

South Africa's new plan to end power cuts is seriously flawed

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South Africa experienced [unprecedented electricity shortages](#) in 2023 as aging coal plants became increasingly prone to breakdowns. The country urgently needs to develop new electricity generation facilities and reduce reliance on coal power.

In the first week of 2024, the South African [energy](#) minister, Gwede Mantashe, released a proposed roadmap for the future of [electricity](#) in South Africa. Unfortunately, the draft [Integrated Resource Plan](#) is a major disappointment. Described by some analysts as "[shoddy](#)", the plan contains, among many flaws, huge errors in costing the different future energy scenarios.

Firstly, the plan's costing estimates aren't credible. It does not even consider the most inexpensive combination of new, additional electricity—largely wind and photovoltaic solar, with some battery storage. Instead, the plan claims wrongly that gas-intensive scenarios are cheaper.

Secondly, the plan says the government must build 6,000MW of new gas-fired [power](#) stations by 2030. This idea has been [vigorously opposed](#) by environmental and other [civil society groups](#) on the grounds that increased use of fossil fuels would accelerate global warming. Another problem is that the gas would have to be imported, leaving South Africa at the mercy of international gas price fluctuations. The kind of investment in gas that is needed would require major new builds, which invariably end up with [major delays and cost overruns](#).

The new draft plan could commit South Africa to unnecessarily expensive solutions. This will damage economic prospects and drive energy costs to unaffordable levels.

The plan's energy scenarios

The first scenario is a "Reference Case," which proposes that all additional electricity be generated half by gas and half by wind and solar power. The draft plan wrongly claims that this is the most cost-effective option.

The second is a "Renewable Energy" scenario, where no new coal, nuclear and gas plants are built, but where only about one third of the new solar power investment would be in the form of photovoltaic technology. This scenario says the bulk of new solar capacity would be provided by [concentrated solar power](#), which is rarely considered globally these days because it is much more expensive than photovoltaic technology. Concentrated solar power previously had the advantage of being able to store heat for a few hours, generating electricity after sunset. But this can now be achieved with photovoltaic technology and battery storage.

The third scenario is "Renewable Plus Nuclear," where about 15,000MW of new nuclear builds would provide the electricity attributed to concentrated solar power under the previous all-renewable scenario.

The fourth is a "Delayed Shutdown" scenario. Under this plan, the life of the country's coal plants would be extended by several years each, long beyond the projected closure dates for these plants.

The final option proposed by the government is a "Renewable Plus Coal" scenario, where new gas and [coal plants](#) would replace the capacity attributed to concentrated solar power or nuclear in the other scenarios.

Strangely, there is no provision for what is probably the most cost-effective option: a renewable energy scenario using photovoltaic technology and with increased storage.

Unclear how government calculated the costs of new energy

We do not know how the government costed these scenarios because the draft plan does not set out the costs per technology. Instead, it claims to have used the April 2023 [Lazard Levelized Costs of Energy report](#) to calculate how much each new form of energy would cost.

But this doesn't appear to have been the case. Lazard is the world's [largest independent investment bank](#). Its reports are widely recognized as authoritative. The costs Lazard has calculated for the various technologies—renewable, coal, gas and [nuclear power](#)—are very different to the costs that the government must have used in the draft plan.

If the ministry's planners had used the Lazard energy costing, they would have reached a very different conclusion. There are three possible explanations: that the planners didn't use the Lazard costing, or they used it incorrectly, or their cost calculations are wrong.

What are the costs of the different energy scenarios?

[Lazard sets out](#) these costs per megawatt hour of electricity:

- utility scale solar photovoltaic: US\$24-96 per MWh
- utility scale solar photovoltaic plus storage: US\$46-102 per MWh
- onshore wind: US\$24-75 per MWh
- coal: US\$68-166 per MWh for coal from a newly built coal plant and US\$29-74 per MWh for [coal](#) from an existing plant
- nuclear: US\$141-221 per MWh for new build; US\$29-34 per MWh for existing plant.

Lazard last produced costs for concentrated solar power in 2019: US\$141 per MWh, which is exactly the low-cost end of nuclear. However, concentrated solar power is no longer updated in the Lazard report as almost all solar plants developed in the last few years are photovoltaic. There is therefore no way that the "Renewable Plus Nuclear" scenario can work out cheaper than the one for renewables only, as claimed in the draft Integrated Resource Plan.

These costs clearly show that wind and [solar power](#) are the cheapest options. South Africa has extraordinarily high sunshine levels and good winds, which would bring the costs for solar and wind power down to near the lowest levels in the earlier quoted ranges. It is therefore inexplicable that the ministry's team has concluded that the "Renewable Energy" scenario is by far the most expensive.

A good electricity plan is key to ensuring a country's energy security. It is imperative that the exact assumptions made in the modeling must be declared and that government must make the calculations clear.

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