South Africa's new energy plan needs a mix of nuclear, gas, renewables and coal, says expert

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South Africa's economy has been hard hit by 15 years of loadshedding (rolling blackouts). The country's coal-fired power plants have a maintenance backlog and frequently experience unexpected technical failures. On the other hand, South Africa has committed, under the Paris Agreement, to transition to low-carbon energy generation technologies by 2050. This puts South Africa at an energy crossroads where it needs well thought out policy development and implementation to make the transition possible.

South Africa's reliance on coal-fired power to supply about 72% of its energy needs is catching up with it as coal plants fail. But switching to renewable energy technologies is not that simple. Renewable energy also has strengths and weaknesses. While wind and solar are environmentally friendlier, they cannot supply electricity consistently unless they have large-scale storage systems.

The new draft Integrated Resource Plan is the country's national electricity plan. It sets out how electricity will be provided for South Africa between now and 2050. The government is currently considering public comments, which it needs to incorporate into the plan.

I am a senior lecturer at the African Energy Leadership Center and a professionally registered scientist with over 18 years' experience in researching how climate change, water and energy resources can be managed to achieve sustainable development in South Africa.

I believe that the country should select an energy mix of nuclear, gas, renewable and coal. Electricity should, however, be clean, affordable, and reliable. This suggests that the Integrated Resource Plan should provide a platform for South Africa to reduce its reliance on coal and diversify its sources.

In my view, the current draft plan is promising. However, considering the urgent need for reliable electricity, it has to ensure that the pace of rolling out the new energy mix is fast.

What does the draft Integrated Resource Plan say?

The draft Integrated Resource Plan contains two "horizons" or time frames. Horizon One says how the government will stabilize the power system between now and 2030. Horizon Two looks at what kind of energy South Africa will need beyond 2030.

Recently, I discussed what the draft plan says on the Energy Conversations Podcast, a regular discussion hosted by a private energy company, Bayakha, and the African Energy Leadership Center at the Wits Business School in Johannesburg.

The state-owned electricity provider, Eskom, has been unable to meet the electricity demand through the current fleet of coal-fired power stations. In 2024, the shortfall is predicted to be over 2,001 megawatts every week, meaning that loadshedding is likely to take place throughout the year.

Horizon One in the plan wants to address the shortfall in electricity by delaying the shutdown of coal-fired power plants and improving them instead. However, these plants are aging, missed out on midlife refurbishment, and are very costly to upgrade. These plants are also emitting more than they are legally allowed to under South Africa's Minimum Emissions Standards.

Horizon Two looks at how South Africa's electricity will be provided over the longer term, between 2030 and 2050. It aims to make sure that South Africa has an affordable, secure energy supply but also moves away from coal-fired power stations, which are responsible for large

scale carbon emissions.

The plan proposes various pathways to introduce new energy generation. Gas, renewables and nuclear together with clean coal are mentioned along with a proposed coal fleet shutdown delay.

Environmentally friendly, affordable, reliable and inclusive electricity

There are high levels of inequality in South Africa. Electricity is not affordable to everyone. Although not specific on the numbers, Horizon Two of the Integrated Resource Plan acknowledges that massive investment will be required to transit to technologies such as clean coal and nuclear.

My view is that South Africa should embrace the costs associated with every new power generation project. But everyone involved must learn lessons from the R300 billion (US$15.8 billion) overspending on the new-build Medupi and Kusile power plants about how to constrain costs.

Abatement technologies should be used to reduce the amount of polluting emissions from coal power plants. The government will need to pay the bill to retrofit these plants with technologies to reduce emissions. However, the current plan does not provide for this.

For renewable energy, battery storage can be used to store what is generated. This is part of the Integrated Resource Plan, and government has released a request for bids to procure the battery storage via the Battery Energy Storage IPP Procurement Program.

The national electricity plan also has to make sure that nobody is left behind in the drive towards low-carbon energy. Increases in electricity

prices have been exorbitant recently—an 18.65% increase in April 2023 and a further 12.74% increase from April 2024.

High priced electricity that is also unreliable has contributed to unemployment, lost wages and business collapse. The National Energy Regulator of South Africa must look into the pricing model again. Government should consider subsidizing all socio-economic classes.

The transition to renewable energy must be inclusive. South Africa must look into manufacturing its own renewable energy components rather than importing them.

Recently, South African president Cyril Ramaphosa said thousands of jobs could be created if manufacturing plants for solar panels, battery energy storage systems and wind farms were set up across the country. The economy would be industrialized. Skills must be developed faster and the right enabling environment and policy position must be created for this to happen.

What comes next

South Africa is at a crossroads and needing to make big decisions to ensure that it conforms to the National Development Plan. The final Integrated Resource Plan should pursue all the existing technologies at a faster pace. Gas to power and nuclear energy must be included at all costs to reduce reliance on coal. This will require massive investment from both the government and private sector. This way, a steady flow of electricity will always be available.

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