NSTF
National Science & Technology Forum

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Transitions in South African energy provision

NSTF discussion forum

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Concept Document

Introduction

The key questions are: There are various transitions that can be related to the Just Energy Transition. *How should these transitions be managed? What science, engineering best practice, and technology can inform these transitions? How can South Africa's electricity crisis be ended, its impacts mitigated and long term supply of electricity be established on a firm footing?*

Electricity generation, transmission and distribution are in a perpetual state of crisis in SA. President Cyril Ramaphosa declared the crisis a Disaster, given the magnitude of the cascading negative impacts caused by the ongoing failure of all parts of the vast national electricity system. The declaration was withdrawn due to widespread criticism. Yet, the crisis can indeed be called a disaster without it being a National Disaster in the legal sense of the term. It is truly disastrous for our country and its people.

A system of loadshedding (rolling blackouts) is now a feature of daily life, and the increasingly negative effects of this are experienced by all South Africans: from struggling with the tasks of daily life and maintaining small businesses, to the dire effect on the economy and sinking levels of global confidence; from education/training activities under current conditions to the dire state of health care; from the reliability of water supply, to the strength of cell phone signals.

President Cyril Ramaphosa spoke about SA's electricity challenges in his 2023 State of the Nation Address and announced his plan for addressing the electricity disaster and ending loadshedding.

A year ago, the government brought out an energy plan to end loadshedding, which can be read here: confronting-energy-crisisan-action-plan-end-load-shedding.pdf (www.gov.za). It says:
'Government is focused on two overriding objectives:
» First, to improve the performance of Eskom's existing power stations; and
» Second, to add as much new generation capacity to the grid as possible, as quickly as possible.'

Cosatu's deputy chairperson in Gauteng, Thabang Sonyathi said, in the context of their march for improved service delivery on 6 July 2023: "There is no way that we can resolve our contradictions and our [socio-economic] issues without resolving the energy crisis. This transition that is often spoken about must be in the interest of the workers."

There's the government's dilemma: the Just Transition, led from Pres Ramaphosa's office, is well-intentioned. The idea is to transition to greater dependence on renewable sources of energy at the same time as growing energy supply, thereby cutting carbon emissions over the long term, and creating a healthier environment for SA's people. However, inevitably such a transition involves the shedding of jobs. It is simply not possible to re-skill all workers.

Here follows a list of some of the problems involved in the energy crisis:

- **Shedding of jobs** in the transition from coal fired energy generation to renewables
- **Maintenance of infrastructure** is particularly pertinent: After all the warnings from engineers for more than 25-30 years, maintenance has never been brought up to date, and now the country faces many emergencies, not only in electricity but many other areas (roads, railways and water, for example) every single day.
- **Crime** also has a severe impact: for every step forward in repairs and maintenance, it seems that theft and sabotage take the country several steps back.
- **Impact on the economy**: Energy is the fundamental input of all economic activities. Decreased energy supply leads to increased energy prices. This increases the cost of production and reduces consumer spending. When consumers are not spending, there is a decline in economic growth and growth in unemployment. Mining and manufacturing companies are to some extent, trying to supply their own energy needs, but many are closing down shop in SA and going elsewhere in the world where there is a reliable electricity supply. Disinvestment and lack of new direct foreign investment are costing the economy and society dearly. Business confidence is slipping. We are in dire need of *a transition to energy stability*.
- **Policy uncertainty is at an all-time high:** leading to sinking investor confidence. The NWU Business School Policy Uncertainty Index rose to about 72, up from 52 in quarter 4 of last year. This is higher than during the COVID-19 pandemic and is almost entirely due to the electricity crisis.

What should be done? What advice can be given to the powers that be, on how to handle and mitigate the disasters we face on all levels as a result of this major disaster? There is a greater sense of urgency than ever to press the authorities to take action – what are the priority actions advised by scientists and engineers? What should be done immediately, in the medium term, and over the long term?

This online discussion forum

The National Science and Technology Forum (NSTF) is hosting this discussion forum on **Transitions in South African energy** to focus attention on the planned and implemented interventions and transitions in South Africa's energy systems, and identify any up- and downsides to these. We also want to find out: how likely are these to work and are they based on scientific evidence?

The main topics/themes

1. Overview and analysis of the problems and their impacts
2. The government's Energy Plan
3. The just transition towards low carbon emissions

4. Transition to greater energy efficiency
5. Transition to solar energy
6. Transition to hydrogen fuel and/or biomass fuels
7. The nuclear energy option as part of the mix
8. The Karpowership intervention
9. Skills and re-skilling for energy transitions

Points to consider in every topic/theme:

- What research has or can inform the government's choice of actions?
- Breaking down the overwhelming problem of supplying the SA economy and population with electricity, what should the timeline be for various actions and deliverables?
- What technologies should be invested in over the long term?
- Is the government on the right track?
- What provision is made for maintenance of infrastructure? What measures are necessary?

Annual energy discussion forum

Due to this wide variety of important issues, and the long term nature of the problems, the NSTF is starting a series of **Annual NSTF energy forums**. Science and innovation are taking place, and ongoing, in the energy space, and should inform energy decisions by both private and public roleplayers. Having an annual event will provide a predictable platform to bring together scientists, engineers and innovators to share their expertise with the public and policy-makers.

Background:

South Africa, unlike some other countries across the globe that are struggling with energy, began to experience the electricity crisis already in the last months of 2007. This crisis has continued to spread, with ongoing periods of widespread blackouts. The conditions became severe in September 2022 when our country experienced when about half of Eskom's generating capacity collapsed. The population now knows the reasons for the collapse at the time, and for the ongoing crisis. Widespread and deep-seated corruption has been exposed at Eskom, South Africa's national power utility, by whistleblowers, in the press and through the Zondo Commission hearings into State Capture. SA is struggling to rid itself of this 'corruption pandemic' (as it has been called). In the meantime, generation capacity continues to hover at 50%, infrastructure across the country needs refurbishment, replacement and maintenance; and load shedding continues unabated regardless of political measures aimed at addressing the problem. Studies have shown repeatedly that a major cause of the electricity crisis is poor investment in energy infrastructure over the last three decades.

Are there any lights at the end of the tunnels?

- Government's plans
- Government and private sector working together
- Lowering demand of electricity: greater efficiency
- Lowering demand: transition in the home
- The potential of the transition to solar and wind energy
- The potential of nuclear energy
- The potential of the hydrogen economy
- The potential of biomass as a source of energy
- Is the Karpowership a good idea?

Purpose:

This Discussion Forum provides a platform for government officials, researchers, engineers and other professionals to share their insights about the current state of energy and electricity provision in SA. The discussions will highlight the impacts brought about by the energy crisis as well as possible solutions. The NSTF aims to raise awareness of:

- Scientific, evidence-based approaches to finding solutions for our country
- The importance of engineering expertise and skills to design and build the required solutions, do the necessary repair and maintenance, and ensure long-term solutions
- The need for innovation
- The urgency of finding immediate and long-term solutions to the electricity crisis

Outputs:

As is usual for NSTF Discussion Forums, a media release will be issued which summarizes the most important issues and conclusions. The following outputs will also be made available on the event page and through social media platforms (Facebook, Instagram, Twitter, YouTube and LinkedIn):

- Video recordings of speakers' presentations (subject to the speakers' agreement)
- Presentation slides (if available and subject to the speakers' agreement)
- Speakers' biographies
- Useful links (Feel free to let us know should you have any information that you would like us to consider posting here.)
- NSTF will engage the media on possible interviews and/or articles, and post on social media before, during and after the event.

References:

Energy Sector Leader Identifies Key Challenges – Sanedi

Pitso on policy uncertainty and the way forward for the economy | news.nwu.ac.za

Energy Efficiency – Sanedi

The State of SWH Research in South Africa - A Review copy.pdf (sanedi.org.za)

State of Digitalization in Buildings Sector 31082022.pdf (sanedi.org.za)

Domestic issues continue to raise SA's policy uncertainty, reveals NWU report (ewn.co.za)

confronting-energy-crisisan-action-plan-end-load-shedding.pdf (www.gov.za)

SONA 2023: So, what is the plan to end load shedding? (thesouthafrican.com)

South Africa - Karpowership South Africa

https://en.wikipedia.org/wiki/South_African_energy_crisis