SAWEA
South African Wind Energy Association

SAWEA
Suite 2
2 Hood Avenue
Rosebank
2196
010 007 5655

sawea.org.za @_sawea sawindenergy @sawea

23 March 2024
Department of Mineral Resources and Energy
Trevenna Campus
71 Meintjies Street
Sunnyside
Pretoria
0002

Attention: Mr Jacob Mbele

By Email: IRP.Queries@dmre.gov.za

RE: DRAFT Integrated Resource Plan 2023

Dear Mr Mbele,

The South African Wind Energy Association (SAWEA) recognizes the context and importance of the updating the IRP occurring due to changing circumstances with the primary objective of ensuring security of energy supply, as well as to pursue a diversified energy mix, support economic growth and to ensure environmental imperatives are considered. SAWEA is pleased to submit a consolidated set of comments on the draft IRP2023 published by the Department of Mineral Resources and Energy (the Department) on 04 January 2024.

We agree with the approach taken to split the energy generation viewpoint into a short- and long-term horizon to:

- address the existing generation capacity constraints with a view to close the supply gap
- as well as the long-term pathway to a secure and clean energy mix.

We recognize that a diversified energy mix is crucial in the context of a just energy transition. An emphasis should be placed on initiatives to improve the Eskom plant performance to stabilize the electricity supply. We must however emphasize the importance of accelerating new generation capacity with deliberate inclusion of wind energy in both Horizon 1 and Horizon 2 to maintain a course towards a clean energy transition as wind has contributed over 46TWh of energy to the national grid over the past decade.

The importance of the development and expansion of the transmission grid cannot be overstated as this is the highest priority that must be overcome to see new renewable generation capacity come online hence it is great to see this being acknowledged for the context of the report and the grid constraints taken into consideration in the modelling process in IRP2023.

We are concerned about the reduction in wind energy capacity allocation under Horizon One compared to the IRP2019 allocations. A reduction from 14.4GW in the IRP2019 to approximately 4.5 GW in IRP2023 (of which 3GW is pure new generation) is unacceptable and could result in a

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negative impact to the energy security objective. We, therefore, urge the Department to clarify whether the IRP2023 allocations are over and above the IRP2019 allocations to ensure policy certainty. This illustrates another misalignment between the IRP2023 and the Just Energy Transition Investment Plan which outlines the addition of 50GW of new renewable energy generation capacity to the grid.

It is also concerning that whilst the document indicates that emissions targets may be met in the short term, the long-term horizon calls for a deviation to the South Africa's NDC under the Paris Agreement with none of the scenarios in Horizon 2 achieving the goal of net zero emissions by 2050. This illustrates the misalignment of the IRP2023 with other policies such as the Low Emission Development Strategy, a misalignment which must be addressed.

The implications of a new carbon tax regime has not been fully explored considering the changes to the carbon tax offset concession made by the National Treasury.

The IRP 2023 document indicates that the energy mix arrived upon in the IRP are typically presented on a least cost basis however one of the biggest concerns is that the Horizon 2 energy transition pathways indicate a higher cost associated with renewable energy with no supporting evidence. All literature investigated on this matter has provided a contrary view.

A full list of industry concerns can be found in **Annexure A – Industry Comments**

From a process point of view, industry suggest the Department to consider the following to take the IRP to a successful point:

- Increase transparency by including the modelling assumptions in the document itself.
- Increase the level of consultation for the modelling and assumptions process.
- A continuous review of assumptions should be undertaken, to include such related to industrialisation objectives and growth prospects associated with the chosen supply options.
- Provide clear motivations/reasons for the policy adjustments.
- Provide details on the cost associated with the various scenarios including the tariff implications.
- Conduct an overhaul of the scenarios and pathways before the public participation process is concluded.
- Ensure alignment with other polices and frameworks including the National Development Plan (NDP), Electricity Regulation Act (ERA) Amendment, Transmission Development Plan (TDP) and the Energy Action Plan (EAP) amongst others.
- Wind energy should be included to a greater extent in both Horizons together with incorporating the prioritisation of BESS which will address peak demand and dispatchability.

Yours sincerely

Niveshen Govender
CEO

SAWEA
Suite 2
2 Hood Avenue
Rosebank
2196
010 007 5655
sawea.org.za @_sawea sawindenergy @sawea

Annexure A – Industry Comments

Table 1: IRP2023 Industry Inputs and Comments

No.	Heading	Item	Comment/Suggestion
1.	**Policy inputs / considerations**	There appears to be inconsistencies in policy application.	• Just Energy Transition vs inclusion of Coal/Gas. Kindly clarify these.
		Alignment of the IRP with Transmission Development Plan and grid capacity	• It is unclear how the IRP2023 takes the TDP into consideration and aligns with same or vice versa. • Links with other policies and resultant forecasted impacts is not clear in the IRP – this includes, but is not limited to: ERA amendment, Eskom unbundling, TDP, etc. This is particularly important for Horizon Two.
		Policy adjusted IRP	• Is there an intention to have a policy adjusted IRP pursuant to comments?
		Policy Integration	• The Industry is pleased to see some level of policy integration that has gone into the IRP document especially with regards to the JET IP and Energy Action Plan with additional considerations being: - JET - Revisiting clean coal - Inland Nuclear SMRs

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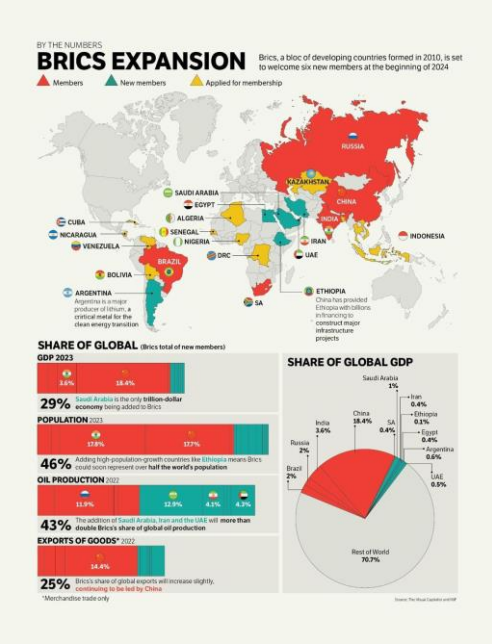
			- Gas in Mpumalanga • The Eskom 2035 strategy plans to run coal plants beyond their design lives and previous shutdown dates does not align with the JET IP and funding plans. We do not understanding how the life of a coal plant has been changed from 40 years to 50 years? The following are important aspects that must be considered in the energy strategy: - Eskom Roadmap (Unbundling, NTC, CPA, Market Operator, Virtual Wheeling) - IPP Procurement - Wheeling - Price Path - Privatization - Gas Master Plan
		SAPP	• The IRP2023 does not appear to consider the Southern African Power Pool (SAPP) and SA's participation in it. Is this included in another document?
		Assumptions	• It is unclear what assumptions and data have been utilized and inputted. Please can these be made available in particular the price assumptions for least cost.
		Urgency regarding energy security until 2030	• With respect, the IRP2023 should indicate a stronger urgency towards energy security and a firm plan for same in particular regarding Horizon One.
		Grid constraints	• It is unclear how the grid capacity constraints will be addressed and resolved for each of the Horizons, in particular Horizon One. • We strongly advocate for the explicit inclusion of grid infrastructure considerations in the planning scenarios to ensure a holistic and effective approach to energy planning. The evolution of grid infrastructure plays a pivotal role in determining the scale, pace, and geographical distribution of new energy generation facilities.
		Climate considerations	• The Industry supports the development and deployment of renewable energy in South Africa towards achievement of net-zero and has a climate positive goal by 2035. Considering this, the Association's position on the draft IRP2023 is as follows: • No new coal • Phasing out of existing coal fired power stations as soon as feasible

			• Maximise South Africa's renewable wind and solar resources • Provide storage to compensate for the intermittency of renewables in the form of BESS and pumped storage using renewable energy for pumping. • Security of supply is an imperative for South Africa. Decarbonisation impacts should be clearly outlined, as per each energy planning scenario presented. Given that South Africa's climate targets (COP NDCs) are heavily impacted by our carbon intensive electricity generation, it is important for those within the energy industry to understand where we are tracking with regards to our climate goals. This also links into the planned coal plant decommissioning and any associated changes in the plan (especially as compared to IRP 2019).
		Implementation Challenges	• Procurement timelines are unclear and do not seem aligned to realistic implementation periods. Clarity on procurement timelines is essential for ensuring realistic implementation periods base on past experiences. • Eskom Track record of maintaining a sufficient EAF and Koeberg SGs are a concern hence it is imperative to either resolve these issues or propose alternative solutions to ensure the successful integration of new generation onto the grid.
		Localisation	The development and greening of supply chains do not seem to have been considered. There is a misalignment with the South African Renewable Energy Masterplan (SAREM) process which required great policy and market certainty to be achievable – this is not being inspired by the draft IRP2023.
2.	**General**	Drafting	We appreciate that the updating of IRP may have been difficult, however, the drafting of the IRP remains vague and additional clarity is required on the assumptions and inputs. The IRP should be updated more frequently to: ○ properly account for changes in energy regulations; ○ accurate inclusion of projects that close and reach COD; ○ factor in latest EAFs, ○ factor in decommissioning of coal plants, ○ account for load shedding;

			○ account for cost / price declines of renewable energy and BESS technologies; ○ factor in changes in NDCs, carbon tax adjustments and other related climate initiatives.
		Risk Considerations	A good plan designed to ensure cost efficient security of supply into the long term. There are however a number of key risks to implementation that the document does not provide mitigation for. All of these risks are currently controlled by Eskom: 1) EAF (~3000 MW if EAF falls to 40%) 2) Minimum Emission Standards (up to 30,000 MW) 3) Transmission Capacity (1,350 MW by 2030 and up to 12,500 MW by 2050, if one assumes a third of new capacity) 4) Koeberg license extension (1800 MW) The industry welcomes the legal separation of the National Transmission Company from Eskom as this will spread the risk to an alternative entity that will have more capacity to address risk and can be held to account.
3.	**Geopolitical Context and Implications in the IRP**	BRICS Expansion	• In 2023 BRICS added additional members: Argentina, Ethiopia, Egypt, Iran, United Arab Emirates and Saudi Arabia, strengthening cooperation in the Global South. • The enlarged group has added three of the world's largest oil exporters and would constitute 42 per cent of the global oil supply. The biggest change this brings to the alliance is cooperation in oil (and by association gas) production. Along with Russia, which ranks third in global oil output, BRICS now covers four of the world's top 10 energy exporters. South Africa's state owned PetroSA already committed to a gas deal with GazProm, Russia's gas parastatal. Increased gas reliance by SA, particularly in the Reference and Delayed Shutdown Scenarios of the Draft IRP (up to 10,000 MW by 2050) will further entrench this alliance. • The addition of Argentina, which has the world's largest reserves of lithium, would make BRICS among three of the five largest lithium producers in the world, alongside China and Brazil. Lithium is used in solar panels and for battery storage systems such as in the electricity sector. The DRC which has requested membership ,and could be added at a later date, has the world's

			largest cobalt reserves (85%). Lithium and cobalt are essential for currently preferred lithium-ion battery technology for BESS and would be especially significant in the Renewable Energy and Nuclear Scenario of the IRP (20,000 MW by 2050). • BRICS members, China, India, Russia, Egypt, Argentina and the UAE, have all committed to new nuclear programmes underway. China and Russia have state owned companies, CGNPC and Rosatom building nuclear power plants around the world and would be serious contenders in the planned Nuclear RFP that the DMRE has said it plans to launch in March 2024. • There are currently only four Small Modular Reactors (SMRs) globally in advanced stages of construction in Argentina, China and Russia, and several existing, other countries are conducting SMR research and development. These smaller reactors are better for load following and as peaking power with intermittent renewables, China is a major manufacturer of renewables. In 2022, China accounted for 77.8 percent of the global photovoltaic (PV) module production. China is also a dominant player in global wind power generation, with manufacturers in the country supplying nearly 60% of installed wind turbines worldwide in 2022. • All Draft IRP 2023 scenarios are beneficial to SA's BRICS partners. However, our current strategic focus emphasizes sustainable and greener alternatives. It's worth noting that the DMRE's potential encouragement of Nuclear and LNG procurement in the immediate future does not appear to be aligned with our current objectives.

			
		Conflict	Many oil and gas producing countries are involved in conflict in the middle east, Africa and Russia. This puts Gas supplies and supply routes at risk – note the impact of the Red Sea shipping attacks in recent months. There is also increasing conflict in the Eastern DRC where the majority of the world's cobalt resources are located, essential for Lithium-Ion Batteries. Furthermore, Grand Inga and the transmission line bringing power from the DRC to South Africa is at risk for delays and sabotage as a result of current and future conflict in any country where the planned line crosses. Currently South Africa is importing up to 1200MW from Cahora Bassa in Mozambique. There are plans for additional Hydro capacity from Mozambique and potential LNG supply from Northern Mozambique with an LNG terminal in Maputo. This is at risk from the insurgency in Northern Mozambique which has escalated again in the past few months after relative quiet in recent years.

			We encourage the support of local Independent Power Producers (IPPs) and the expansion of the transmission network to accommodate the additional energy generated.
4.	**The IRP in Context (1)**	Purpose of the IRP	• We note and support the purpose of the IRP as ensuring the security of electricity supply and balancing other imperatives. • This primary objective should permeate through the IRP when considering different technology choices in particular gas. • Clarity around any 'policy adjustments' incorporated into any scenarios. The updated IRP should clearly outline any deviations from a least cost modelling approach.
		Coal	• Whilst we agree that coal will still feature in SA's electricity generation mix, the continued considerable reliance on same is concerning, particularly the age of the plants. • CCUS (Carbon Capture, Utilisation and Storage) – the costs of this technology may not be justified for a developing economy and may take long to recoup such investment if retrofitted to existing coal plants. • The continued maintenance and life of plant may be a significant hindrance therefore it is unclear how feasible the study into CCUS would be for SA. The ultimate long-term purpose and benefit needs to be considered before embarking on this path. • It is unclear how the Just Energy Transition funding may be impacted, if at all. • Revisiting clean coal. "South Africa must pursue strategic partnerships with countries that have made advancements in the development of cleaner coal technologies." Who is this? Who will lend the money? What about FGD, water, coal availability and Eskom record? What are the EAF assumptions? Document implies the IRP is based on not complying with minimum emission standards. • Eskom's system status report does not show an increase in PCLF which likely means the EAF trend will continue on its current trajectory and the low EAF scenario is likely optimistic. Also, EAF projections beyond 2030 is not clear. • While the table of assumptions includes new build, the cost of repairing coal stations to meet the EAF assumption is not provided. • Cost of training (upskilling) as recent international studies and reporting indicated the lack of skills within Eskom to manage and maintain coal power stations.

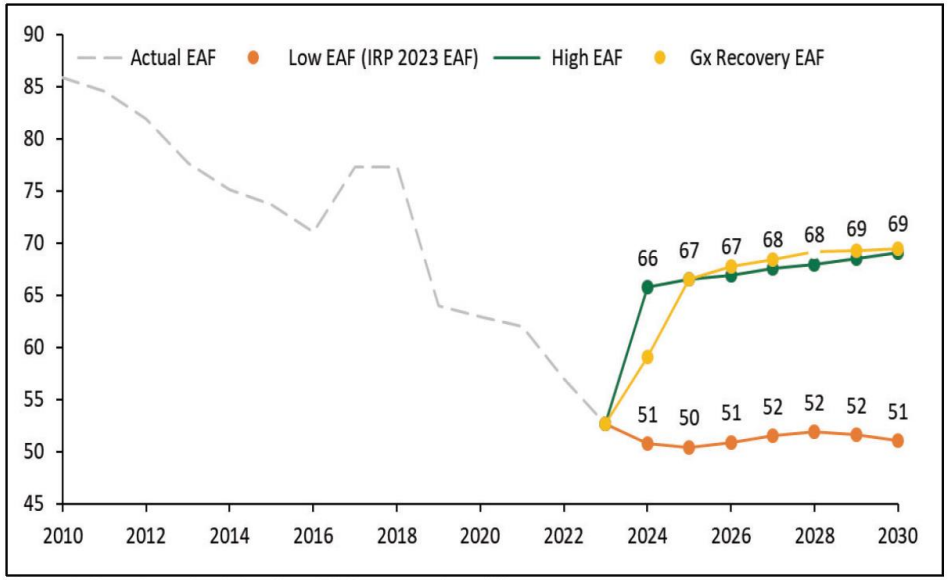


Figure 3: Overview of existing fleet EAF assumptions (%)

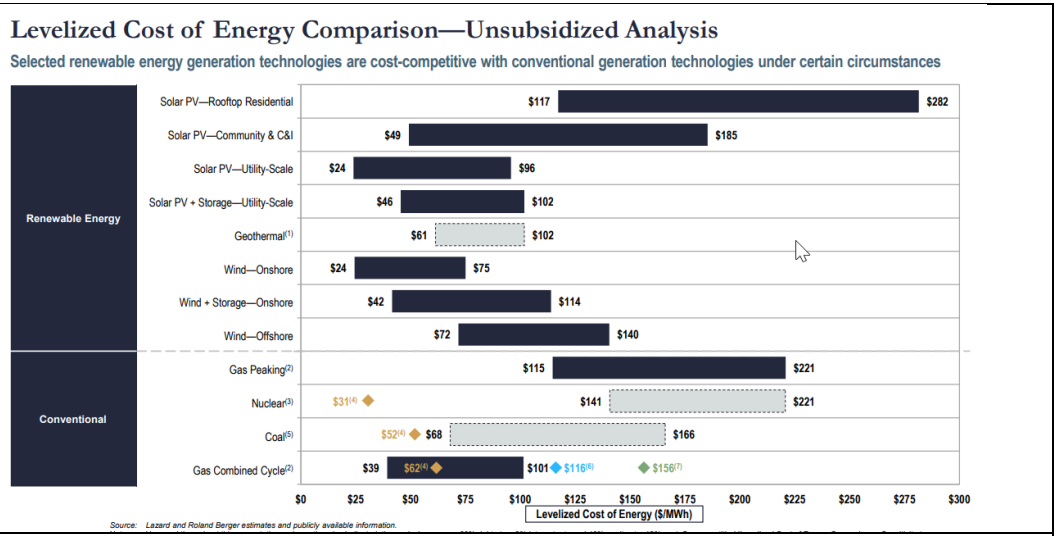
Given the VGBE report, are existing coal fired power plants able to meet the ramp rates?

Table 3-1
Coal plant technical parameters

	Turndown	Cycling Capability Startup to Full Load	Ramp Rates
Ultra-supercritical PC	Minimum boiler load: 25–30%	Very hot startup: <1h Hot startup: 1.5–2.5 h Warm startup: 3–5 h Cold startup: 6–7 h	30–50% load: 2–3%/min 50–90% load: 4–8%/min 90–100% load: 3–5%/min
IGCC	40–50% of maximum continuous rating	Ambient startup: 36 h Hot startup: 4 h	50–100% load: 3%/min
FBC	40% of maximum continuous rating	See below	

	Nuclear	• Industry engagement, in particular the use of small modular reactors in hybrid systems would be welcomed.

			• Given that SMRs are relatively new technology, can we be sure of the assumptions? Will SMRs achieve ramp rates that allow them to complement renewables effectively? • Koeberg nuclear license - weren't the SG replacements meant to add around 30MW? What has happened to this? Eskom's record of performance following commercial operation is not good. Is there a risk of something similar at Koeberg. • South Africa is unlikely to be able to finance large scale nuclear from its balance sheet or the balance sheet of any SOE. This will require partnering at a sovereign level and leave South Africa exposed based on the sheer size of a loan/ partnership agreement to the political needs of the partner country. • Fuel enrichment and waste disposal is always a concern and needs to be detailed clearly especially for nuclear plants in new locations. Below is information on the cost of energy from the most recent nuclear plants in the western world to achieve commercial operation – these should be considered in the Nuclear assumptions: • Most recent is Vogtle in Georgia, United States, which achieved COD in July 2023 "seven years behind schedule and more than double the projected cost" and has an LCOE of approximately USD180/MWh. • The latest nuclear power plant in the UK, Hinkley Point, eventually cost almost twice as much as was initially projected with an LCOE of approximately £128/MWh

		Gas	• Short-term gas import prices are volatile and the impact of this on security of supply must be considered.
			• The cooperation with neighbouring countries is supported - SADC partnerships and stability.
			• A better understanding of SA's decarbonisation goals in light of the increased gas component in the IRP should be elucidated.
			• The life expectancy of the existing diesel plants vs availability of gas.
			• Concerns on the Gas Master Plan.
			• Additional concerns are:
			  ○ Competition with Mozambique for LNG terminal,
			  ○ Geopolitical implications,
			  ○ Dollarization,
			  ○ Security of supply,
			  ○ Price path.
			• Local gas being considered: Amersfoort, offshore etc. Shale/ CBM?
			• CCGT conversion – peaking or mid-merit (timing)

		Renewables	• Support and agree in particular on the potential opportunities through the value chain.
		Hydro	• Pumped storage hydro is the only proven grid-scale technology that can store vast quantities of energy for long durations. These plants act like giant water

			batteries, using excess power from the grid to pump water to an upper reservoir where it is stored, before re-releasing it to generate electricity when demand requires. More options than Tubatse should be explored including small scale pumped storage. Unlike Battery Storage, there is no chemical waste, the life of plant is much longer and there is less supply chain risk around key minerals like Lithium and Cobalt. Assumptions need to include figures outside of Eskom.
		Storage	• We concur regarding the criticality of storage in the energy mix.
		Hydrogen	• We believe there is a place for hydrogen in the SA energy mix and SA should be taking advantage and progressing opportunities to be on par with the rest of the world with respect to this technology. • The opportunities in the value chain can be explored further.
		Solar PV	• Solar PV assumptions seems to be based on 20MW plants, this does not allow for economies of scale as found in REIPPP and even C&I markets.
5. .	**IRP Assumptions**	Key assumptions	• We appreciate the outlining of the various developments in the electricity sector. The interplay of each of these with the IRP should be elucidated. • It would have been good to see a list of key assumptions and the weighting attributed to each in the development of the draft IRP2023.
6.	**IRP Review Methodology**	Horizon One	• Is Horizon 1 a policy-based IRP and the Horizon 2 a least-cost model? • Does horizon 1 consider the IPPO gas programme and if so, why is this horizon until 2030? Is it unlikely that any gas programme outcome will be ready by then.
		Horizon Two	• We welcome the approach of least cost and emission reduction for Horizon Two.
7.	**Factors Considered in the IRP Review**	Eskom Plant Performance	• The decline of the EAF is concerning, and the application of the conservative approach of a lower EAF is prudent. • If the performance of Eskom's coal plants is a serious threat to security of supply, should we be considering CCUS?
		Koeberg Long-Term Operation Plan	• We support the responsible extension of the Koeberg plant. • It is unclear when the extension will be granted and what the alternative plan is should the life extension be rejected or postponed.
		Compliance with Minimum Emission Standards (MES)	• Could a waiver of the MES be granted for a certain period to prevent the shutting down of coal plants? However, a blanket exemption cannot be granted to coal plants – there should be a requirement that all efforts have been expended in getting new RE generation capacity online first then exemptions granted.

			• If up to 30 000 MW will be offline from March 2025, there should be greater impetus to accelerate new capacity but also reach a viable solution immediately. • Can new and existing RE plants be used to 'off-set' the emissions from coal plants?
8.	**Input Assumption Parameters**	Electricity Demand Projection	• Key details behind the assumptions are missing making it difficult to assess the implications. Unfortunately given the track record of Government it seems this could be an attempt to hide or disguise risk. • The change in demand forecast appears to be based on factors which do not affect demand but rather supply. It is unclear how loadshedding, the pandemic and the conflict in Europe affect electricity demand in SA. • If green hydrogen is to be taken seriously, provision should be made (even as a separate item) as the electrolyser will still be connected to the grid.
		Load Forecast	• NT reforms post 2030, what are these and is this realistic or just being used to justify large scare nuclear procurement. • What is the contribution of EVs to the load? • Changing location of load will have an impact on the ability of the Transmission system to deliver the capacity. • A long-term GDP growth projection of 4% seems unrealistically high. For instance, where does the 0.7% growth in coal mining come from given the current state of the export market and closure of coal fired power plants. Furthermore, where is mining growth projected to come from given that gold mining is reaching the end of mine life in South Africa.
		Transmission Availability	• How has the TDP been considered in the development of the IRP2023 and what steps will be taken to resolve the grid capacity constraints? This is a critical dependency which appears to not be fully aligned or considered. • The reference to Annexure B, should be replaced with Annexure A, which is the correct reference. • Does the transmission availability accord with the proposed capacity which is to come online for Horizon One? • In order for Horizon Two to be feasible, serious consideration should be given to resolving the grid capacity constraints. • Section 2: Methodology – no reference to Tx ability even in the medium term, 7 years to plan and build new Tx infrastructure. What about the costs for this?

			• Where additional Tx capacity is needed has this been included in the pricing considerations especially given the geographical nature of technologies.
		Power Generation Initiatives by the Private Sector	• Whilst the private sector has made significant strides in securing their own electricity, these initiatives will quickly be halted by the grid constraints. It is therefore unclear how the proposed pipeline of projects highlighted in these sections, will come online. • It would be useful for industry (and other stakeholders) to have insight into the generation (supply side assumptions). • Accurate information regarding new generation coming online needs to be accounted for – this includes projects that have actually closed under Risk Mitigation, Round 5 & 6 and other programs. • The IRP notes that "While not reflected in emerging plan, it is expected there will be more solar PV and wind capacity from business community that will come online post year 2027." However, in Table 1, a fixed 900 MW p.a. is accounted for under Distributed Generation. This misalignment will likely impact energy planning.
		Cost Assumptions	• The next version of the IRP should clearly provide assumptions for the inputs used as part of the energy modelling – key being the LCOE or any cost / price assumptions for different technologies.
9.	**Analysis of Horizon One (2023-2030)**	Table 2: Emerging plan from Horizon One Analysis	• All new gas, solar PV, wind and BESS new capacity should be shifted up for procurement earlier namely in 2024, 2025 and 2026 rather than as presented in the Table. • It is unclear what 'Distributed Generation Capacity for own use' means and where the allocation of 900MW has been derived from. Kindly clarify. • Has the private sector been allocated any provision?
		Observations	• Firm case of circa 3.8 GW in Scenario 1 (S1) – up to 2030, a generation capacity gap exists considering ~10 GW of shutdowns. • S2 and S3 – relies heavily on private sector initiatives – requires grid development. • S4 and S5 – implementation of gas programme and improved EAF required • Pure new build up to 2030 – 3GW(wind); 1.5GW (PV); 6.3GW (Dx Gen); 6GW (Gas); 2 GW (BESS)

		Identified Constraints	• Potential delays – financial close BW5 and RMIPPPP • Grid capacity constraints • Gas supply • Delays in shutdown – impact on emission standards
		Considerations for Success for **Horizon One**	• Eskom EAF – Energy Action Plan • Accelerate RE – wind allocation missed from BW6 (3.2 GW) • Transmission development (TDP assumes ~53 GW of new capacity by 2032; slightly above 10 000 km between 2024-2030)
10.	**Analysis of Horizon Two (2031-2050)**	Observations	• Input assumptions for least cost would be necessary to fully understand the position that RE and clean energy technologies 'carry the highest cost to implement'. • We support the inclusion of all technologies for a suitable energy mix. • Increased role of variable renewable energy • Risk to security of supply • Role of other dispatchable technologies – nuclear, cleaner coal technologies • Reduced emissions • Emphasis on energy transition
		Identified Constraints	• New extensive build – requires industrialisation efforts locally • Delays in shutdowns – counter improved reduced emissions • Transmission capacity to be enhanced – current TDP up to 2032
		Considerations for Success for **Horizon Two**	• Energy transition – diversified energy mix at least cost. Solutions should be sustainable with minimal environmental impact. • Opportunity to consider other technologies. • Transmission development critical • Opportunities from reformed electricity industry