

Nuclear red. Renewable energy green

 By [Roger Metcalfe](#)

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Given South Africa's world-shattering potential for renewable energy, it is inexplicable why our government is seriously considering the purchase of eight nuclear reactors at an estimated R1tn.

Safety issues aside, borrowing that kind of money to buy such costly nuclear technology seems ill-advised if not reckless, to say the least. If we are unable to service this debt, South Africa could find itself in the same dilemma as Greece. In a worst case scenario, such a purchase could lead to the collapse of the South African economy.

A deeper issue is why our leaders are ignoring inputs from significant organisations.

DOE recommendations ignored

The government's bold, if not reckless, talk of embarking on a nuclear build programme flies in the face of our own Department of Energy's 2013 Master-Plan. In this report our energy experts recommended deferring the decision to build atomic power facilities until at least 2025, and possibly scrapping the idea entirely if costs became prohibitive.

Is a trillion rand not prohibitive?

Without delving into figures, if South Africa goes nuclear, it currently stands to pay more than double of what India, China or South Korea are paying in terms of installed kilowatts.

The recommendation of our scientists was to push ahead with renewable energy to support the country's baseload requirements. Such [growth in renewable energy](#) would immediately reduce our dependence on coal-fired power.

Is it too obvious a question to ask why our government would push aside the recommendations of its own Department of Energy?

The DOE master-plan arose from a white paper on renewable energy in 2003, which set a target of 10,000 gigawatt hours of energy to be generated from renewable energy by 2013. The sources included a mix of wind, solar electric, biomass and small-scale hydro-electric power. Such an integrated energy development could effectively replace two of Eskom's coal-fired power stations, showing that South Africa is clearly in a unique position to take advantage of renewable energy.

International Atomic Energy Agency

The International Atomic Energy Agency found South Africa's nuclear preparedness deficient in more than 40% of its assessment criteria, strongly indicating that South Africa is simply not ready to expand its nuclear capability safely.

This was reported by the DA's shadow deputy minister for energy, Dave Mackay, who added: "We find the minister's announcement to go ahead with the nuclear build programme to be downright confusing, premature and irresponsible." Consultancy Africa, a global security specialist, [echoes similar sentiments](#).

UCT research findings

An in-depth [study published in 2013 by the University of Cape Town's Energy Research Centre](#), revealed that nuclear plants were not needed and would not be cost-effective for the next 15 to 25 years, if at all. One of South Africa's key advantages over the rest of the world is its vast renewable energy potential.

Greenpeace Africa

The executive director of Greenpeace Africa, Michael O'Brien Onyeka said in a 2013 report titled Powering the Future: Renewable Energy Roll-out in South Africa:

"Current energy planning is dangerously short-sighted, ignoring the vast external costs of both coal and nuclear and which fails to provide electricity for millions of citizens. Greenpeace questions why the [SA] government continues to support such power plants and centralised energy distribution, when renewable energy is cheaper, provides universal [locally distributed] access and creates thousands of jobs."

One might also add that renewable energy systems are vastly safer, much quicker to build, are great job creators and can be developed close to where electricity is required, anywhere in the country.

Funding model unclear

If today's leaders fail to be guided by scientific expertise and rational, cutting-edge thinking, our children may well pay the price. That's the reality of the world in which we live.

Currently the favoured supplier, state-owned Rosatom of Russia, has already indicated it will [lend SA the money](#), to be repaid over 20 years. It does not sound too healthy for the seller to be lending such vast sums of money to the buyer.

What then is the funding model?

At this stage, Deputy Director General of Nuclear Energy Zizamele Mbambo is not giving much away. Details have not yet been released for public debate, and the funding model remains a closed book.

Fortunately, many organisations such as the Southern African Faith Communities' Environment Institute are pushing for a green solution and [calling for transparency](#).

No public debate

There has been no open public debate on sustainable energy supply ... an issue barely addressed by mainstream media. Where is the energy indaba in which qualified South African stakeholders engage in a structured conversation about our own energy future? We need to explore alternative options, long-term and short-term safety issues, and especially affordability.

We had better debate this issue while we can, for once the contract has been signed, all South Africans will be committed to the outcome, for better or for worse.

Finances aside, and based on research from around the globe, nuclear is already falling out of favour, largely because of safety issues and growing public opposition. If any argument has ever called for precautionary principles to be applied, it is around the issue of nuclear power.

Assessing nuclear risk

In classic risk analysis one weighs up the probability of something going wrong against the seriousness of it. Russian roulette is an appropriate example. In loading only one bullet in six, the probability of something going wrong is relatively low, yet the seriousness is extremely high. The rule is simple ... you don't take the risk.



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How many more Chernobyl and Fukushima disasters do we need before we learn that the nuclear risk is simply unacceptable?

There is a reason for the global trend towards renewable energy. Nuclear waste issues aside, when nuclear reactors go wrong, they represent a serious, long-term threat to all life on earth.

Fukushima is a reminder of a disaster of planetary proportions, and to this day the Japanese are still unable to stem the daily [300-ton flow of highly radioactive water into the Pacific](#). We need to factor this into any energy/risk equation.

Koeberg Power Station

Let's re-examine our own ageing Koeberg nuclear power station on the Cape West coast. It sits on the western seaboard within sight of Table Mountain, alongside an earthquake faultline which has its [epicentre in Milnerton](#). The last two serious earthquakes on the Milnerton Fault occurred in 1811 and in 1969, the one that demolished the town of Tulbagh and gave Cape Town an alarming shake. I remember running out of the house that fateful night, and hearing the massive oak trees hissing as their leaves were violently shaken. I thought the world was coming to an end. This proves that Cape Town can become geologically active very suddenly.

To reduce the risk of a catastrophe, Koeberg's engineers mounted the nuclear reactors on a steel plate and a six inch concrete slab, all cushioned by neoprene rubbers designed to act as shock absorbers.

In theory, Koeberg can ride out an earthquake of up to seven on the Richter scale. But geologists know that earthquakes are totally unpredictable. And if things really go wrong, how does one ever evacuate Cape Town, a city of millions?



Source: www.eskom.co.za

Questionable evacuation plan

My father used to advise 'every wise rabbit has two exits'. Those sufficiently aware of risk should have at least one plan of action in the unlikely event of a Koeberg meltdown. In such a case, radiation could well be carried by wind or rain to Cape Town and suburbs. Depending on wind direction, Table Mountain may only deflect and temporarily delay the radioactive contamination of this populated area.

Currently, Capetonians are unaware of any evacuation plan for the city, and one wonders how our authorities will alert the public to a serious radiation leak, if they do at all.

Judging by past nuclear disasters such as Fukushima and Chernobyl, my prediction is that cover-ups and denials will be the initial reaction, simply because no government will risk provoking panic over a predicament it is powerless to solve. Capetonians will only learn about a radiation leak gradually over time, by which time the deadly genie will be out of the lamp.

What evacuation plan can there be when moving a million-odd souls in a heartbeat is out of the question?

There is a [theoretical traffic coordination plan](#) to evacuate citizens from the five-kilometre and the 16-kilometre emergency zones, but this does not explain how the public will be alerted.

The Fukushima disaster

Even today, four years later, there is no solution to the Fukushima meltdown, and [radioactive water continues to pour daily into the Pacific Ocean](#). Many nuclear experts, radiation scientists and marine biologists say the ocean has been poisoned. Japan's east coast [fishing industry has come to a halt](#). Without going into atmospheric contamination, we must remember that all major oceans are connected. Essentially the earth is one closed ecosystem.



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Red light flashing

Fukushima, being a disaster of planetary proportions, it is astounding that a global alarm bell has not been sounded. The cover-up continues for there are no bodies lying in the streets, and modern medicine is competent to cope with the tragic symptoms of radioactivity. In the end, damage from radioactivity comes down to dosage. High exposure means death within hours, while low exposure to radioactive isotopes can take months or longer to trigger cancer, strokes, birth deformities, heart disease, mutations or other deadly ailments. As one scientist put it, "It's like a fire that cannot be put out."

The problem begins with the manufacturers who are able to design and sell impressive nuclear technology, yet have no solution in the case of a serious meltdown. They fail to design failure into their plan.

Such designs can unwittingly cause accidents from which there is no short-term recovery and immense long-term collateral damage to all forms of life. It baffles the rational brain that such deadly technology is used simply to boil water to create super-heated steam to drive the turbines that generate electricity. There has to be a better way.

And there is, as the three countries below demonstrate.

Japan energy today

What's happening in Japan is revolutionary. After the Fukushima meltdown four years ago, every nuclear power station in the country was shut down. Until now, the country has coped surprisingly well without nuclear, and this without one instance of load shedding.

How was this achieved?

First the utilities fell back onto coal and gas. Admittedly these are fossil fuels, but certainly less life-threatening than radioactivity. Then the Japanese introduced the 'feed-in tariff'. This means that anyone who installed a solar PV system on the roof of their homes can sell electricity back (feed in) to the grid and are paid well for this. This form of distributed (versus centralised) power, rapidly accelerated Japan's move towards alternative energy. Today the country is on target to meet a third of its power through renewable energy. The trend is good.



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The one downside is that Japanese power utilities are now talking of [restarting some of the nuclear plants](#); this in the face of immense public opposition to nuclear energy.

Burnt painfully into Japanese memories are names like Hiroshima and Fukushima, not to mention earlier nuclear disasters such as Chernobyl, Three Mile Island and Windscale.

Denmark today

This July 2015, Denmark reached a remarkable milestone. Over 100% of the country's electricity needs were supplied by renewable energy, the excess being sold to neighbouring countries. Running an entire economy on natural energy is clearly not a fantasy. Plus, it is clean and safe when compared to nuclear or fossil fuels.

The Danes are combining solar electric (photovoltaic) and wind energy which means little or no storage is required. After sunset, the wind continues to generate electricity. Hydro-electric and geothermal power also contribute to the energy mix, underlining the importance of an integrated approach to renewable energy.

Germany today

Germany is changing its entire power supply and undergoing a total energy revolution, the first since the start of the industrial revolution. It is phasing out nuclear and coal and rapidly ramping up renewable energy. This is taking place in a country of 80 million people with heavy industries. According to World Watch Institute, Germany is on track to [nearly half its energy requirements through renewable energy](#). This includes solar electrical power, wind energy and hydro-electric power. Half of its renewable energy capacity is already owned by citizens ... highlighting the trend towards decentralised power.

Potential for renewable energy

South Africa has been blessed with astounding natural energy such as wind and solar. Both our east and west coasts offer great wind generation potential, while the northwest Cape offers a solar irradiation index virtually unequalled on the planet. Developing these technologies provides substantial employment, stimulates local manufacturing and feeds into the national grid. A big plus is that renewable energy technology can be commissioned in a very short time, certainly far less than it takes to build and commission a nuclear power station. As this time-lapse video demonstrates, one wind turbine can be built and commissioned in three weeks.

While they may be initially capital intensive, renewable technologies are sustained by natural, free and, above all, safe energy.

Antagonists of renewable energy will point out the intermittent and unpredictable nature of natural energy systems. Perhaps they do not realise that intermittency can be overcome through an integrated approach. Underlying this approach is what one engineer termed a "rational green design", together with a few sensible lifestyle adjustments.

And what is load shedding, if not another form of intermittency?

Although South Africa still has a long way to go before renewable energy replaces coal, the shift is already underway.



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A rational green design

To run South Africa on renewable energy is attainable. We need the political will to support our scientists and engineers who are more than capable of designing our energy future - a 'rational green design' that fulfils itself, unhindered by short term profiteering, misguided government involvement, and corruption.

By what compass do we navigate?

Perhaps in the end it comes down to physics, the most efficient and purest form of applied energy. Hopefully, our government sees the light in time, and supports the harnessing of clean, safe renewable energy which this sun-blessed country possesses in abundance.

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Roger Metcalfe is an award-winning journalist and filmmaker specialising in the environment, technology and medicine. He received the SA National Cancer Association's Award for Enterprising Journalism for nationally televised documentaries (MRI, breast cancer). Roger has written over 50 magazine articles, been interviewed on radio (Fukushima, water), is an ex-diplomat and former council member of the Writers Guild of SA. He recently graduated with a Postgraduate Diploma in the [Filmic] Arts. Contact Roger at roger@global.co.za.

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