

We do building & alterations,
Alternative energy projects,
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Lifestyle Projects

ENERGY SAVING TIPS

Background

I have seen many articles published in newspapers or statements made by government related institutions around our energy crisis, which are grossly inaccurate. The worst example must have been “to switch appliances OFF, but keep your TV on”. Only our “proudly SA” broadcasting corporation could come up with such a short sentence containing so much nonsense. This article attempts to clear up some of the common questions and myths.

Given our electricity supply crisis, it is important for everyone to reduce the *peak power* consumption, whether you are an individual a retailer or a manufacturer. Power (Watts) = Voltage (volts) x Current (Amps). Peak power consumption is different from your average monthly consumption. It is the consumption you use when you switch on all the major appliances you use on a regular basis. No one switches on all the appliances you have in the household; neither will you switch on ALL lights in a house. But when you have electric under floor heaters and 2 geysers, a pool pump and a stove and oven, those installations are mostly responsible for your peak power consumption. If your main circuit breaker in your distribution board trips, then you know that your peak power consumption is higher than the circuit breaker's rating x 220V.

Some issues one should be aware of:

- To get a new power plant takes about 10 years from go-ahead. We can thus expect load shedding to continue until 2018.
- The councils may introduce an escalating tariff structure based on your main circuit breaker or an your actual meter reading (like the sliding income tax scales). Although as consumers, we would not like this, it would make sense from Escom's point of view to ease their predicament.
- Upgrading to a larger circuit breaker or 3-phase is very expensive. The tariffs vary from council to council, but we are talking in the region of R15000 to R80000 respectively.

Common questions:

Q: Do geysers and under floor heaters break quicker when switching them ON and OFF.

A: Both appliances have already a thermostat build in to regulate the temperature, so they do already switch ON and OFF by themselves. Just imagine they would not switch off!

Q: Do I save energy by switching my geyser OFF during the day?

A: No: This myth falls in the same category as the infamous statement made by the SABC.

Q: After switching a geyser or an under floor heater off and then on again, they use more energy because now they have to heat up water or concrete again which has cooled down.

A: You are actually NOT saving energy by switching a geyser off. You are merely helping Escom by reducing energy demands at peak times. During office hours, industries require more energy from Escom. By switching geysers off during these times, we are actually helping Escom to supply that power to the point where it is most needed. Of course when you go away from home for a couple of days, you will save energy by switching the geyser off.

Q: Will I save a lot of money by installing a geyser blanket?



A: A geyser will typically loose about 2kWhr in 24hrs. A geyser blanket can reduce these losses by about 20%, thereby saving you 400Whr per day. This is the same consumption a 100W globe would use in 4hrs and saves about R0.20 per day at R0.50/KWhr. (Source: A.Harris, M.Kilfoil & E-A.Uken, "Domestic Energy Savings with geyser blankets". Cape Peninsula University of Technology). At about R400 for a geyser blanket, it will pay for itself in 800 days. I do not know if rats chew it!

Q: How long will it take for my geyser to heat up?

A: To heat up water, use the following formula:

$$t(\text{hrs}) = \frac{\text{Vol} * (T_{\text{HOT}} - T_{\text{COLD}}) * 4200}{3600 * P}$$

Where Vol = capacity of geyser in liters
 T_{HOT} = set temperature of the geyser's thermostat (or hot water temperature)
 T_{COLD} = temperature of the water entering the geyser
P = Power of geyser's element in Watts

Example: a 150ltr geyser set to 60°C with a 2.5KW element will take 3.15hrs to heat up, assuming the temp of the water coming in is 10°C. Most often, not all the water in the geyser is used, and only the water which was replaced needs to be heated up. After taking a 5min shower, which uses about 80ltrs at 40°C, that same geyser will only be on for 55min. (80ltrs at 40°C requires a mixture of 44ltrs at 60°C and 36ltrs at 10°C).

Q: Should I install a solar geyser?

A: Definitely, if you can afford it! South Africa has the right climatic conditions for exploiting solar energy to heat up water. Using solar energy, is just "the right thing to do", as it is the green solution to saving our planet. An installation cost unfortunately between R20000 and R30000, whereas an electric geyser costs only about R5000, including installation. Be wary of suppliers promising you an amazingly short payback period. Do your own estimations with the formulae given above. My calculations show a payback period of about 8 years for a family of 4. For the DIY enthusiasts: you can just put some high-pressure (8 bar will do) poly propylene pipes on top of your roof. Using a 20mm pipe, you need about 700m pipe to hold 150ltrs of water ...but they will cool down during the night. At about R3/m it can be a feasible solution. Storing the hot water in a conventional geyser would be advisable. Look at the UV resistance of the pipes you purchase.

Q: What other alternative energy sources should I consider?

A: By the time you read this, new alternatives may be viable. At present, photo voltaic solar panels are not an attractive solution for the average household. They supply at most about 100W/m² and cost about R4000/m². Then you still need batteries and an inverter. If you live at the coast, wind power is an option, but has also a high capital layout. Heat pumps, when used for heating purposes, use about 3x less energy than direct electric heaters. An air-conditioner is the common name for a heat pump.

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Tips

- Change incandescent globes to energy saving globes, wherever possible. They use about 5 times less energy for the same light output. Do not use them in places where lights are switched ON and OFF for very short periods (like inside a fridge).
- Use the appropriate amount of light for different area's. Too much light is referred to as light pollution, and we see daily plenty of it!
- Don't leave the lights on unnecessarily. Install day/night switches, motion sensors or timers for those lights one easily forgets about. (This recommendation is mostly violated by the larger office blocks!)
- Set you geyser thermostat to an as low temperature as possible. Thermal losses are more at higher temperatures. 50°C will normally do the trick, unless you run out of hot water. Only then should you set the temperature higher.
- Do not boil more water than what you need in the kettle, and do educate the domestic to do the same!
- For the serious energy savers: switch the water off when you are soaping yourself in during a shower. You probably save about 20% water. Educate the kids to take short showers.
- If it takes a long time for hot water to get to an often used point, like the kitchen sink, consider installing an instant geyser at that point. However: whilst you would be saving energy, you would also increase the peak power demand! An instant gas geyser is an alternative to be considered.
- If you are building a new home: insulate your hot water pipes. If the pipes are plastic, then this is less of a concern. Design the house such that the hot water pipe length is minimized.
- Run your swimming pool pump for as little time as possible: the pump uses between 750 and 1000W. Compare this now with the potential savings in geyser losses of 400Whr per day!
- Set your computer to go to standby mode after being inactive for a set period. 300W is quite a lot!
- Make a list of all appliances you may use at the same time and add up all the power requirements (watts). Divide that number by 220; this will give you total current consumption in amps. The main circuit breaker in your electrical distribution board should be larger than that number. If not, **you will** experience tripping of the main circuit breaker at times. Then it is time to look at installing a load controller device.

Typical household appliances power requirements (verify your appliances)

TV (tube, plasma or LCD)	400W	Light, incandescent	60-100W
Fridge (when on)	150W	Light, energy saver	11-26W
Oven	3000W	Computer	300W
Stove, per hob	800-2000W	Geyser	2000-3000W
Washing machine (with heating element)	1000-3000W	Under floor heater	400-3000W
Microwave oven	1500W	Towel rack heater	100-200W
HiFi installation	200W		

To those who believe I have stated the obvious, my apologies.
To the others, I hope I have been of some help.

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