

Moving from a place of suffering to a place of agency: Taking control of your energy security with solar power

Keynote address by Professor Tracy-Lynn Field on the occasion of the Annual General Meeting of the Vandia Gardens Resident's Association, held on 15 August 2023.

In reflecting on what I could address you on this evening, I realised that I come to this space wearing at least three hats:

- As a professor of law at Wits University, where I've engaged with issues of environmental law, climate change and energy justice for at least twenty years.
- As a resident of this area – and my house falls into the block that keeps on being shifted (now we are Block 10, now Block 14, then back to Block 16 – crazy!!)
- And as a homeowner that also rents a solar system.

As I share my thoughts with you on how to move from a place of suffering to a place of agency by taking control of your energy security, I will be drawing on all three of these hats.

As a resident of this area, I know that energy security has become increasingly bad, and has been particularly bad in the last while. We have not only had to contend with the load-shedding schedule, but with many faults and unplanned outages. Before, an unplanned outage would last a couple of hours. Now when it goes out, we are becoming used to the fact that the power will be out for a day, two days, maybe even more. We face conflicting messages about what the cause of the outage is, what the ETR is etc. Usually, no-one is able to give us a clear answer. We are literally 'in the dark'. And yet we still have to pay for all the services.

The feelings of anxiety, resentment, hopelessness, powerlessness, frustration and anger while residents wait for the lights to come back on is palpable from our 'VGRA Electricity and Candles' group. We are in a place of suffering.

Why are we in a place of suffering?

To understand why we are in this place of suffering, it is important to realise that we are in a fact-moving space where things are indeed 'falling apart' and something new is emerging.

But what exactly is falling apart?

In South Africa, as in many other countries of the world, our energy security comes from a centralised, fossil-fuel dependent energy system based on:

- Coal-burning power stations
- High-voltage transmission lines that connect the energy generated in these stations to distribution centres like cities and towns

- Distribution lines and assets like stations and sub-stations that eventually distribute the power produced in coal-fired power stations to your home
- A centralised nuclear power station in the Western Cape, that is nearing the end of its design life

In recent years, other sources of energy generation have been added to the list such as the open-cycle gas turbines you will hear about to manage 'peak demand'. Since 2011 the Eskom has also contracted with so-called Independent Power Producers who have invested in very large utility-scale renewable energy projects such as solar and wind farms. This renewable energy is fed into the grid. About 6.3 GW has been added since the programme was first introduced, which equates to about 10% of our national power demand. However, because these projects feed into the national grid, they are also subject to the national load-shedding schedule.

More than [80% of our electricity needs are therefore still being met by coal-fired power](#). This is not only a very inefficient energy system – a significant amount of energy is lost in the process of transmission, but one that is also very polluting. The mining, transport (did you know that there are 5000 coal trucks on Mpumalanga's roads daily?) and burning of coal in the coal-rich areas of our country have produced 'sacrifice zones' where there is terrible water and air pollution. The health and livelihoods of the people who live in these areas has been severely impacted. Have a look at [these pictures](#) and at [these](#).

South Africa currently emits about **450 Mt (million tonnes)** of greenhouse gas emissions per year, and the overwhelming majority of this comes [from the energy sector at 47%](#). This makes us about the 14th largest emitter of CO₂ worldwide. If we take into account per capita emissions (greenhouse gas emissions per person per year), we rise to about the 11th largest emitter. As we all know, greenhouse gas emissions are driving climate change, which has already impacted extreme weather events in South Africa such as severe drought and devastating floods.

But this inefficient and polluting energy system **is now falling apart**, for a host of reasons:

- There is great pressure on countries of the world to reduce greenhouse gas emissions. Because South Africa is a party to the Paris Agreement, the country has international law obligations to reduce emissions. The country's commitments are set out in a document called the [Nationally Determined Contribution](#).
- Because the whole world is needing to move away from fossil fuel-based power, product innovation, commercialisation and upscaling in the renewable energy industry has taken off dramatically, and the price of goods and services has fallen.
- At the same time, Eskom has been gutted as a state-owned enterprise. Its level of debt (more than 400 billion) is a sovereign risk because Government has guaranteed it and it has been brought to its knees through years of corruption, mismanagement and state capture. In the last few months, measures to unbundle Eskom into generation, transmission and distribution companies has gathered space. Even as

service levels from Eskom have declined, the price of electricity has increased dramatically.

- Municipalities are constitutionally responsible for distribution. Here, service levels have also declined due to the dysfunctional state of many local councils, non-payment for services, corruption, mismanagement, theft and vandalism.
- Finally, highly-organised criminal syndicates are preying on the copper in our distribution assets. Many outages in our own neighbourhood can be linked to copper theft as well as vandalism of the distribution assets.

So what is falling away is the ability to rely on centralised, fossil-fuel based electricity as it becomes increasingly expensive and unreliable (while remaining inefficient and polluting). What is emerging is reliance on more localised forms of renewable power generation.

The general shift we will see in years to come is a movement from public to private service provision, and from centralised to decentralised facilities.

In concluding this part of my talk, I'd like to highlight two key messages:

The first is that **we are not going back, we cannot go back to reliance on Eskom**. Belief that we can, or that things will somehow 'go back to normal' is to cling to something that is slipping away. We are in a new ball game and a new era.

The second is that **an end to load-shedding will not mean energy security**. Apart from the fact that loadshedding is going to be a permanent fixture in our country, at least over the medium term, the problems we are having in the distribution segment of the market, which are managed by City Power, means our energy security will not improve. At the moment, it is not possible to have private investment in these assets (stations, sub-stations and distribution lines). This means our suffering will continue.

So what can one do? Taking control of your energy security

There is always a choice in every difficult circumstance, and the choice that faces us as the old falls away and the new emerges is:

- To stay in the place of suffering and misery, waiting on others to turn the lights back on **OR**
- To take charge of your electricity security.

If you opt to take charge of your electricity security, you face two further choices in our kind of context:

- To invest in a diesel-powered generator **OR**
- To invest in a solar-powered system

The generator option

Many households have invested in diesel-powered generators as a back-up supply for load-shedding. This is understandable as it provides the household with stop-gap electricity security.

There are many issues associated with diesel power generator though:

- The investment is like an inverted triangle, it may not cost that much to buy a generator but over time fuel and maintenance costs will mean that your costs rise along the sides of the inverted triangle.
- They are very noisy, and the larger the generator the greater the noise. I have seen a number of complaints on the telegram group relating to people running their generators at inconsiderate times.
- They pollute the air in the neighbourhood, affecting everyone. The noise and pollution means they create a nuisance.
- The transport of diesel has also emerged as an issue, and there have already been a few instances where the trailers carrying diesel have exploded on the highway. This is a risk for the whole community.
- They may be find for a stop-gap solution but when the power is out for a day, two or three, they become a very expensive, impractical, un-neighbourly solution.

The solar option

The alternative option is to invest in a solar system comprising solar panels, an inverter and batteries. This is the route our household opted for when, on a dark-loadshedded night sometime in January when Stage 6 was in play, I decided **I am not going to live like this.**

Many people believe they are unable to afford solar power. While it is true that purchasing a solar system may involve tens or even hundreds of thousands of rand (depending on how big you want the system to be), companies have emerged that offer **rent-to-own** and **rental (solar-as-a-service)** options. The monthly payments on these other options are comparable to the price you would pay for City Power anyway. We opted for a rental option, as I wanted to understand the ins and outs of the system before investing more heavily.

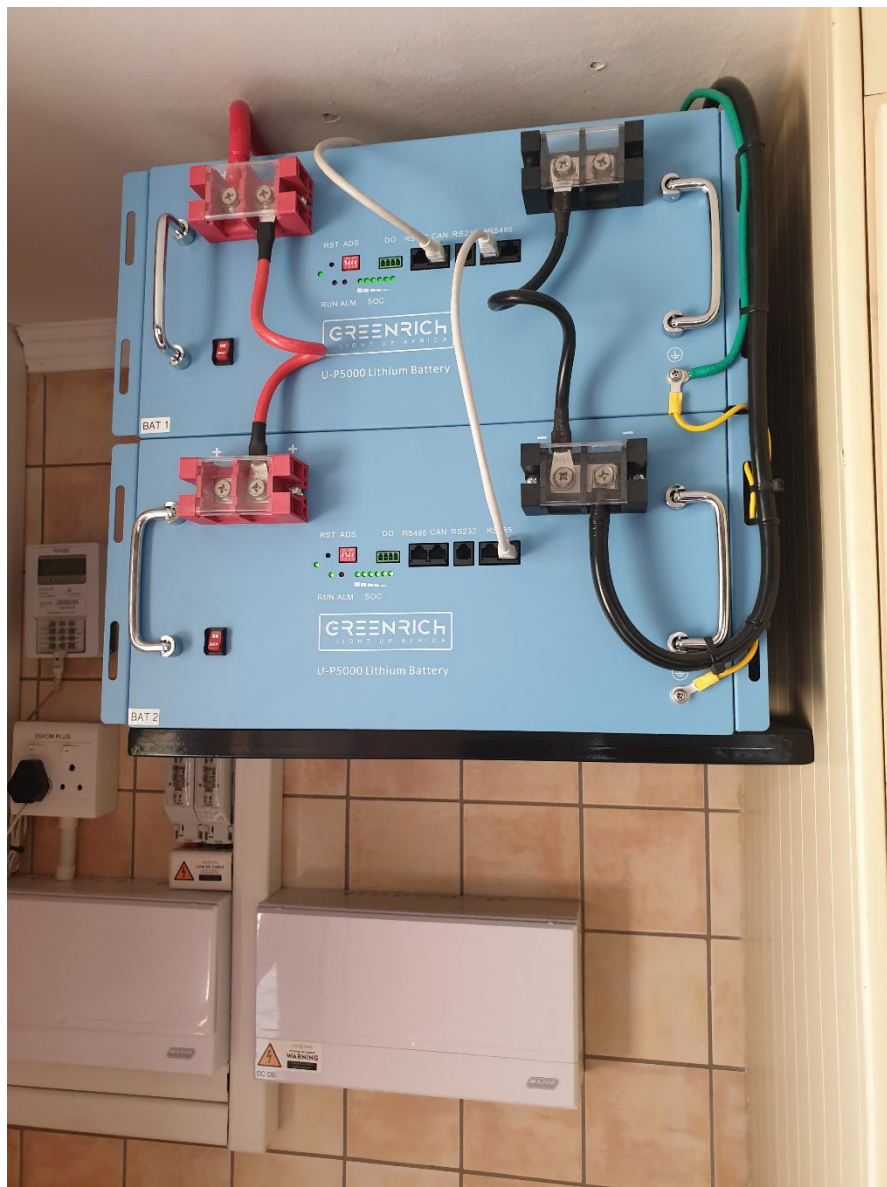
We used a service provider located in the neighbourhood to provide the solar rental service. I was hugely impressed by their professionalism throughout and followed their advice of installing a bigger system (9 panels, 8kVa inverter and 2 batteries) on which the heavier appliances (two geysers as well as the stove) were also added. The system is grid-tied, which means that City Power can be used to charge the battery or even provide electricity.

I am so glad I followed their advice because since the installation in February we have essentially **not had one day of load-shedding or City Power-shedding.** There was only ONE

day, in the last few weeks, when I switched on one of the geysers in the afternoon. The grid power unexpectedly went down, and as the afternoon wore on and the sunlight grew less strong, the system switched heating the geyser from solar and grid power to the battery. When I arrived home I was horrified to see the batteries sitting on 46% at 4pm with no back-up grid power. That night, when the batteries reached 25% capacity, the system automatically shutdown, and we had to face City Power shedding once more. But the next morning, the sun rose again and started charging our batteries, and by 9am there was enough power for our solar power system to start again.

The pictures below show the inverter and batteries.





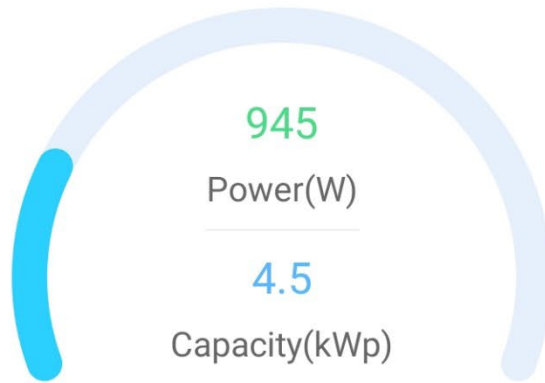
The next picture shows the control panel on the inverter, which was taken on 19 August 2023, at around 12h20. On this picture you will see three green lights at the top of the screen, which indicates that solar power ('DC'), grid power ('AC') and battery power ('Normal') are all available to power our electricity needs. On the right-hand side, you will notice four blocks. The top block on the right-hand side is our energy demand, which you will notice is 4540 watts – the reason being is that this is the time of day when we heat the largest geyser in the house. The block next to it shows the power provided by the solar panels (3130 watts). The block below that shows how much power the batteries are contributing to heating this large geyser (1570 watts). The block on the bottom right-hand side shows how much grid (City Power) we are using to heat the geyser: 0.00 watts; i.e. nothing.



The next picture is a screenshot of the app you use to manage your system. You will notice that the inverter sits at the centre. On the top left the app shows at any time how much sun power is powering your system (945W), the state of charge of the batteries (99%), the electricity demand in the house (851W) and the amount being contributed by the grid (0W).



Overview



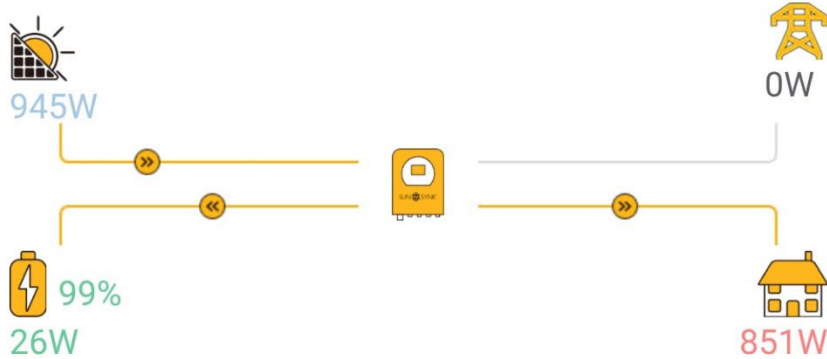
5.3 kWh
E-Today

272.1 kWh
E-Month

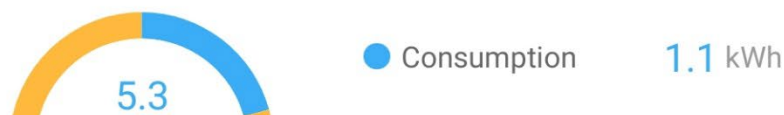
2416.8 kWh
E-Year

2416.8 kWh
E-Total

Power Flow



Generation Purpose



Overview Equipment Event Layout Intelligent



Things to bear in mind when choosing solar

The solar rental installation has been **nothing short of amazing**. Because I manage our batteries well, we have essentially had no load- or City-power shedding since February. The anxiety and depression that load-shedding was causing in my life and in the household has vanished.

From my experience with a solar rental options, I can share the following insights:

- Installing solar requires a few behavioural changes. The most important is that you need to heat your geysers when the sun is available and best, i.e. the middle of the day. We heat our largest geyser between 12h00 and 13h00, and our smaller geyser between 13h30 and 15h00. The half hour break between the two biggest loads on the system allows the battery to recover.
- We realised that we were completely over-heating our geysers and **basically throwing money away**. You will have hot to very hot water heating your geyser for one to one-and-a-half hours per day. If you need a top-up of hot water in the morning, half an hour heating using City or battery power will do the trick. In this vein, geysers are South Africa's most significant energy demand problem that could be managed so much better. There are an estimated 5 to 6 million geysers in South Africa and if only **5%** of those were switched off in peak demand times we would be able to reduce one stage of load-shedding. Some people leave their geysers on for the whole day – **completely unnecessary**. If there is one thing you do today, turn your geyser off or install a timer so that it only switches on during certain times of the day.
- Also be aware that when you heat your geyser in the evening or early morning, you are being subjected to the **highest** electricity tariffs.
- Because we heat our geyser in the middle of the day, it means that we are not drawing any power for the geysers in the evening. That means more than 7000W not being loaded onto an already overloaded system.
- You will become aware how many watts your various appliances use. Geysers take the most power, then stoves and heaters. We have gas heaters, but our stove draws about 3000W and drops to lower wattage as the heat increases. An airfryer takes about 1500W but then drops dramatically; microwave takes about 1500W but you use it for less time; hairfryer about 2000W, pool pump in the region of 800W (but you use it for long). Air conditioners and underfloor heating are not recommended for a solar system as they draw big amounts of electricity. A stove with four electric plates would draw about 6000W if you used them simultaneously.
- The other behaviour change is to cook during the middle of the day, and to refrain from using a dishwasher at night. We've tended to use our stove less (roast chicken

from checkers is just as good) and ditched our dishwasher (which would draw power at night, when you don't have the sun and thus drain your batteries). Washing and drying dishes has become a family connecting time (albeit with the occasional moan).

- You must aim to have your batteries charged by 100% at the end of the day – you will then easily have enough power to last through the night even if the grid power goes down. If you have grid power, it keeps the batteries charged once they fall to a particular level. Our levels are 80% till 1am, and then 70% until 5am. You can set these lower – its just a question of how much security you want to have.
- Your solar will not work as well for powering your house and charging your batteries on an overcast or rainy day (although it still produces some wattage and if the sun comes out your batteries recharge pretty quickly). We have had to make some sacrifices on those days when we've had cloudy or rainy weather AND loss of grid power for extended periods. On these days, we don't heat the geysers.
- My City power bill has fallen by 80% and I pay the same for the solar rental as I did for City Power. **If you can afford City Power, you can afford a solar rental.** We still pay for some City Power, making my overall electricity bill a little more expensive, but given the energy security we now have this is worth it.
- If you are a homeowner, you must make an amendment to your insurance policy with the home loans division of your bank. They are geared up for this. Our monthly insurance instalment increased by R17.
- To install the system, the service provider will do credit checks and there is a small upfront payment (R5K in our case). You do also need to have your existing electrical compliance certificate as the installer will provide you with a new one. Frustratingly, I had lost our original certificate, but the service provider was set-up for that and we were able to navigate that hurdle.
- Don't be tempted to get a fly-by-night operator to install your system. This can be dangerous for your household and the integrity of the grid as a whole. Here is a link to a list of approved suppliers from this website: [SAPVIA - The South African Photovoltaic Industry Association](#) and this one [AREP – Association for Renewable Energy Practitioners \(arepenergy.co.za\)](#).
- Finally, there are now at least **three** government supported initiatives to support households and business make the shift to solar, namely: the solar tax incentive, the expanded renewable energy tax incentive under s12B on the Income Tax Act which allows for accelerated depreciation for business investments in renewable energy, and a recently-announced energy bounce back loan guarantee scheme, which will

make securing a loan from your bank to finance your solar system easier. Get in touch with a legal or tax practitioner if you want to better understand these options.

In conclusion:

It is difficult to move from the old to the new. However, the time is now more opportune than ever to take your energy security into your own hands and move from a state of suffering to a state of agency. Solar power will provide you with the energy security you need and take pressure off the grid. I urge you to make the change soon.