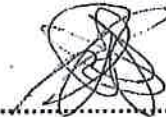


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**ESKOM HOLDINGS SOC LTD**

**COMMENTS ON DRAFT IRP 2018**

Approved on behalf of  
Eskom Holdings SOC Ltd



.....  
Mr Phakamani Hadebe  
Group Chief Executive

Date: 28/10/2018



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## 2 Executive summary

The Draft Integrated Resource Plan (IRP 2018) report has been published and is open for public comment and response for a period of 60 days until Friday 26 October 2018. That is, for 60 days from 27 August 2018. The Eskom comments cover a range of topics:

### Assumptions

- The demand forecast assumptions are potentially too high. Eskom's low-demand forecast is 52 GW in 2050 versus the IRP's low-demand of 58 GW.
- The currently installed plant included in the study does not include the existing photovoltaic rooftop plant (Rooftop PV). Eskom estimates this is in the order of between 300 and 400 MW.
- Review use of 2017 prices for technology.

### Energy mix:

- Given the socio-economic challenges facing the country, Eskom supports an electricity mix that is based on the least cost to the consumer.
- Concern over the ability to deliver on the gas options with the lack of extensive gas infrastructure, as well as the inclusion of hydro from Inga without a contingency plan should this not materialise in the time frame required.
- The option of gas and Inga hydro are seen as positive from a carbon-budget perspective. However, the ability of developing the Inga Project in the given time frames is questionable. Eskom is of the view that it will take at least 12 years to develop Inga, which is beyond 2030. Furthermore, there is a need for the IRP to identify trigger points that would signal that Inga is an approved project. Clarity needs to be provided on how Inga and the associated transmission lines to the border would be funded.
- Infrastructure needed to deliver gas via pipeline resources to power plants is not sufficiently developed in South Africa to meet the generating contingent set aside by the IRP. However, it will take at least two years to develop LNG terminals in the harbours, and therefore LNG gas is the preferred option.
- More studies need to be done to verify whether the renewables, gas and diesel combination, will provide the energy security we get from base load stations.
- The large volume of gas-fired capacity proposed in the IRP could expose the electricity price to external factors, such as the oil price and exchange rate, unless well contracted for.
- New generation capacity should be located at sites of Eskom power stations that have been shut down, to leverage the existing infrastructure (e.g. transmission integration) and sustain the economies around these locations.

### Transmission Integration

- Technical studies must be done to determine how to maintain grid stability as levels of renewables increase.

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- It is suggested that an industry-wide collaboration (e.g. Eskom, CSIR, energy-intensive users group, universities, etc) be undertaken to conduct these studies.

**Economic and environmental considerations**

- Concern over the price of gas used in the model.
- Concern that the cost of coal used in the projections may be unrealistic.
- Recommendations for a range of exchange rates and discount rates to be used in the scenario-based approach.
- Other exchange rate-related costs, such as forward cover need to be included in the cost of fuel purchase.
- Inclusion of a carbon tax in the modelling.

**Decommissioning of plant**

- Revised decommissioning dates provided for Arnot, Grootvlei and Hendrina

**Nuclear**

- Nuclear only becomes an option if the carbon budget is implemented.

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## 3 The IRP comments overview

### 3.1 General comments

- Overall, it is supported that the South African electricity mix results in the least cost reliable electricity for the consumer, given our socio-economic context.
- Eskom also supports the fact that more detailed studies will be undertaken to better inform the energy mix beyond 2030.
  - The draft IRP does not include nuclear in the planning window until 2030. Eskom agrees with this, because the earliest plausible commissioning date is expected after 2030 (2032-2034). This expected commissioning date assumes that planning work continues without disturbance and undue stoppage from this point in time. It also assumes the receipt of a positive environmental authorisation and Section 34 determination in the next two years. The absence of clear direction on nuclear may invalidate the latter assumption, pushing out the commercial operation date even further. There is a risk that, without clear direction from the IRP/government on the period after 2030, Eskom will stop planning and this may sterilise the option for the period 2030-2040.

### 3.2 Assumptions

- The assumptions used for technologies are beginning with 2017 numbers. Given the rate at which technology costs change, specifically renewable technologies, this may be a reason for concern.
- The demand forecast assumptions are potentially too high. Currently, Eskom's sales are decreasing, and assuming higher growth, specifically over the short term, may lead to a situation where too much plant is commissioned. Eskom's low-demand forecast is 52 GW in 2050 versus the IRPs low-demand of 58 GW.
- The currently installed plant included in the study does not include the existing Rooftop PV. Eskom estimates this is in the order of between 300 and 400 MW. Consideration should be given to the inclusion of this. Furthermore, the draft IRP 2018 makes no mention of allocated small-scale embedded generation (SSEG) capacity of less than 1 MW.
  - According to the proposed amendments to the Licensing Exemption and Registration Notice of 8 June 2018, generators that are exempt from obtaining generating licences are those that meet certain requirements, falling into five categories (listed as 2.1–2.5 in the notice), two of which are for grid-tied generators with an installed capacity of no more than 1 MW, that is, SSEG. Within the wording of the notice for SSEG in sections 2.1 and 2.2, exemption is only given to those generators under circumstances where "the Minister has not published a notice in the Government Gazette stating that the amount of megawatt (MW) allocated in the integrated resource plan for embedded generation of this nature has been reached".
  - This implies that an allocation for embedded generation (including SSEG) has been/will be published in the IRP. The draft IRP 2018 makes no mention of allocated SSEG capacity, and therefore sheds no light on how registration may be limited or capped by NERSA or distribution network operators. It is understood that the allocations for "embedded generation" listed in Table 7 and expanded on in Appendix E refer to generators in the 1-10 MW capacity range, and are therefore, for the most part, different from the SSEG that are exempt from licensing.
- The assumptions for the Eskom fleet performance is in line with an 80% energy availability factor (EAF) that Eskom provided for the study. However, Eskom is not currently on the performance levels assumed and therefore Eskom revises EAF down to 78 %.

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### 3.3 Decommissioning of plant

Eskom uses 50 years for planning life-of-plant for coal power stations. Actual life will depend on economics evaluated closer to planned end-of-life. The shutdown information for Arnot in the draft IRP needs to be corrected:

- Arnot has six units and not nine units. The shutdown dates for these six units are : 2021, 2026 ,2026 ,2027, 2029, 2029.
- Eskom has recently brought forward shutdown dates for the Komati Power Station: 2018, 2018, 2018, 2018, 2018, 2019, 2019, 2019, 2021.
- Eskom has recently brought forward shutdown dates for Grootvlei to: 2018, 2018, 2019, 2019, 2020.
- Eskom has also recently brought forward the shutdown dates for Hendrina: 2018, 2018, 2018, 2019, 2019, 2020, 2020, 2021, 2021, 2022.
- With regards to nuclear decommissioning: Koeberg's life was extended from 40 to 60 years based on the steam generator refurbishment. The text erroneously infers that the steam generator will extend Koeberg's life to 80 years.

### 3.4 Transmission integration

- Renewables (inverter-based) do not provide adequate frequency, fault-level or voltage support. Technical studies must be done to test the feasibility of integrating this increased amount of renewables to the system.
- It is suggested that an industry-wide collaboration (e.g. Eskom, CSIR, energy intensive users group, universities, etc.) be undertaken to conduct these studies.

### 3.5 Gas and imported hydro power

- The assumption of an inflation-linked gas price, which has been used for all scenarios from IRP 1-6 is misleading, as this will most likely be market-related, because the gas is imported. Depending on the contractual conditions, the price could move in both directions and may not be linked to the rate of local inflation.
- The use of gas will expose the cost of the system to the exchange rate and market price risks, where the primary fuel price and production are out of our hands. Further studies are required to ensure that the development, contracting and construction of gas infrastructure can be done within the time frames required by draft IRP 2018.
- In addition, importing power over a distance of more than 5 000 kilometres from the DRC is technically risky. Our exposure to Cahora Bassa has taught us how difficult this can be. The impact on the system in terms of additional reserve requirements has not been studied properly. In addition, these imports will not add to the security of the system but rather reduce it.
- The option of gas and Inga hydro are seen as positive from a carbon-budget perspective. However, the ability of developing the Inga Project in the given time frames is questionable- Eskom is of the view that it will take at least 12 years to develop Inga, which is beyond 2030. Furthermore, there is a need for the IRP to identify trigger points that would signal that Inga is an approved project.
- Clarity needs to be provided on how Inga and the associated transmission lines to the border would be funded.
- Mozambique provides a number of hydro options, including Mphanda Nkuwa and Cahora Bassa North Bank. Not only would transmission lengths be much reduced but project risks associated with Mozambique are also better understood.

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- The necessary infrastructure to deliver gas via pipeline resources to power plants is not sufficiently developed in South Africa to meet the generating contingent set aside by the IRP. However, it will take at least two years to develop LNG terminals in the harbours, and therefore LNG gas is the preferred option.
- More studies need to be done to verify whether the renewables, gas and diesel combination, will provide energy security we get from base load stations.
- The large volume of gas-fired capacity proposed in the IRP could expose the electricity price to external factors, such as the oil price and exchange rate, unless well contracted for.
- Given the risks associated with gas noted above and that the renewables allocation depends on gas, pumped storage might be an attractive option to replace some of the gas and thus lower the risks and costs should gas prices increase. Eskom submits that pump storage is a technically sound option that has advantages in managing the grid. Economics depend on the site. The assumption of Ingula costs as a proxy need to be investigated. Pumped storage costs are very site-dependent. Eskom would like the opportunity to develop the options to see the impact on cost and make the economic case.

### 3.6 New coal

- The requirement for coal in the draft IRP 2018 is noted. However, Eskom has previously expressed concerns about the two coal IPPs that have been selected for this allocation, given the strenuous risk allocation to Eskom and therefore the consumer. Feedback on these risks have been given to NERSA by Eskom following public participation.
- Additional coal from 2023 may be required earlier given the constraints on the Eskom system. However, Eskom is **concerned** about the two **coal IPPs** that have been selected for this allocation, given the strenuous risk allocation to Eskom and therefore the consumer. Feedback on these risks has been given to NERSA by Eskom following public participations.

### 3.7 Environmental sustainability

IRP 2018 paragraph 3.2.3. emission external costs: a cost per pollutant is provided. However, the cost of coal technology includes flue gas desulphurisation, low NOx burners and particulate matter (PM) controls, for example where Kusile is used as the benchmark for the future cost of coal. It must be confirmed that there is no double accounting in the cost of new coal capacity. The document refers to the cost of damage. However, there is a question of whether this considers the cost of damage if the plant is commissioned with the relevant emission abatement equipment. It is not clear in the document how the externality was calculated.

Eskom notes the use of peak-plateau decline as a strategy to reduce greenhouse gas emissions and the use of the carbon budget as a different strategy. It is important that a decision be made on the appropriate strategy for South Africa given the large differences these have on the post-2030 energy mix. Modelling should include the impact of the proposed carbon tax to determine the least cost electricity mix.

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### 3.8 Water resources and infrastructure

- Inadequate water resources and infrastructure could be an impediment to energy developments. The IRP 2018 needs to factor in the water use requirements, possible locally, availability of water resources and quality thereof, but more importantly the water supply and treatment infrastructure developments and investments required to support any new generation option. That is, there needs to be an integrated water resources and infrastructure plan that makes the generation developments in the IRP 2018 possible. The draft National Water and Sanitation Master Plan and DWS Reconciliation Strategies need to support the IRP 2018.
- Water efficient technology choices need to be considered in the IRP 2018.

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## 4 Conclusion

### 4.1 Observations

Given the socio-economic challenges facing the country, Eskom supports an electricity mix that is based on the least cost to the consumer. This should be a practical energy mix, able to meet the energy demands of the country while balancing the grid. Factors such as the proposed carbon tax should be modelled into the IRP to determine the lowest cost energy mix for the consumer.

Socio-economic impact studies must be done with regard to change in the technology mix with an increase in the exposure to international markets and impacts on coal industry. The sites of Eskom power stations that are shutting down should be leveraged for future generation capacity to minimise the socio-economic impact at these locations.

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## 5 Contributors

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