

Academy of Science of South Africa (ASSAf)

Statement on the Electricity Crisis and the Just Transition

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In the first months of 2023, the intensity of loadshedding increased from an already significant number of days in the year to occurring almost every day. The absence of a reliable electricity supply has an ongoing devastating impact on South African society and the economy with hundreds of thousands of jobs been lost, whilst many more have been compromised. The full impact on economic output has not been quantified but is undoubtedly very high. The academic community has published widely on the causes, inter-dependencies, and implications of load-shedding.

In 2023, the President declared that the energy crisis being experienced in the country constituted a national state of disaster¹. The new Minister of Electricity, appointed in March 2023, was tasked with implementing the National Energy Action Plan to end loadshedding and to focus on Eskom. Eskom's operational activities are now administered by three Ministries – Mineral Resources and Energy, Public Enterprises, and the Presidency (Electricity). However, the unclear division of responsibilities and coordination of mandates among these three Ministries creates additional confusion that undermines accountability and performance improvement. Consequently, little progress has been made in politically resolving the electricity crisis.

ASSAf believes that sound, evidence-based policymaking should start with understanding the deep roots of the electricity crisis, in the context of multiple other crises (polycrises) that confront the country. This Statement aims to contribute to the public discourse on the current electricity crisis from a 'just transition' perspective.

What is a just transition and how does it relate to the electricity crisis?

The concept of a just transition emerged from the US trade union movement in the 1980s. It was taken up by many international organisations, including the International Labour Organization (ILO). The ILO defines a Just Transition to mean "greening the economy in a way that is as fair and as inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind"².

When the concept was imported into South Africa in the 1990s, it was defined by the labour movement broadly to mean transformative change to create a more just and equal society³. Since then, the concept has been narrowed to refer only to an energy

¹ Ramaphosa C, (2023). State of Nation Address. Republic of South Africa. <https://www.stateofthenation.gov.za/assets/downloads/State-of-the-Nation-Address-2023.pdf>

² ILO, (2023). International Labour Organisation. Frequently Asked Questions on Just Transition.

³ Swilling M, Nygaard I, Kruger W, Wlokas H, Jhetam T, Davies M, Jacob M, Morris M, Robbins G, Funder M, Hansen U, Olsen K, Davy E, Kitzing L, Khan B, and Cronin T, (2022). Linking the Energy Transition and Economic Development: A Framework for Analysis of Energy Transitions in the Global South. Energy Research & Social Science 90:102567. doi: <https://doi.org/10.1016/j.erss.2022.102567>

transition. A just transition in South Africa has many aspects, among which is an important public debate on a just energy transition. Social justice is critical. A just transition puts people at the centre of decision making, especially those most impacted, the poor, women, people with disabilities, and the youth, empowering and equipping them for new opportunities for the future.

The literature also points to the limitations of considering energy transitions without equity, particularly in the global South⁴. The crucial element of justice, which has distributional and procedural elements, is often overlooked in techno-economic approach to solutions related to the energy crisis. Procedural equity is crucial to build broad support for the transformational changes entailed in moving from a high- to a low-carbon economy. Distributional equity means that not only a few could benefit from an energy transition.

However, in the context of the electricity crisis and just transitions, there are confusing and often misleading narratives around coal and jobs. This is evident in how employment in coal mines (which employ approximately two-thirds of the workers in the coal value chain) peaked in the early 1980s, at around 140 000 jobs. Jobs for coal miners declined as capital intensity increased and had almost halved by 2015⁵. In other words, jobs in the coal industry started decreasing at a time when South Africa had massive over-capacity of electricity supply.

South Africa is facing a serious risk that inequality will be further entrenched because of Eskom's death spiral. With daily loadshedding, more and more businesses and richer households are defecting from the grid. Those who can afford alternative power, either buy diesel generators or install solar home systems. This leaves the remainder of Eskom as a national utility to provide energy for poor households. The silver linings are that the national utility must supply to a reduced demand. Seemingly, South Africa is heading for a dual energy economy - those who can buy their own services, and those who cannot pay who get poor public services⁶.

The complexities within Eskom and the energy crisis.

The root of the electricity crisis in South Africa lie in the complex issues around Eskom's operational, structural, and financial challenges⁷. These major internal challenges are compounded by failures in governance, and a complex and contested relationship with government. Additionally, these operational, structural, and financial problems have been further exacerbated by mismanagement within Eskom. Moreover, the technical

⁴ Swilling M, Nygaard I, Kruger W, Wlokas H, Jhetam T, Davies M, Jacob M, Morris M, Robbins G, Funder M, Hansen U, Olsen K, Davy E, Kitzing L, Khan B, and Cronin T, (2022). Linking the Energy Transition and Economic Development: A Framework for Analysis of Energy Transitions in the Global South. *Energy Research & Social Science* 90:102567. doi: <https://doi.org/10.1016/j.erss.2022.102567>

⁵ COBENEFITS, (2022). From Coal to Renewables in Mpumalanga: Employment Effects, Opportunities for Local Value Creation, Skills Requirements, and Gender-Inclusiveness. Assessing the co-benefits of decarbonizing South Africa's power sector. COBENEFITS Executive Report. Potsdam/Pretoria. <https://www.cobenefits.info/resources/from-coal-to-renewables-in-mpumalanga/>

⁶ Cock J, (2019). Resistance to Coal Inequalities and the Possibilities of a Just Transition in South Africa. *Development Southern Africa* 36(6): 860–73. doi:10.1080/0376835X.2019.1660859

⁷ Winkler H, Tyler, Keen S, and Marquard A, (2023). Just Transition Transaction in South Africa: An Innovative Way to Finance Accelerated Phase out of Coal and Fund Social Justice. *Journal of Sustainable Finance & Investment* 13(3):1228–51

structural problems have been compounded by corruption during the era of state capture⁸.

Operational challenges include a fleet of ageing coal plants, with other units out of operation (even the newly built Medupi and Kusile plants), leading to a rapid decline in the Electricity Availability Factor (EAF). The EAF is the share of time that a power plant produces electricity over a certain period⁹. A good EAF would be around 80%, considering that plants require planned maintenance, and often unplanned shutdowns may occur. However, Eskom's EAF is now below 53%, meaning that the fleet is operating just over half the time.

Additionally, the building of two large new coal-fired power stations, Medupi and Kusile, experienced long delays and over-spending which are typical of mega-projects everywhere. In South Africa, however, these problems were compounded by corruption and mismanagement. Consequently, these new power stations were not constructed properly. This resulted in design defects and damaged units, and subsequently in power stations that have never operated at full capacity.

There are structural challenges related to Eskom's history as a national utility. South Africa's existing grid has been highly centralised, which is supplied by 15 coal-fired power plants, one nuclear plant, a smaller capacity of open-cycle gas, renewable energy, and other sources. However, with the implantation of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), Eskom lost its status as a 'natural monopoly' and now faces competition in generation. The REIPPPP has brought in private investment, but regulatory constraints were placed on Renewable Energy (RE) development¹⁰. During the several years that the Integrated Resource Plan (IRP2019) was debated, limits were placed on how much wind and solar photovoltaics (PV) could be added – despite these technologies rapidly having become lower in cost, in South Africa and globally. There is strong resistance from some actors in the fossil fuel industry to large-scale deployment of renewable energy, or what some studies call 'regime resistance'¹¹.

The financial challenges of Eskom are multiple, very large, and have been at least two decades in the making. Electricity tariffs are not cost-reflective, yet they are unaffordable for poor households. Increases in tariffs that would make them cost-reflective are not politically palatable, as consumers already pay high tariffs for electricity that is available intermittently, at best. The CSIR found that loadshedding occurred for 3 773 hours in 2022

⁸ PARI, (2017). Betrayal of the Promise: How South Africa Is Being Stolen. Public Affairs Research Institute, <https://pari.org.za/wp-content/uploads/2017/05/Betrayal-of-the-Promise-25052017.pdf>

⁹ Daily Investor, (2023). Eskom's load shedding problems shown in one graph. <https://dailyinvestor.com/energy/23261/eskoms-load-shedding-problems-shown-in-one-graph/#:~:text=When%20the%20EAF%20declines%2C%20a,generation%20power%20to%20meet%20demand>

¹⁰ IPP, (2023). An Overview. Independent Power Producer (IPP) office. [https://www.ipp-projects.co.za/Publications/GetPublicationFile?fileid=060966a9-3610-ee11-95ad-00505685662d&fileName=20230531_IPP Office Q4 Overview 2022-23_Final.pdf](https://www.ipp-projects.co.za/Publications/GetPublicationFile?fileid=060966a9-3610-ee11-95ad-00505685662d&fileName=20230531_IPP%20Office%20Q4%20Overview%2022-23_Final.pdf)

¹¹ Ting M and Byrne R, (2020). Eskom and the Rise of Renewables: Regime-Resistance, Crisis and the Strategy of Incumbency in South Africa's Electricity System. *Energy Research & Social Science* 60:101333. doi: <https://doi.org/10.1016/j.erss.2019.101333>

with an upper limit of 11 529 GWh relative to actual energy shed of 8 301 GWh¹². Furthermore, part of South Africa's history was to over-build electricity generation, in response to sanctions that could have put energy imports at risk. Yet this did not provide affordable access to energy for most of its citizens.

This results in what is known as a 'utility death spiral'. This term in the literature refers to situations of increases in demand-side energy efficiency or distributed generation leading to declining demand, increased tariffs, and more pressure on customers to reduce demand. Customers 'defect' from the grid, leading to losses of revenue and contributing to a further downward spiral^{13 14}.

A widely misunderstood issue around tariffs is the view that cross-subsidies flow from industrial to residential users. On the other hand, many think that households subsidise industry, since energy-intensive users pay a lower amount per kWh but use by far the larger amount of electricity. However, higher residential tariffs are applied to a smaller share of total electricity, and thus contribute less to total revenue.

In the absence of revenues covering costs, Eskom has repeatedly asked for, and received, bailouts from National Treasury. Effectively this means that, instead of customers paying, taxpayers do. Government provided Eskom with R350 billion of debt guarantee and committed R128 billion in bailout fund for 2019-2021. Debt has built up rapidly since 2018 and stood at R423 billion at the beginning of 2023. Interest payments on Eskom debt now exceed R20 billion per year and total debt service costs are over R60 billion¹⁵.

Different Finance Ministers have repeatedly sought to bring the debt by state-owned enterprises (of which Eskom's is the largest share of debt) under control. In January 2023, Minister Enoch Gondongwana effectively said that Treasury will consider taking on *all* of Eskom's debt under certain conditions. Another R254 billion was allocated – to be spent only on debt, not on any new generation capacity by Eskom.

Eskom's credit rating has fallen to a speculative level (junk-rated) and matches that of the sovereign debt of the country by most of the international agencies. As at the end of 2023, South Africa is facing increased indebtedness as a percentage of gross domestic product whilst also having to budget for increased debt servicing costs.

¹² CSIR, (2023). Statistics of utility-scale power generation in South Africa. CSIR Energy Centre. <https://www.csir.co.za/sites/default/files/Documents/Statistics%20of%20power%20in%20SA%202022-CSIR-%5BFINAL%5D.pdf>

¹³Laws N, Epps B, Peterson S, Laser M, and Wanjiru G, (2017). On the Utility Death Spiral and the Impact of Utility Rate Structures on the Adoption of Residential Solar Photovoltaics and Energy Storage." *Applied Energy* 185:627–41. doi: 10.1016/j.apenergy.2016.10.123.m

¹⁴Swilling M, (2020). Eskom Is in a Death Spiral, so It's Time to Change the Energy Ballgame. *Daily Maverick*. <https://www.dailymaverick.co.za/opinionista/2020-02-18-eskom-is-in-a-death-spiral-so-its-time-to-change-the-energy-ballgame/>

¹⁵ Inglesi-Lotz R, (2023). Load Shedding in South Africa: Another Nail in Income Inequality? *South African Journal of Science* 119(9/10). doi: 10.17159/sajs.2023/16597

Recommendations: What is to be done?

Given the deep roots of the crisis, the multiple challenges facing the country and the need to act urgently on climate change, South Africa's electricity supply sector needs to undergo a transition from a coal dominant monopoly into a diverse energy mix, to add power into the grid quickly in response to the electricity crisis, and to meet the country's climate change goals.

ASSAf, therefore, recommends the following:

Recommendation 1:

There needs to be urgent political will to implement the National Energy Action Plan announced by President Ramaphosa ¹⁶.

Recommendation 2:

Consideration of alternate energy sources incorporating renewable energy technologies such as wind and solar PV, which have the lowest cost per kWh and with the shortest lead-times, should be prioritised.

Recommendation 3:

Since energy storage is an important component of the energy pipeline, hydrogen and battery storage systems should be researched further to understand their utility for energy storage to address the issue of intermittency for renewable energy.

Recommendation 4:

It is essential to ensure that systematic and well-planned maintenance of existing coal-fired power stations are sustained to overcome the energy crisis.

Recommendation 5:

The future electricity system should be more decentralised, both technically and politically.

Recommendation 6:

Immediate actions should be taken to strengthen transmission and distribution systems where the grid is constrained and improving access to electricity in more diverse locations across the country.

Recommendation 7:

The demand market participation particularly for large industrial users should be continued and expanded to include aggregations of smaller consumers.

Recommendation 8:

South Africa must address the threat that the electricity crisis is deepening inequality. Measures need to be put in place to avoid having two economies for energy – one

¹⁶ Ramaphosa C., (2022). Address to the Nation on Energy Crisis. 25 July. The Presidency, Republic of South Africa. <https://www.gov.za/speeches/president-cyril-ramaphosa-address-nation-energy-crisis-25-jul-2022>
0000#:~:text=The%20crisis%20that%20we%20are,energy%20scarcity%20in%20South%20Africa

for the rich, and another for the poor. Businesses and richer households should be encouraged to move to solar PV, rather than diesel generators. For poorer households, solar PV needs to be subsidised and free basic electricity needs to continue, or even be increased.

Recommendation 9:

South Africa needs to create green and climate-related jobs that provide decent work opportunities and are sustainable in the future climate economy.

Recommendation 10:

Solutions to the energy crisis should not ignore or amplify the other chronic crises in South Africa. Consideration of interconnected systems should inform policy- and decision-making.

Recommendation 11:

Policymakers should also consider the needs of women, people with disabilities, and the youth in coal affected communities who rely on those workers to provide a market for their informal sector activities.

Recommendation 12:

Alternative forms of development should be created in coal/energy producing areas to mitigate against job losses.

Conclusion

These recommendations are made based on the arguments and evidence presented in the previous sections. All these proposed steps additionally require the acceleration of scientific and technological advancements. A just transition is the way out of the electricity crisis. It is an energy transition if it accelerates decommissioning of coal and supports renewable energy. It is 'just' only if it funds social justice for the poor and the powerless.

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