dark rooms without needing to flick a switch. Skylights will also warm the room, which can be a blessing or a challenge. In hot climates, skylight blinds can help avoid overheating.

The staircase in the centre of the Ngewanas' house initially received no natural light and needed electric lighting even during daylight hours. The roof and ceiling above the staircase were fitted with a solar light tube to bring daylight down from the roof to the ceiling. Bulelwa reports that it even provides enough light from the moon and stars for them to see their way up and down the stairs on most nights, without turning on electric lights. The light tube was sponsored and installed by [Skylite Concepts](#).

5.3 Heating and Cooling

[Webisode: <http://vimeo.com/96069249>]

Give your fireplace a window

Open fireplaces may look charming, but you don't see the heat and pollutants whooshing up the chimney. Modern, closed-combustion fireplaces and wood stoves retain the charm while vastly improving efficiency by controlling the flow of air. Wood pellets, made from scrap wood and sawdust, or firewood from suburban tree fellers are also renewable biomass fuels. Choose a wood-burner if the romance of building a fire inspires you; pellets are for those who value convenience.

The Ngewanas' lounge had an open fireplace that was previously used on occasion with anthracite coal or wood, together with a gas heater. The open fireplace was replaced with a Calore Piazzetta closed-combustion fireplace, burning wood pellets made in South Africa. Using biomass pellets mean that the house is heated using renewable energy.

The stove is fan-assisted and has a small duct at floor level to send some heat towards the downstairs bedrooms. With the warmth from the fire and new insulation, the Ngewana family never needed their electric heaters this winter and greatly reduced their use of the gas heater. In previous winters, they would use about 13 LPG bottles, 9kg each. This winter they used only two. The closed-combustion fireplace was sponsored and installed by [Calore, South Africa](#).

Protect your home with adequate ceiling insulation

Poke your head into the ceiling. If you don't see a thick coat of insulation, you're most likely losing heat in the winter and gaining too much in the summer through the roof. A layer of glass wool or blown-in cellulose made from recycled paper can cut heating costs by a quarter. If summer's heat is your problem, foil insulation under the roof can help reflect heat away. Roof paints specially formulated to ward off the sun's radiant heat are also available. The most appropriate insulation

will depend on your type of roof and the climatic zone you live in. (For more details see this [Eskom brochure on insulation](#).)²⁶

Previously, there was no insulation in the Ngewanas' house. The entire ceiling was fitted with fibreglass batts 135 mm thick,²⁷ sponsored by [Saint-Gobain Isover](#). The insulation is manufactured in South Africa from 80 percent recycled glass. The family has reported that their home was noticeably more comfortable this winter.

Save in summer and winter with ceiling fans

If summer's heat is tempting you towards air conditioning, try a ceiling fan first. It is much more cost effective than an air conditioner, using as little as 1/10th of the electricity to run, while lowering the apparent room temperature a few degrees. Fans do not cool the air, however, only the skin of the person in their breeze. So turn them off when you are not in the room. In winter, use them in brief spurts or in reverse at low speed in heated rooms to push warm air down from the ceiling.

Several rooms in the Ngewanas' home now have efficient ceiling fans sponsored and installed by [Eurolux](#).

Allow summer's heat an escape route

If you are renovating and want a cooler house in the summer, look up. Heat gets trapped at the ceiling. Installing high exterior windows and horizontal 'transom' windows above the doors between rooms can help heat flow through and out of your home. Whole-house extractor fans suck the heat out and draw in cool breezes at night. If mosquitoes cause you to close windows on summer nights, invest in screens over your windows to allow the breeze in.

5.4 Appliances

Choose efficient appliances that make the grade

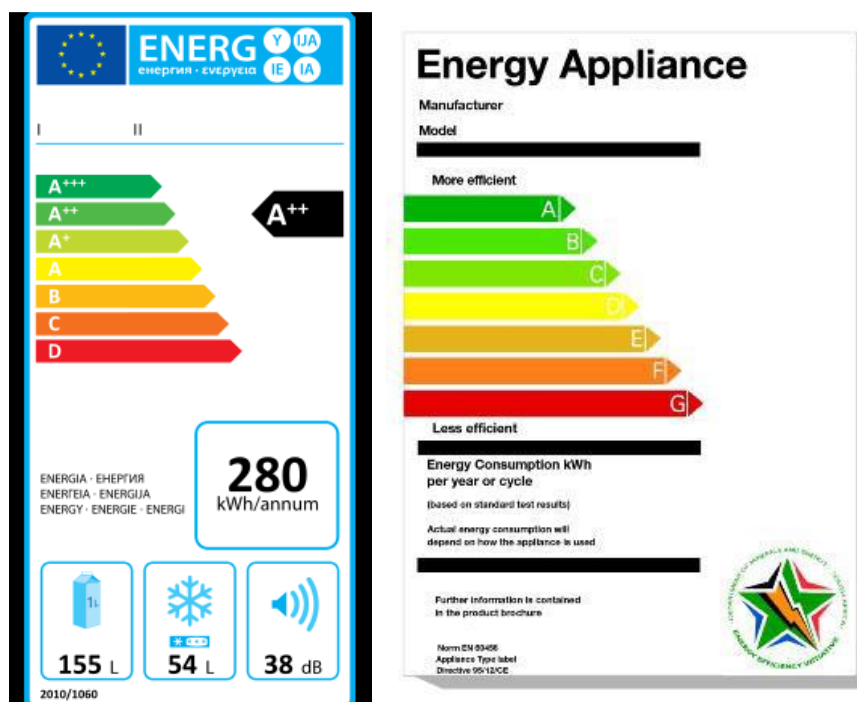
Refrigerators

Refrigerators and freezers vary widely in efficiency, so when buying a new appliance, make sure you check the energy label. Labels are still voluntary in South Africa, so if you don't see a rating, assume it's not efficient, or find the rating in a brochure or online. SA labels max out at A, but if you see an EU label, aim for an A+ or A++ fridge. Also look at the estimated consumption in kilowatt hours. This is what you can expect the fridge to use in a year. The letter ratings are only for comparing fridges of the same size; a smaller A-rated fridge will save you more than a large fridge with an A+. The estimated kWh/annum matters most. If you know your R/kWh tariff — probably well over R1/kWh — you can quickly calculate your savings per year for choosing a more efficient fridge.

²⁶ www.eskom.co.za/sites/idm/Documents/126614ESKD_Insulation_brochure.pdf

²⁷ The insulation has an R-value of 3.38, which combined with the roof and ceiling board is in line with the local climatic zone requirements of the new SANS 10400 energy efficiency standards.

A new Hisense refrigerator with an energy rating of A+ under the European Union's energy rating system replaced the old refrigerator in the Ngewanas' kitchen. The EU estimate for annual consumption is 310 kWh per year. The refrigerator was sponsored by [Hisense](#).



Sample European and South African energy labels

Washing machines

Energy labels on washing machines only compare how much electricity they use on hot washes. So if you plan to save the most energy by running cold-water washing cycles, the labels aren't very useful. Any machine is quite efficient with cold water, so it is more important to make certain that the machine you choose has a 20° or cold-water setting. If you have a good reason to wash in hot water, such as cloth nappies, look for at least an A+ machine. Front-loaders are generally more efficient than top-loaders, and they use less water. If you use a tumble dryer, a fast spin setting on the washing machine can reduce the amount of time and energy needed to dry your clothes.

Tumble dryers

Tumble dryers are not very energy efficient — there is just no way around that fact. Most energy-rated tumble dryers get a C. The most efficient choice of tumble dryer is no tumble dryer. If you need one, however, make sure it at least has a moisture sensor and try to use it as little as possible.

Dishwashers

The labels compare electricity consumption on the 'standard' temperature setting. An 'A' rating is now average, so aim for an A+ or higher dishwasher, if available. And look beyond the ratings, too. An 'Eco' or 35° degree setting will help you save more energy. The power drying option wastes a lot of electricity, so a dishwasher without a 'dry' button is better — or you can just remember to leave it off.

Ovens

EU and SA labels are available on ovens, but they are not often displayed. If you can find an EU label, in addition to the letter grade look for a kWh figure for the electricity used per 'cycle'. This will show you how much electricity is required to heat up the oven. Generally, convection ovens use less electricity because the heat is better distributed by the fan, and self-cleaning ovens are often more efficient because they are better insulated. Smaller ovens also use less electricity than larger ones.

Televisions

Energy labels are rare on TVs in South Africa, but you can still find an efficient one. First look for the wattage on the back of the TV. If you can't find the wattage, as long as you avoid plasma TVs and buy an LED TV that is not larger than you need, it should be fairly energy efficient. Size matters. TVs are measured in inches on the diagonal, from corner to corner of the screen. For every 10 inches larger, an LED TV will use at least a third more electricity. LED TVs in the 40 to 50 inch range should use about 50 watts or less.

The Ngewana family had two televisions: an old cathode ray tube (CRT) model using 52 watts and a liquid crystal display (LCD) model using 110 watts. Both TVs were replaced by LED backlight, 32-inch televisions that use only 35 watts each. The televisions were sponsored by [Hisense](#).

For more information on energy labels, see My Green Home's [Guide to Appliance Energy Labels](#).²⁸

Install a dual-flush toilet

Old-fashioned toilets use about 9 to 13 litres per flush. A modern dual-flush uses a maximum of 6 litres, or 3 for a half flush, saving a family of five at least R1000 a year on their water bill. The latest toilets use even less, and work better than the first generation of water-saving toilets. If you are doing a bathroom renovation, check the water consumption per flush of various models.

Dual-flush toilets by [Lecico, South Africa](#), replaced old single-flush toilets at the Ngewanas' home. The toilets use 4,8 litres of water for a full flush and 2,4 for a half flush.

Go green with gas

Whether heating a room or a pan on the stove, gas has the advantage over electricity in supplying instant heat. Gas stoves and heaters also keep working despite load-shedding. Their green advantage is that switching from electricity to gas cuts the carbon footprint for those appliances about in half. Operating costs using bottled LPG in 2014 are similar to electricity for those paying about R1,50 per kWh; the lucky few in Johannesburg who can connect to piped gas will save much more and have the convenience of not needing to replace gas bottles. Note that a gas installation needs to be done by an accredited service provider, and you need to comply with safety regulations. The Ngewana family have a gas heater — though they use it less now that they also have a pellet heater — and a new combination gas/induction stove from Snappy Chef.

²⁸ mygreenhome.org.za. (Click on Appliances and then on My Green Home's Guide to Reading Energy Labels under Resources at bottom of page.)

5.5 Waste and Toxics

Buy quality and keep it

The 'embodied' energy that went into making the stuff in your cupboard may be even greater than the energy that goes into your geyser. Make sure that you buy only what you need and buy it for keeps. Look for quality in everything from fabrics to construction; for cellphones and PCs that can be easily upgraded and appliances from established brands that keep spare parts available. Every time you opt to repair rather than replace, you keep jobs in South Africa, resources in the ground and pollution out of the air.

Upgrade your tap water

South Africa's major cities pride themselves on excellent drinking water quality. Avoid bottled water that wastes energy, plastic, money and even water; around 3 litres of water is needed to make every litre of bottled water. If your tap water's taste causes you to buy bottled water, improve the taste at the tap. An activated-carbon filter can remove the chlorine taste and will quickly pay for itself as you stop buying bottled water. The bottled water you buy may be only filtered tap water anyway.

5.6 Outdoor and Transport

[Webisode: <http://vimeo.com/96078500>]

Buy a more efficient pool pump

The best-kept secret in home energy savings is what's called a variable-speed pool pump. While most pool owners are using 750w and 1100w pumps, these new models use only 150w to 300w at their lowest settings. Expect to pay R7 000 to R14 000 up front, compared to R2 000 for an ordinary pump, but you should earn all of that money back within a few years as your utility bills drop significantly. What's more, variable-speed pumps are whisper-quiet and long-lasting.

The Ngewanas' house had a small pool pump rated at 550w, which was actually drawing just over 600w. Running 10½ hours a day — and even 24 hours a day on override for long periods — the pump was one of the largest users of energy in the entire house. A new Speck Badu Eco Touch variable-speed pump was installed. At its lowest setting, which is adequate for filtering, it uses 300w. The pump and an LED pool light were sponsored and installed by [Speck Pumps, South Africa](#).

The combination of reduced hours — down to three hours in winter — and the efficient pump has made this one of the most dramatic improvements in efficiency at the Ngewana household. Compared to running their old pump 10½ hours a day, they will save about R3 500 in the coming year at the pool pump.

Cover your pool

You don't want your pool to turn green, but you do want it to *be* green, so consider installing a floating cover. Uncovered, a typical 30m² pool will lose tens of thousands of litres of water each year to evaporation, adding more than R1 000 to your water bill. A cover also cuts chemical use

roughly in half and keeps the pool a few degrees warmer. A heavy-duty, opaque cover lasts longest and controls algae by starving them of sunlight.

Bring back your backwash water

Each time you backwash your pool, you lose 200 to 500 litres of water, so a weekly backwash could add several hundred rands a year to your water bills. One way to reduce wasted water is to check the pressure gauge on the pool filter and only backwash if the needle is in the red zone, or above 120 kPa. Most filters don't need backwashing every week. Another option is to invest in a backwash settling tank.

The Ngewanas' pool now has a backwash tank sponsored and installed by [Water Rhapsody](#). It stores backwash water for 24 hours, while sediment and debris are given time to settle with the assistance of a flocculent chemical. Then the clear water from the top of the tank can be returned to the pool, rather than being released to the sewerage system and replaced by municipal water.

Indigenize your garden

Local is lekker in the garden. Birds and butterflies are attracted to the wild plants they know, and you can cut water consumption greatly with plants that are adapted to your climate. The [SA National Botanical Institute](#) has representation in most metropolitan areas and can assist with advice and indigenous seedlings or plants. Reduce lawn space and ask about replacing your thirsty kikuyu lawn with more water-wise native varieties, e.g. buffalo grass in the coastal Cape or couch grass in the Highveld. Group plants according to their water needs so that you can concentrate irrigation on a smaller area. At the Ngewana household, gardening consultants [Cape Contours Landscape Solutions](#) prepared a landscape design and planting plan for the property in order to convert the existing garden into a water-wise indigenous garden combined with an organic food garden.

Redirect grey water to the garden

A greywater system saves by redirecting waste water from the shower, bath, wash basins and the washing machine to be used in the garden for irrigation. (They don't use water from the kitchen dishes, which tends to be too greasy.) Plants are generally happy with grey water, but it is important to use phosphate-free washing powder and avoid using harsh chemicals when cleaning the bath, etc. Grey water is best used for flowers, trees and lawns, not for vegetable gardens.

A Garden Rhapsody system was installed at the Ngewanas' house to distribute bathing and washing water to the garden. The water flows into a 250 litre tank, which is automatically pumped out when the tank fills up. The water is distributed by means of ordinary hosepipe and sprinkler, which can be manually moved to spread the water to different parts of the garden. The greywater system was sponsored and installed by [Water Rhapsody](#).

Make your next car CO₂-tax-free

A car dealer might not mention it, but most vehicles come with an often-hidden tax of thousands of rands imposed on cars and bakkies that emit more than 120 grams of carbon dioxide (CO₂) per kilometre. Cars with higher emissions yield a higher carbon tax. The CO₂/km number is usually listed on a windscreen sticker on new cars.

Consider the carbon emissions and fuel efficiency when you are looking around for a new car. Almost every make has at least one model below 120 grams/km — including nearly all hybrid cars. Avoiding the tax is just the beginning of years of savings at the petrol pump. The National Association of Automobile Manufacturers of SA provides [a fuel economy and emissions database](#)²⁹ for comparing passenger vehicles.

***"I think we need to cut down in engine capacity
and use more energy efficient cars."***

Zweli Ngewana

Generate your own sun power

Once you have reduced your consumption as much as possible with our No-Cost, Low-Cost and Invest-to-Save ideas, then you might consider solar photovoltaic (PV) panels. A PV system can pay for itself if you keep it simple. Batteries can almost double the price, so unless you really want to go off the grid, you can start with a basic system to cover most of your consumption during daylight hours without storing for night-time.

After the Ngewanas' house was made as efficient as possible, a small photovoltaic system was added to generate electricity to cover some of their daytime use. A single polycrystalline silicon panel rated at 255 peak watts (that's the maximum it can produce in ideal sun) PV panel and 230 watt inverter (to convert DC power to AC) was installed on the roof. This PV panel reduces the amount of purchased electricity during daylight hours, but it does not store electricity. For now, their electricity supplier is not set up to buy excess electricity from them, so the system was kept small to cover just some of the daily 'base load' usage. In the future, it is possible that it could be expanded and the family could sell any electricity they do not use back into the electricity grid.

The approximately 230 watts that the PV panel can generate in full summer sun covers most of what is required to run their efficient pool pump or some of the power needed to run other appliances being used, e.g. washing machine, iron, kettle and televisions. On sunny days in September, it was providing more than a kilowatt hour of their electricity needs per day, reducing the electricity they had to pay for by 8 percent in the first half of that month. The solar photovoltaic system was sponsored and installed by [Citrine Construction](#).

6 Household Staff

Greening a home is a team sport — everyone has to pull together. And some of the most important team members might not be in your family. Domestic workers are often the main users of some of the most energy-intensive appliances and play a key role in managing waste in a home, while gardeners often use more water outside than the family uses inside. My Green Home has put together checklists in [Appendix 2](#) and [Appendix 3](#) that you can share and discuss with your staff.

²⁹ www.naamsa.co.za/ecelabels/

You may want to post them in places where your domestic worker and gardener can refer to them regularly.

Explain to your housekeeper and gardener that you are looking for ways to save electricity and water. You might want to show them your bills or pre-paid vouchers, which will make the issue abundantly clear. Emphasize that you also don't want them to waste their time on unnecessary tasks — often saving energy and water means doing less work, not more.

If you really want to sharpen your gardener's enthusiasm for saving water, consider incentives, since he can readily influence water bills. This usually works as a six-month or year-long temporary measure to establish good habits. Show him the pattern of water expenses over the past year, and offer him a percentage of any savings for each month in the coming year, compared to the same month the year before. (But remind him that the plants mustn't suffer.)

7 Counting the savings at My Green Home

[Webisode: <http://vimeo.com/96087717>]

The experience of the Ngewana family and My Green Home has provided many lessons on the best ways to go about greening a home. But more important, it has taught us one very big lesson: Significant change is possible.

There was nothing about the Ngewanas' house or family that gave it some special advantage in saving energy and water and reducing waste. Indeed it had some disadvantages, such as the fact that it is not a north-facing house, and so cannot take the best advantage of the sun. And yet this ordinary family in an ordinary house accomplished the extraordinary. They reduced electricity consumption by 53 percent, water by 44 percent and their waste going to landfill by 81 percent.

It is true, of course that the Ngewana family was given sponsored appliances and equipment worth well over R100 000, almost all of it in one month. And they had the benefit of one-on-one training. But My Green Home has ensured that everything the Ngewana family learned is available on the website and in this guide. And we have ample evidence that many of the most effective expenditures pay financial dividends that make them not just affordable, but actually profitable.

This section explores in more detail the results of the Ngewana family's green journey.

"One family can make a big difference. When one person knows how to save energy, other families then can learn from you. We need to have families who are pioneers."

Zweli Ngewana

7.1 Energy efficiency

Baseline

In the baseline month of March 2014, detailed measurements of the Ngewana family's consumption showed them to be fairly typical for a suburban South African household. The home as a whole was using an average of 42,4 kWh per day. The geyser was the largest user of electricity in the home (12,7 kWh/day), as it is in most South African homes with standard electric geysers.

The pool pump was using about the same amount of electrical power as the geyser. This drew attention to the fact, however, that for most of the baseline measurement period, the pool pump had been running 24 hours a day as the override switch was on. It is a rather simple calculation to determine what consumption would have been if the pump had been running 10½ hours a day, which was the setting on the timer. In that situation, the pool pump still would have used a very significant 6,5 kWh per day, virtually tied with the plugs (refrigerator, kettle, TVs and all other devices plugged into the sockets in the house) in second place. The total consumption in the home with a pump running 10½ hours a day would have been 35,6 kWh/day.

After No-Cost actions and behaviour change

The objective of this phase was to see if the energy and water consumption would decrease as a result of the training and increased awareness of the family. The pie chart below indicates the consumption per electricity metering point as a percentage of the total consumption in this second phase. The daily average consumption dropped from 42 kWh (using the baseline with the pool pump running full-time) to 29 kWh, a drop of well over 30 percent. This was very encouraging and in line with international research, which has found that behavioural changes can typically reduce consumption by 10 to 30 percent.

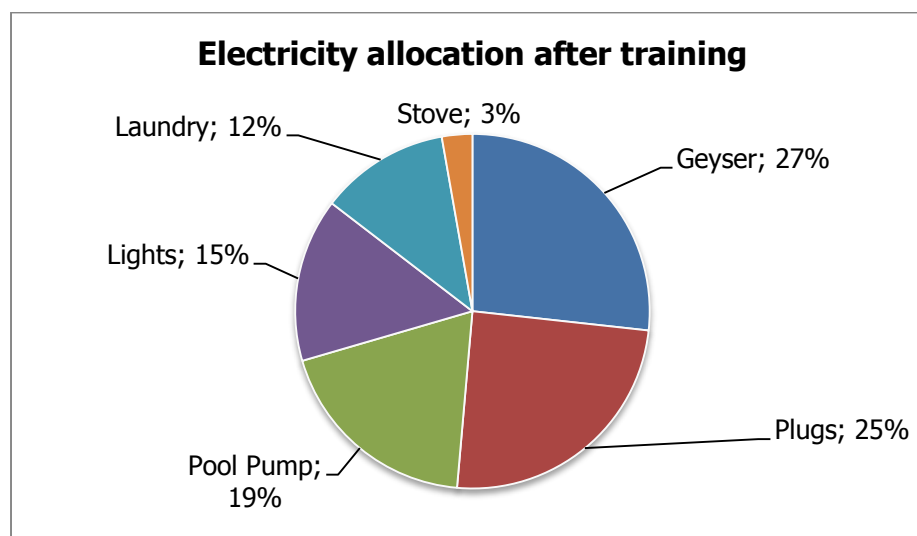


Figure 4: Electricity consumption as measured per meter as a percentage of total consumption after training. (No-Cost, behaviour-change phase)

After the retrofit

Consumption fell further after the retrofit, though it did not immediately achieve all of the goals the family had set for themselves. Their 'stretch' target was to ultimately reduce their consumption to below 600 kWh per month, which would keep them below the higher electricity tariff. This is equal to a daily average of about 20 kWh. At first, this target was not quite reached, since the post-retrofit measurement period coincided with the onset of winter. With the weak winter sun frequently covered in clouds in the Cape Town climate, the solar panels were not giving the typical performance expected in a year-round average. Winter also increases consumption in many other ways, with greater need for lighting, hot drinks and food, and hotter showers and baths.

September is a more typical month, with a more generous mix of sun and clouds, and the results in September 2014 have been very promising. The monthly total was 442 kWh and the average daily consumption for the month was 14,6 kWh, meaning the Ngewana family exceeded all of their goals. Even measured against the lower adjusted baseline — normalised for the pool pump — electricity consumption in September was less than half of what it was before the project began. In September, and probably for most months of the year, their consumption will be below 600 kWh per month and so will not incur the higher electricity tariff

Hot water: Installation of a solar water heater

The electricity consumption of the geyser decreased by an impressive 40 percent after the training. Two primary changes appear to account for these savings. First was the reduction of the geyser thermostat setting by 10°, from 70° to 60°. And second, the family was encouraged to reduce the number of baths and shower times during the training.

The immediate post-retrofit period did not show dramatic improvements in electricity required for hot water because of winter weather. But again, September (the last three bars on the right of the chart below) gives an indication that results for the rest of the year should prove very satisfactory. The electricity demand for hot water, which is supplementary heating for the water in the late afternoon and/or early morning, was just 5,2 kWh per day in September. This is a 59 percent reduction compared to the March baseline.

The gradual improvements have also been a demonstration of the fact that efficient implementation of solar water heating often requires some tweaking over time. This is especially true in the setting of the times and thermostat settings for the electrical element that is needed if the solar-heated water is not sufficient for the day's use. With adjustments to the particular needs of a household, the use of the electrical element can be minimized, to maximize savings.

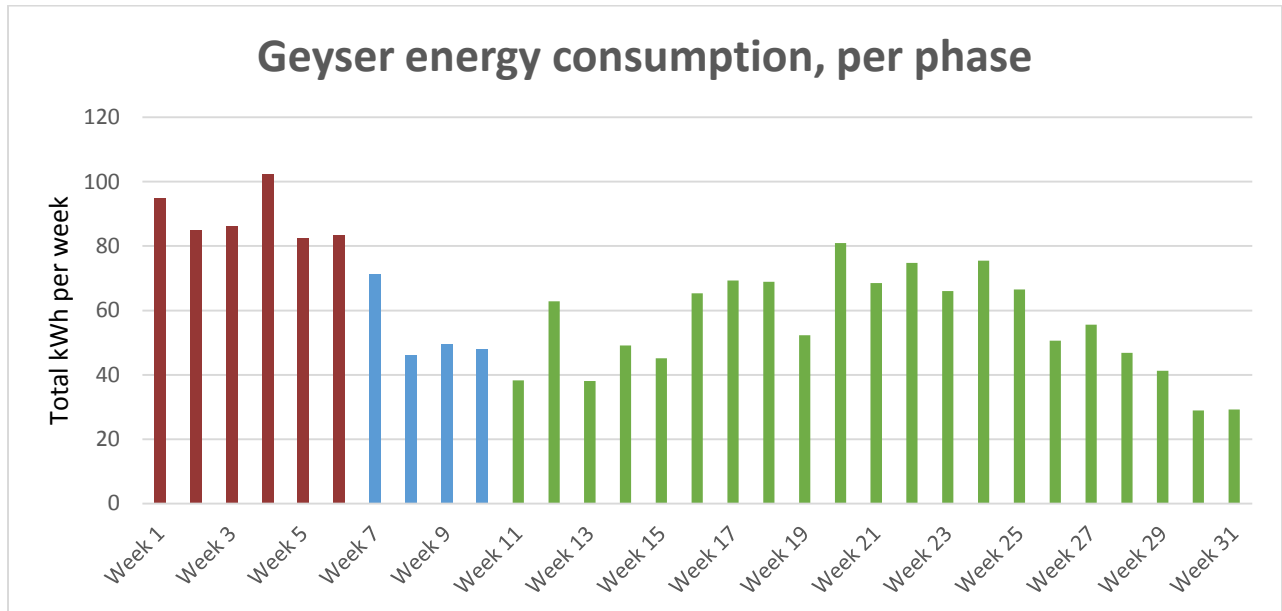


Figure 5: Weekly total energy consumption (kWh) by the geyser in three different phases; pre-intervention (red), post-training (blue) and post-installation of the solar water heater (green).

Lighting

During the audit, 63 light fittings were counted, representing a total lighting load of 2 420 watts. A full LED lighting retrofit was done, with fittings and fixtures also replaced. The huge savings that can be achieved by LEDs is evident and substantial. Electricity consumption from lighting has decreased so far by 74 percent.

Pool pump

The daily electricity consumption of the pool pump was 12,7 kWh in the baseline period, or 6,5 KWh adjusted to a normalised 10½ hours of pumping per day. This dropped to an average of just 2 kWh in the post-technology period, and shows just how large electricity savings can be achieved with a combination of awareness and new technology. In fact, in the depth of the winter, the pool pump was using less than 1 kWh per day.

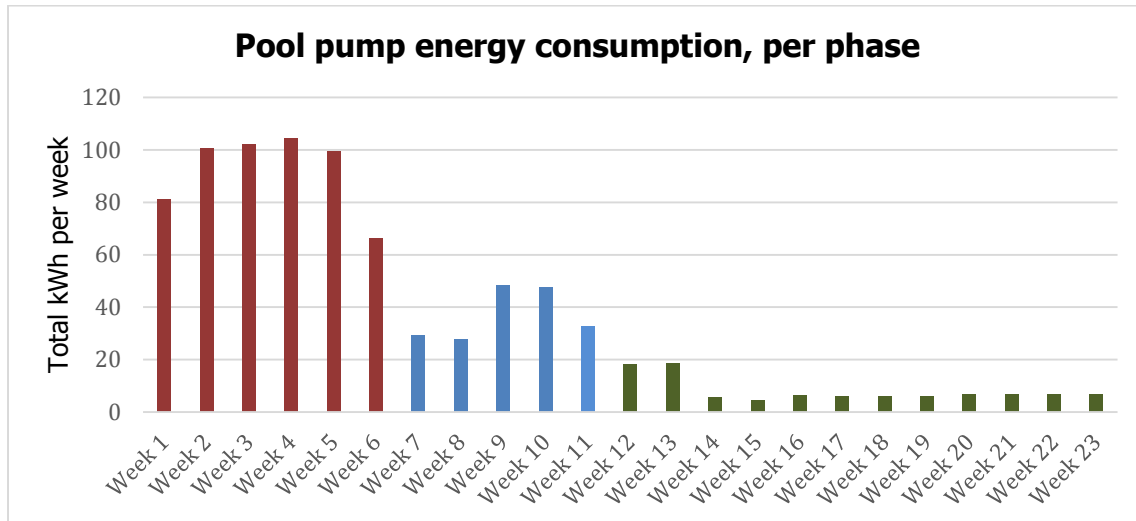


Figure 6: Weekly total energy consumption (kWh) for the pool pump in three different phases: pre-intervention (red), post-training (blue) and post-installation of the new pool pump (green).

Text box: Count the savings

The two main factors influencing the pool pump consumption were the number of hours that the pool pump was running and the installation of the variable-speed pool pump. Compared to running their old pump 10½ hours a day, if the family sticks to using the variable-speed pump for 3 hours a day in winter and 5 hours a day for the rest of the year, they will have annual savings of 1883 kWh or about R3 500.

The savings from the investment in the pump alone would vary according to the number of hours it is used. At the low-hour regimen of 3 hours in winter and 5 hours the rest of the year, switching from the Ngewanas' small AC pump that was drawing 620 watts to a 300 watt (on its lowest setting) variable-speed pump will save 526 kWh and R983 in a year. If the Ngewanas had purchased and paid for a Speck Eco-Touch pump, a cost of R8 000 for the pump and installation would therefore be paid back in 6 to 7 years. If, however, they had a broken pump and needed to buy some kind of replacement anyway, the additional cost would have been only R5 000, with a 4 to 5 year payback period. Typical South African pool owners with higher wattage pool pumps and larger pools requiring more hours of filtering could expect much greater savings and shorter payback periods.

Liquid Propane Gas (LPG)

Many families in South Africa make use of gas space heaters. The Ngewanas have a three-panel gas heater in their TV room. Gas is purchased from local garages or hardware stores as required, and no records are kept. It was estimated that the family used 13 X 9kg bottles during the baseline year. This equates to 1 615 kWh per year on an energy equivalence basis. In the winter of 2014, they used just two bottles, a reduction of approximately 85 percent.

7.2 Water conservation

The baseline water consumption measured in March 2014 for the Ngewana household was a daily average of 1 397 litres prior to any interventions. This works out to an average monthly cost of

R679 for water supply and another R425 for sanitation³⁰ for a total of R1 104, using the 2014/2015 tariffs.

A water meter was placed on the main supply at the same time as the electricity meters at the start of the project. It was decided to add two sub-meters a month into the project to allow for more detailed data gathering. The first sub-meter was placed in the laundry room and the second measured the water supply being drawn by all water points in the main house, except for the downstairs bathroom. All family members tended to bath or shower in the main bathroom, which is situated upstairs, but subsequent to the bathroom renovation, the downstairs shower is now much more popular.

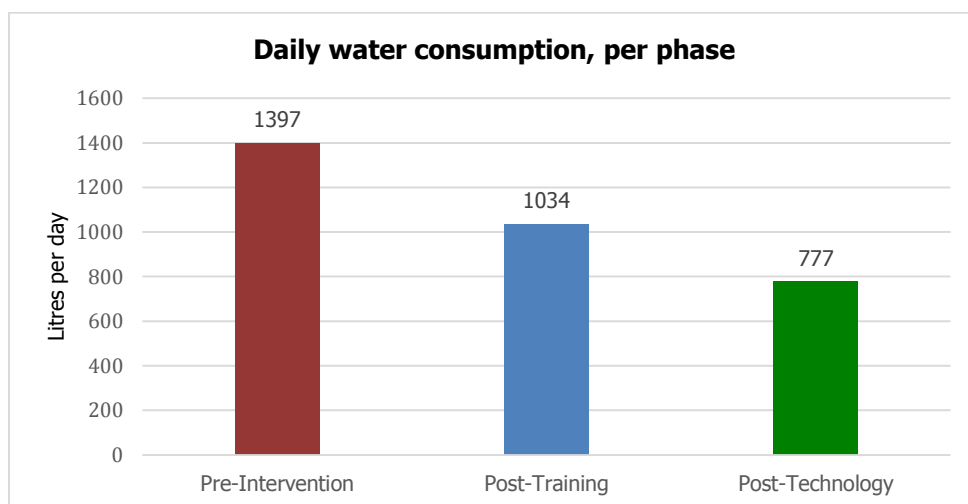


Figure 7: Average daily water consumption in litres during the various project phases

After the training was given, the daily average water consumption dropped from 1397 to 1034 litres (26 percent decrease), and after the retrofit it dropped further to 777 litres per day (25 percent decrease), which was an overall decrease of 44 percent. The change in seasons from the baseline period in March at the end of the dry season to the post-retrofit period during Cape Town's winter rains may accentuate the savings. The garden would have received water in March, but needed much less in May, June and July. But if this consumption level is sustained for the year, the anticipated total annual water and sanitation costs would drop from R1 104 to R434, a savings of R670.

³⁰Water is all incoming potable water used for drinking, bathing, toilets, laundry etc. Sanitation is all sewerage or waste water and sewerage flowing out from the house which the municipality must process. In Cape Town, the disposal charge for sewerage is a percentage (70%) of the potable water consumed multiplied by the applicable tariff.

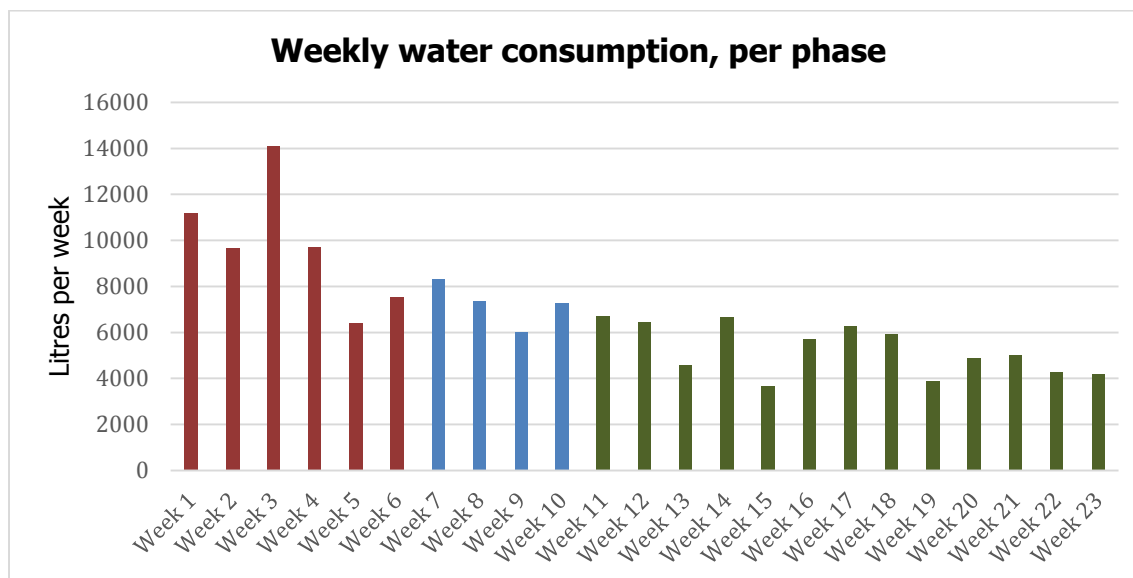


Figure 8: Weekly total water consumption (litres) by the household in three different phases: pre-intervention (red), post-training (blue) and post-retrofit (green).

7.3 Waste reduction

At the start of the project, the Ngewana family was sending all their waste to landfill, but it did not take them very long to change that situation around. The family was challenged to take a critical look at their waste, which was initially a big mess and all in one bin. They realised that there was a lot that they could do and started with implementing a three-bin system, differentiating between waste to landfill, dry recycling and organic waste.

Once the three-bin system was in place it was easy to implement because the municipality collected their recycling on the same day as their normal waste. They were simply required to place their recycling in a see-through bag, while waste was in the normal black bag. The main types recyclable materials produced by the family were typical of a high-income home, with large amounts of packaging, including glass, plastic, tin, cardboard and paper. They also implemented a counter-top bucket for the food scraps that would go to either the worm farm or compost heap.

At the start of the process around 15kg of waste was sent to landfill each week, but this was reduced, with around 68 percent being recycled, 13 percent sent for composting or the worm farm and only 19 percent sent to landfill.

7.4 Other benefits to the family

In addition to the obvious monetary savings due to a reduction in energy and water consumption, there have been other benefits to the family as a result of this process. The simple action of measuring their environmental impact allowed the family to gain a better understanding of the connection to the earth's resources.

The installation of the Calore fireplace and insulation is not only reducing electricity consumption, but also provides a more comfortable living environment for the family. When the family used the

previous fireplace, it was not very effective and thus was not used often. The family used their living room a lot more frequently this past winter, and the fireplace is not just heating up the living room, but also the adjoining rooms.

One of the themes addressed was the reduction of waste and toxics, which also benefits the family in various ways. Through implementing a system of waste separation at source it helps to reduce the contamination of recycling and allows for allocating organic (food and plant) waste for composting and the worm farm. The organic waste is turned into compost that can be used in the garden, reducing the need to buy additional fertilisers.

Volatile organic compounds (VOCs) and other chemicals in paint products have a direct link to illnesses in humans such as asthma and allergies; even leukaemia has been linked to VOCs found in paint. VOCs have a five to seven year life span in a painted surface, so the danger is not gone when the smell has left the room. The Ngewanas' home was painted with a coating that has zero VOCs or toxic chemicals. Even the paint used on their roof, RoofGuard, has no VOCs or toxics.

The family also enjoyed the benefits of a healthier home environment through using eco-friendly cleaning products. The skin is the largest organ of the body, and toxic chemicals can be absorbed through the skin. Cleaning products that are free of harmful chemicals contain fewer allergens. They also provide improved indoor air quality and healthier work facilities for employees.

The implementation of a greywater system not only reduces water consumption, but also adds value by keeping the garden green without using potable water.

8 Conclusion

An oft-repeated slogan of My Green Home is: One family changing their home to help change the world. There can be no doubt that the first half of that mission has been accomplished. The Ngewanas' home and the Ngewanas themselves have been significantly transformed in a very short time. In March of 2014, they were a household that was 'normal' in the context of suburban South Africa — which is to say unacceptable — in their use of electricity, water and the quantity of waste sent to landfill. By August they were well ahead of their peers in all of those areas.

The second half of this mantra — “. . . to help change the world” — is the mission that is not yet completely fulfilled. Their personal improvements do impact the environment in their own small way, of course, but both the Ngewana family and the sponsors of My Green Home hope to change the world in ways that go far beyond one family.

Already, many South Africans have followed their journey on the My Green Home website, and have been inspired to make changes in their own home. For truly broad change to come out of this experience, however, a fundamental question has to be answered: How replicable is the My Green Home experience?

Whether the impact of this process is multiplied through the efforts of individuals, NGOs, utilities or governments, the practicality of transforming thousands of 'Ngewana families' must be addressed. What have we learned in this regard?

Not everything that was done for the Ngewanas is widely affordable in terms of effort and expenditure. In general, however, the most effective No-Cost actions that transformed the Ngewana household were not burdensome. Turning down the geyser thermostat, reducing hours on the pool-pump timer and sorting the ironing pile are not daily routines, but once-off, or at most twice-a-year actions. All three of them can be accomplished together less than one hour. Some of the most effective investments in energy efficiency — low-flow shower heads, LED lights, variable-speed pool pumps, solar water heaters and heat pumps — save enough that a household will be poorer in the long run *not* to invest in them.

So the most important elements of the 'extraordinary' progress made by the Ngewana family are clearly replicable. My Green Home has laid the foundation for a broader transformation of the residential sector by sharing the journey with all of South Africa and making the lessons learned easily accessible on the My Green Home website, www.mygreenhome.org.za. Other South Africans and organs of South African society can take it from here. One day, the advances the Ngewana family made in the year 2014 may seem quite ordinary.

Now it's up to you to take on the challenge in your own home. Good luck!

9 Resources

Resources for additional information on the following topics

Where to start

- My Green Home's Checklist Guides for domestic workers and gardeners: <http://mygreenhome.org.za/wp-content/uploads/2014/08/MGH-Domestic-Workers-Checklist-v2-6-Aug.pdf>
- Eskom Appliance Energy Calculator: <http://www.eskom.co.za/sites/idm/Pages/EnergyCalculator.aspx>
- Eskom Comprehensive Energy Audit Calculator: www.eskom.co.za/sites/idm/Pages/Home.aspx (Click on "Calculate your energy costs".)
- Eskom Guide to managing your home's energy consumption: <http://www.eskom.co.za/sites/idm/Residential/Pages/Residential.aspx>
- How to Understand your Utility Costs, by My Green Home: <http://mygreenhome.org.za/wp-content/uploads/2014/04/How-to-understand-your-utility-Costs-25-AprilV5.pdf>
- My Green Home's How to Do a Home Eco-Audit: <http://mygreenhome.org.za/wp-content/uploads/2014/05/How-to-do-a-Home-Eco-Audit-9-May-v5.pdf>
- My Green Home's How to Calculate your Consumption per Square Meter (kWh/m²): http://mygreenhome.org.za/wp-content/uploads/2014/04/How-to-calculate-your-Per-Square-Metre-Consumption-29-April-V6_revCB.pdf

- Eskom brochure on saving electricity:
<http://www.eskom.co.za/sites/idm/Documents/20130919Eskomtrimmingbrochure.pdf>

Hot water

- My Green Home's Step-by-Step Guide to Solar Water Heaters: <http://mygreenhome.org.za/wp-content/uploads/2014/05/Guide-to-Solar-Hot-Waters-16-May-20161.pdf>
- City of Cape Town Solar Water Heater Programme:
<http://www.capetown.gov.za/en/electricitysaving/Pages/Service-Providers.aspx>
- Eskom Guide to Choosing a Solar System: <http://www.eskomidm.co.za/form/find/A guideline to choosing a solar system.pdf>
- Eskom Guide to Switching off your Geyser:
http://www.eskom.co.za/sites/IDM/Documents/1317_geyser_fact_sheet_no_rmr.pdf
- eThekweni Municipality Shisa Solar Programme: <http://www.shisasolar.org.za/>

Lighting

- My Green Home's Guide to Globes: <http://mygreenhome.org.za/wp-content/uploads/2014/05/Guide-to-Globes-20-May-v3-.pdf>
- Builders Warehouse DIY Lighting Guide: <http://builders.ensight-cdn.com/content/Lighting.pdf>
- Eurolux Energy Saving Calculator: <http://www.eurolux.co.za/calculator.php>

Heating and Cooling

- All about green wood stoves and fireplaces: <http://www.woodheat.org/>
- How to make a draft-excluder 'snake' to block drafts:
<http://www.theguardian.com/lifeandstyle/2010/jan/05/how-to-make-draught-excluder>
- Understanding electric heating: <http://www.energywise.govt.nz/products-and-appliances/heating/electric>
- Advantages of biomass for heating:
<http://www.calore.co.za/stdContentWhite.asp?vchPageName=Biomass>
- Eskom Guide to Building Insulation:
http://www.eskom.co.za/sites/idm/Documents/126614ESKD_Insulation_brochure.pdf
- Eskom Winter Fact Sheet:
http://www.eskom.co.za/sites/IDM/Documents/1274_Winter_fact_sheet_revised.pdf

Appliances

- Eskom Guide to Appliance Energy Usage:
http://www.eskom.co.za/sites/idm/Documents/Appliance_Usage_rev41.pdf
- Green Guide to Dishwashing: <http://applianceadvisor.com/dishwashers/27>
- My Green Home's How to Read Appliance Energy Labels: <http://mygreenhome.org.za/wp-content/uploads/2014/06/Guide-to-Energy-Labels-for-appliance-theme-2-June-2014.pdf>
- Insulation or retained-heat cooking: <http://thermalcooker.wordpress.com/>
- Wonderbag recipes (insulation cooking): <http://nb-wonderbag.com/Pages/Recipes>

Waste and Toxics

- Consumer guidelines to healthy cleaning and choosing appropriate cleaning chemicals:
<http://www.ewg.org/guides/cleaners>
- National Recycling Forum: <http://www.recycling.co.za/>

- Recycling drop off points: <http://www.mywaste.co.za/>
- Recycling cans: www.collectacan.co.za
- Recycling glass: <http://www.theglassrecyclingcompany.co.za/>
- Recycling paper: <http://www.mpactrecycling.co.za/>
- Recycling PET: http://www.petco.co.za/ag3nt/system/recycling_02_reasons.php
- Recycling plastic: <http://www.plasticsinfo.co.za/>
- Safer cleaning: <http://watoxics.org/toxicwatch/top-10-tips-for-safer-cleaning>

Outdoor and Transport

- Energy efficiency of swimming pools: <http://eepublishers.co.za/wp-content/uploads/legacy/Vector%202012/energy%20efficiency.pdf>
- Eskom Guide to Pool Pumps: <http://www.eskom.co.za/sites/idm/Documents/20131007PoolpumpscanaccountforhouseholdselectricitybillsEnewsletter.pdf>
- Green car shoppers guide: NAAMSA Fuel Economy / Emissions database <http://www.naamsa.co.za/ecelabels/>

General websites:

- 49M Campaign: <http://www.49m.co.za/>
- City of Cape Town Save Electricity Campaign: <http://www.savingelectricity.org.za/>
- City of Cape Town Smart Living Handbook, a guide for households on energy, waste, water and biodiversity: www.capetown.gov.za/smartliving
- *Energy Effizients Plus Haus, Germany*: http://www.buil_dup.eu/cases/40001
- GreenerHouse blog by Don Boroughs: <http://www.greenerhouse.co.za/>
- Nedbank Green Living Guide: http://www.nedbankgroup.co.za/pdfs/Nedbank_Green_Living_Guide.pdf
- RandWater Water Wise: <http://www.waterwise.co.za/site/home.html>
- Sustainable Energy Society of South Africa (SESSA): <http://www.sessa.org.za>

10 Acknowledgements

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The German government provided main co-funding through the South African-German Energy Programme (SAGEN) as part of the bilateral cooperation between South Africa and Germany. SAGEN is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (www.giz.de), an international organisation, which supports the German government in achieving its objectives in the field of international cooperation for sustainable development. SAGEN's funding made My Green Home possible, and they provided active support throughout the project.

The Ngewana family were truly committed to taking on this very public green living challenge. Their dedication to changing their habits and actively participating in the equipment upgrade and publicity efforts over many months has been key to the success of My Green Home.

Other main project partners that provided in-kind service support are thanked for their ongoing support in making the project a success:

- **The South African National Energy Development Institute (SANEDI)** was involved from inception and provided facilitation, promotion and overall support.
- **The 49M campaign** and their appointed service providers provided significant in-kind services for the publicity drive from the start.
- **Karebo Systems** sponsored a series of print adverts in the Sunday Times and a home audit for the competition's Grand Prize winner.

Product sponsors provided a range of green products and devices for the Ngewanas' home retrofit, as well as prizes for the competition (weekly prizes and a Grand Prize for another family's green home makeover):

Sponsors for both the Ngewana home and for prizes

- [SolarTech](#) installed solar water heaters at the Ngewanas' and grand prize winner's home.
- [Hisense](#) provided A+ rated efficient fridge/freezer sets and LED televisions for the Ngewana family and as prizes.
- [Eurolux](#) installed LED lamps and fittings for the entire lighting needs of the Ngewanas' home and property, as well as ceiling fans, and LED bulbs for the grand prize.
- [Saint-Gobain Isover](#) installed Aerolite ceiling insulation, as well as geyser and hot-water pipe insulation, for both the Ngewana family and the grand prize winners.
- [HansGrohe](#) installed water efficient shower heads, taps and mixers at the Ngewana home and also provided many prizes.
- [SpeckPumps](#) installed the efficient variable-speed BADU Eco Touch pool pump at the Ngewanas' home as well as for the grand prize.
- [Lecico South Africa](#) installed dual flush water efficient toilet systems for the Ngewana family and at the grand prize winner's home.
- [Snappy Chef](#) provided a combination induction and gas stove-top cooker, as well as special cooking pots and utensils for the Ngewanas and also prizes.
- [Aquatrip](#) installed a home water management system for the Ngewanas and for prizes.
- [Natural Balance](#) provided Wonderbag insulation cookers.
- [Green African Initiatives](#) provided mobile solar chargers for cellphones.
- [Woolworths](#) provided winter bedding, flasks and task lighting.
- [WizzardWorms](#) sponsored a worm farm for the Ngewanas and grand prize winner.
- [Reliance](#) provided mulch and compost.

Sponsors for the Ngewana home

- [Calore](#) installed a closed combustion Piazzetta wood pellet fireplace.
- [Citrine Construction](#) sponsorship and installation of a photovoltaic system.
- [Fourways](#) installed an Alliance heat pump.
- [Breathecoat](#) applied eco-friendly paints and finishes.
- [Skylite](#) Concepts installed a Solatube Skylight.
- [Homebug](#) installed a home energy management system.
- [GeyserWise](#) installed a timer/thermostat geyser control system.
- [Water Rhapsody](#) installed a Garden Rhapsody and Poolside Tank water recycling systems.

- [Cycology](#) sponsored an electric bicycle for Lutho Ngewana to use for three months.
- [Saint-Gobain Weber Tylon](#) sponsored bathroom tiling to allow for the renovation of the bath into a shower downstairs at the Ngewana home.
- [Postwink](#) provided recycling bins.
- [The Botanical Society of South Africa](#) provided indigenous garden plants for the Ngewana family's garden upgrade, and an annual membership to Kirstenbosch National Botanical Garden
- [Cape Contours](#) provided landscaping services.
- [EcoSmart](#) provided eco-friendly cleaning products.
- [Better Earth](#) also sponsored eco-friendly cleaning products.
- City of Cape Town provided fleece blankets.
- [Tierhoek](#) sponsored a selection of organic produce.
- [Vineyard Hotel](#) provided accommodation for the Ngewana family during the retrofit.

Promotional partners collaborated to help spread the message amongst their staff and stakeholder networks:

- Accelerate Cape Town
- Alan Grey
- Black River Park
- Botanical Society of South Africa
- Cape Town Partnership
- City of Cape Town
- City of Tshwane
- Ethekwini Municipality
- Green Cape
- Greenpop
- Hotel Verde
- Old Mutual
- Pam Golding Properties
- PETCO
- Rand Water (Water Wise programme)
- Santam
- The Property Foundation
- United Kingdom Green Building Council

Service providers that were integrally involved with project implementation:

- Grace Stead from Steadfast Greening was project co-ordinator for important aspects of the project, including intensive liaison with the Ngewana family and a large range of sponsors that were successfully brought on board, and conducting training for the family.
- Native VML for the digital strategy and development of the website, social media and advertising for online and print applications.
- Don Boroughs from GreenerHouse for writing content for the website and press releases, and editing the case-study guides.

- Deryck Broom and the team from Trilogy for producing the 'webisodes' — the short audio-visual clips for the website - and their partners Slingshot Media for the photography for publicity and the website.
- Theo Covary from Unlimited Energy and partners at Energy Resource Optimizers for technical services including metering, energy audit, monitoring and data analysis and reporting.
- Solid Insight and Station Seven for the metering and online monitoring systems for energy and water consumption.
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Green Building Council South Africa team who were most involved:

Sarah Rushmere, Jodi Kupper, Manfred Braune, Michelle du Toit and Brian Wilkinson.

And finally, many thanks to all of the households around the country who actively participated through the website, social media and competitions and made a difference in their own homes too.

PRODUCT SPONSORS

The following product sponsors have assisted in making this project a reality through providing their products and installation:

- Citrine Energy – rooftop solar photovoltaics - <http://www.citrine.co.za/>
- Hisense – Efficient fridges and LED televisions - <http://www.hisense.co.za/>
- Solartech - Solar water heaters - <http://setsa.co.za/>
- Calore – Wood pellet fire place - <http://www.calore.co.za/>
- Eurolux – Lighting with LED products and ceiling fans - <http://www.eurolux.co.za/>
- Saint Gobain / Isover – ceiling and geyser insulations - <http://www.saint-gobain.co.za/>
- Breathecoat – Eco-friendly paints, varnish and waterproofing - <http://breathecoatpaints.com/>
- Alliance / Fourways – Heat pumps - <http://www.allianceheatpumps.co.za/>
- HansGrohe – Efficient showerheads, and aerators for taps and mixers - <http://www.hansgrohe.co.za/>
- Speck Pumps – Energy efficient pool pump and LED pool light - <http://www.speck-pumps.co.za/>

- Lecico – Dual flush toilets - <http://www.lecicoso.co.za/>
- Snappy Chef – Induction and gas stove - <http://www.snappychef.co.za/>
- Natural Balance – Wonderbag heat insulation cooker - <http://nb-wonderbag.com/>
- Skylite Concepts – Skylights - <http://www.solatube.com/>
- Homebug – Real time home energy management system - <https://www.homebug.co.za/>
- Aquatrip – Home water management system - <http://www.aquatrip.com.au/>
- Geyserwise – Thermal control geyser management systems - <http://www.geyserwise.co.za/?page=1>
- Water Rhapsody – Greywater and pool-side tank systems - <http://www.waterrhapsody.co.za/>
- Cycology – electric bicycles - <http://cycology.biz/>
- Green African Initiatives – mobile solar chargers- <http://www.greenafricaninitiatives.co.za>
- Woolworths – Efficiency related household products - <http://www.woolworths.co.za/>
- Postwink – Recycling bins - <http://www.postwink.co.za/>
- WizzardWorms – Worm farm for turning organic waste into compost - <http://www.wizzardworms.co.za/>
- Reliance Compost – Compost and mulching - <http://www.reliance.co.za/>
- Cape Contours – Landscaping service - <http://www.capecontours.co.za>
- Better Earth – biodegradable cleaning products - <http://www.betterearth.co.za/>
- Eco Smart – biodegradable cleaning products - <http://www.ecosmart.org.za/>
- Botanical Society of South Africa – Indigenous plants - <http://www.botanicalsociety.org.za/>
- Vineyard Hotel – Accommodation - <http://www.vineyard.co.za/>
- Tierhoek Organic Farm – Organic produce - <http://www.tierhoekorganic.com/>

11 Appendix 1. Efficiency Plus House, Berlin

The concept for My Green Home was partly based on the German Efficiency Plus House in Berlin, which was constructed as a show house to generate its own energy and even feed excess energy back into the public grid. The house included e-mobility, generating power for two electric vehicles and an electric bicycle. A key goal was to integrate the energy production technologies into the architecture of a highly efficient, newly built house. A family was selected to live in the house for 18 months to experience the house and its new technologies and provide feedback. An extensive monitoring process was implemented, with live, online metering.

<http://www.buildup.eu/cases/40001>



Source BMVI

12 Appendix 2. Checklist for Domestic Workers

Please try these ideas whenever possible to help save electricity and water and cut down on waste that goes to the landfill. If you have questions about any of them, please ask.

Laundry

- ☐ Wash laundry in cold water, unless there is a special need for hot water.
- ☐ Don't wash clothing that isn't dirty just because someone forgot to hang it up.
- ☐ Wait until you have a full load to run the washing machine, unless you're asked for an urgent wash. A front-loader can be filled to the top, but not packed tightly.
- ☐ Only wash sheets every week if you are asked to. Every second week is usually OK in winter and if the family members wash themselves in the evening.
- ☐ Only use a tumble dryer if really necessary. Wait for dry weather to use the washing line unless there is a rush, or dry clothes indoors on a rack.
- ☐ Don't iron things with wrinkles that don't matter, such as pajamas, underwear or fitted sheets. To reduce wrinkles in the first place, shake and smooth them out when drying and fold them carefully when dry.

Dishwasher

- ☐ If a dish fits in the dishwasher, put it there instead of handwashing it.
- ☐ Try not to rinse dishes before putting them into the dishwasher unless necessary.
- ☐ Run the dishwasher only when it is full.
- ☐ Use the lowest temperature setting on the dishwasher, such as 35° or 45°.
- ☐ Turn off the heat-dry button. Open the dishwasher to air-dry instead.

General cleaning

- ☐ If you have a smooth microfibre cloth for glass, wet one with very little water to wash windows and dry with a second microfibre cloth. No sprays are needed.
- ☐ Dust with microfibre dusting cloths, using no sprays unless asked to.
- ☐ Whenever you use cleaning chemicals, use as little as possible.

Rubbish and recycling

- ☐ Keep clean paper and cardboard separate from the rubbish for recycling.
- ☐ Keep glass bottles, tins and plastic containers separate from the rubbish for recycling. (But broken vases and drinking glasses do go in the rubbish; they cannot be recycled.)
- ☐ Remove lids from plastic bottles and flatten boxes, cans and plastic, whenever possible.
- ☐ Rinse bottles with very little water. Clean very dirty tins, but try not to use hot water.
- ☐ If there is a compost heap, ask if any food scraps should be kept for it.
 - ☐ If there is a worm farm, keep these for worm food: tea bags, coffee grounds, fruit and vegetable scraps - but not these: onions, chillies, and citrus fruit like oranges.

13 **Appendix 3. Checklist for Gardeners**

Please try these ideas whenever possible to help save water and cut down on waste that goes to the landfill. If you have questions about any of them, please ask.

Lawns

- ☐ Lawn clippings and leaves should not be mixed with rubbish. Ask whether they should go to the compost heap or be saved for municipal composting.
- ☐ Some lawns do not need to be watered and can go dry for a season. Ask first which areas of grass should be watered.
- ☐ If a lawn is to be watered, wait until the soil is dry. Stick your finger into the soil to check.
- ☐ Water lawns in the mornings, before 10 a.m. if possible, to reduce evaporation losses.

Garden beds

- ☐ Don't rake the soil unless asked to. Let leaves stay on the soil as mulch, which makes plants grow better. A layer of mulch acts like a blanket to keep the soil moist for longer, regulates temperature and reduces weeds.
- ☐ Try not to turn the soil. Pull weeds by hand instead.
- ☐ Don't use pesticides without checking with your employer first.
- ☐ Some beds need watering more than others, and some not at all. Ask first which beds should be watered.
- ☐ Water only if the soil is very dry beneath surface. Stick your finger into the soil to check.

Compost heap

- ☐ Turn the compost with a pitchfork once or twice a week.
- ☐ If the compost is dry inside the heap, add water.

Sweeping and cleaning

- ☐ Sweep driveways and patios with a broom, not with water from a hosepipe.
- ☐ Wash cars using a bucket of water, only using the hosepipe if needed for a rinse.

Pool

- ☐ You don't need to backwash every week. Check the pressure gauge on the pool filter. If the needle is in the red zone, or above 120 kPa, then it is time to backwash.
- ☐ Before you leave each day, make sure that the pool pump has switched itself off and the timer not on override.

14 Appendix 4. Tests to do at home

The Ngewanas did a set of practical tests, which are shown in the various 'webisodes' on the website — all simple and revealing. Some of them even led to laughter in the Ngewana family. You can also do these and to get to know your own habits and home better:

- **Geyser hand test:** By simply putting your hand on top of the tank, you can get an indication whether it needs to be insulated or not. If it is warm, then it is losing heat and needs to be better insulated. Also check the surrounding pipes and ensure that any warm pipes are insulated. The warmer the pipe, the more important it is to insulate it.
- **Incense test:** Some windows and doors don't shut tightly, which lets the warm air escape in the winter and cold air seep in. If you simply burn an incense stick and hold it next to the window edges, you should be able to see if there is a draft. Once you know where the gaps are around your windows or doors, you can use self-adhesive insulation tape strips to weatherproof them.
- **Bucket test:** To see if you need a more efficient shower head, you need to know how much your current one uses. Open up the shower to your normal setting and then hold a bucket under the shower spray for 12 seconds. If you collect more than 2 litres, your shower is using more than 10 litres a minute and could be improved with an aerated, low-flow head, as these use less than 10 litres. The Ngewanas' new shower heads have flow rates of 6 to 9 litres per minute.
- **Ironing pile check:** Take all of your clean washing to be ironed and place it in a pile on the table. As a family, including your domestic worker if she does the ironing, go through it and decide what really needs to be ironed and what does not. Underwear, fitted sheets, pajamas and exercise gear don't usually need the time and energy wasted on them. Like many families, the Ngewanas tended to simply iron everything, but realized that most of it is not necessary.
- **Waste analysis:** Now this might not be the most fun thing to do, but it's a very worthwhile exercise. Go through your waste and consider what can be recycled and what can go to compost. If you are hesitant to do this, simply look in your fridge and cupboard to see what will end up in the bin soon enough. A rule of thumb is that only 20 percent of suburban household waste typically needs to go to landfill; the rest can be recycled or composted. Find out if the municipality collects recycling in your neighbourhood, or find a company that can collect it for a fee. If you have a garden, start a compost heap or worm farm. You probably can find drop-off points for recycling and possibly even compostable garden refuse near your home. Check the [Resources](#) section of this guide.