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Integrated Resource Plan 2023



PWC has estimated that the impact of load shedding on GDP is up to 5 percentage points. This implies that our economy should have grown by close to 7% in 2022 and 6% in 2023.

South Africa has also committed to a low-carbon climate economy and society and part of this has been the JUST Energy Transition (**JET**) investment plan. In the medium term, it is necessary for South Africa to move away from the deployment of coal to cleaner technologies.

Eskom, tasked with driving all of this, is faced with structural problems. A recent report by VGBE, commissioned by the Treasury, has found that Eskom suffers from a dysfunctional and overly complex management system.

Given all of this, what is the State's response and its long-term plans for solving the energy crisis?

In January 2024, the Minister of Mineral Resources & Energy published the draft Integrated Resource Plan, 2023. The Minister invited interested and affected persons to submit comments before 23 February 2024, but he has now extended this date to 23 March 2024.

The Resource Plan is intended to update the current 2019 Resource Plan. The Integrated Resource Plan is a living plan which needs to be regularly reviewed. Since the publication of the 2019 Resource Plan, there have been significant developments.

These include a heightened focus on climate change and a low-carbon climate economy and society. JET has been adopted by the Cabinet and significant funding obtained from the governments of France, Germany, the United Kingdom, the United States and the European Union.

The removal of licensing requirements for the development of power generation has enabled the intervention of new private sector power generation of over 6 000MW.

The intervention of the National Treasury to address the Eskom debt means that Eskom is now able to invest significantly in additional infrastructure.

The procurement of approximately 6 000MW of additional generation capacity under the Risk Mitigation Independent Power Producer Procurement Programme, Bid Windows 5 and 6 of Renewable Energy and Bid Window 1 of Battery Storage.

Some key assumptions on which the 2019 Resource Plan was prepared have changed. Importantly, the 2019 Resource Plan assumed that Eskom's plant energy availability factor (EAF) would average at 75% whereas performance for the 2023 financial year plummeted to 54%. From 2010, the EAF has followed a downward spiral from 85% to 54%.

The Eskom plant shutdown plan has been revised. Some power plants that were earmarked for shutdown before 2030 will be operated beyond this date. There remain challenges with Eskom's new build. Medupi and Kusile remain challenges as Eskom continues to repair major plant defects.

The site licence for Koeberg was due to expire in 2024. The 2019 Resource Plan recommended that nuclear power should be retained and the National Nuclear Regulator is currently reviewing the safety case in support of a life extension to Koeberg for an additional 20 years.

Air quality regulations under the National Environmental Management Act: Air Quality, provide that coal power plants under Eskom's fleet must use the minimum emission standards (**MES**) by a certain time, or they would be non-compliant and cannot be legally operated. If this is implemented, it would result in the loss of base load generation immediately of 16 000MW and up to 30 000MW after March 2025, when the current postponements lapse.

The Resource Plan seeks to achieve a balance between energy security and the adverse health impacts of poor air quality and the economic cost associated with the plants shutting down.

Since 2019, it has been also recognized that the grid is significantly constrained. Between 2013 and 2022, 4 000 km of transmission lines were established whereas there is now a shortfall of 14 000 km of new lines required by 2032. Eskom needs to fast-track the development of new transmission corridors and substations.

Mitigating against these issues has been a lowering of the electricity demand projections. The demand forecast has been reduced by 19% against that forecasted in 2019. This follows the shock to the economy brought upon by COVID-19 and lower growth expectations. It is only in 2042 that the electricity demand is expected to be higher than that projected in 2019.

In regard to Eskom's EAF, the plan projects two scenarios. A higher EAF from 2025 onwards in the mid-60s and a low EAF projection assuming a continuation of the current declining EAF trend which is in the range between 50% and 52%.

The document analyses Horizon 1, being the period 2023 to 2030, and Horizon 2, being the period 2031 to 2050.

Horizon 1:

Under Horizon 1, various scenarios are considered. Taking into account supply-side initiatives by businesses as well as public procurement initiatives up to Window 7, unserved energy (an energy supply deficit) remains high throughout the period.

If new gas initiatives are introduced from 2027, then this will restore the security of supply from year 2027 onwards. If Eskom is able to recover the EAF, power supply is restored immediately with a shortage experienced only in 2030.

Improvements in EAF and the deployment of gas to power will result in the electricity deficit being met.

Part of this process will involve resolving the challenges around compliance with the implementation of minimum emission standards on coal-fired power stations. If this can be resolved, it will ensure capacity totalling 16 000MW immediately and up to 30 000MW in April 2025.

To meet the projected energy supply shortages, the following interventions are required:

1. An improvement in the Eskom EAF;
2. The acceleration of gas-to-power projects;
3. Delaying the shutting down of coal-fired power plants;
4. Developing the transmission grid to enable connection of additional generation capacity of the public and private sectors; and
5. Extending Koeberg and resolving the challenges around compliance with minimum emission standards (immediately affecting 16 000MW and up to 30 000MW in April 2025).

Horizon 1 contemplates a new build of 30 000MW of new capacity by 2030 with renewable wind and solar accounting for close to 60% of this new build.

Horizon 2:

Five pathways are considered for Horizon 2.

The first pathway which is the reference case, considers supply and demand balance based on least cost. It is the least cost as it allows technology combinations without any restrictions. The scenario demonstrates a very large build consisting mainly of solar PV, wind and gas with a very significant build requirement by 2035.

Pathways 2 and 3 seek to transition the power system towards the deployment of renewable and clean technologies. Pathway 2 considers green energy technologies but has the highest security of supply inadequacy. Pathway 3 is based upon the deployment of renewables and clean technologies including gas and nuclear.

Pathway 4 is based on delaying the shutdown of coal-fired plants by 10 years and has the lowest new build requirement and adequately maintains security of supply.

Pathway 5 is premised on the deployment of cleaner coal technologies using a combination of fluidized bed combustion and pulverized fuel technologies. The analysis caps new coal deployment at no more than 6 000MW during the study pathway. The pathway has the second least cost new build requirements and low emissions.

The conclusion reached is that the energy pathways based on renewable and clean energy technologies only deliver the desired outcome insofar as decarbonizing the power system, however, these pathways do not provide security of supply and they carry the highest cost to implement.

Between 2031 and 2050, the electricity system will require a massive new build programme with significant capacity required in just over a decade. The implication is that the implementation of the generation capacity required for this Horizon needs immediate and earnest work.

Conclusion:

The IRP Review seeks to balance three distinct aspirations. They are security of supply, energy affordability and carbon emissions reduction.

Between now and 2030, there is an electricity supply and demand deficit. None of the interventions seem to fully address the underlying system inadequacy.

Unless Eskom can immediately improve its EAF (which has been steadily declining since 2010) load shedding will remain with us until gas to power is introduced and this is only expected to come onstream by 2027.

In the longer term from 2030 until 2050, South Africa will need to move towards cleaner technologies which are able to provide security of supply and low emissions.

This will require a massive investment, both in generation capacity as well as in the grid. Work on this needs to start immediately and includes nuclear, the deployment of cleaner coal technologies and significant investments in solar PV, wind and gas.

To meet the demands from 2030 onwards, a great deal of work needs to be done now. Policy decisions need to be taken so as to achieve the long-term decarbonization trajectory as well as the need for energy security.

After comments on the plan have closed, the plan will be scrutinized by the National Economic Development & Labour Council (**NEDLAC**) before it is finalized.

The draft plan sees load shedding continuing until at least 2027 and then only if EAF is improved and gas generation comes onstream. It certainly contradicts many assurances that load shedding will come to an end by 2025.

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