OUTA

ORGANISATION UNDOING TAX ABUSE

OUTA's submission to Parliament's Portfolio Committee on Energy

Public Hearings on the Draft 2018 Integrated Resource Plan

OUTA Submission to Parliament's Portfolio Committee on Energy – Public Hearings on the Draft 2018 Integrated Resource Plan (IRP)

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1. INTRODUCTION

1.1 This document serves as the Organization Undoing Tax Abuse's (OUTA's) high-level submission to Parliament's Portfolio Committee on Energy on the Draft 2018 Integrated Resource Plan gazetted under Notice No. 41685, Volume 638 published by the Department of Energy (DoE) on the 27th August 2018.

1.2 OUTA is a proudly South African non-profit civil action organisation, comprising of and supported by people who are passionate about holding government accountable and improving the prosperity of South Africa.

1.3 OUTA acknowledges the DoE's endeavours to pursue a cleaner and least cost energy mix for the future in line with the reduction in deployment and generation costs of renewable energy technologies and moving towards a more a low carbon energy economy in line with meeting our climate change obligations under the Paris Agreement and a more sustainable energy sector.

1.4 As a civil society organization, OUTA understands and is aware of the complexities associated to adopting a just energy transition and instituting the requisite sectoral reforms amid divergent views from different interested and affected parties in the energy sector value chain.

2. CONTEXT

2.1 The DoE published the Draft 2018 Integrated Resource Plan (IRP) in terms of section 4 (1) of the Electricity Regulation Act, 2006 (Act No. 4 of 2006) for a 60 days public commentary process.

2.2 As compared to the 2010-2030 IRP which was a 20-year plan electricity generation capacity mix, the 2018 IRP will be covering the period 2019 to 2030, which translates into an 11-year plan. The reduced period resonates with OUTA's view that rapid advancements in energy generation technologies and build times are unfolding at a faster pace that policy planning and responsiveness cycles.

2.3 The National Development Plan (NDP) identifies the need for South Africa to invest in a strong network of economic infrastructure designed to support the country's medium- and long-term economic and social objectives. Energy infrastructure is a critical component that underpins economic activity and growth across the country, it needs to be robust and extensive enough to meet industrial, commercial and household current and future energy requirements.

2.4 The Draft 2018 IRP indicated that the National Development Plan (NDP) Update acknowledges the role of nuclear in the energy mix and calls for a thorough investigation of the implications of nuclear energy, its costs, financing options, institutional arrangements, safety, environmental costs and benefits, localisation and employment opportunities, uranium-enrichment and fuel-fabrication possibilities.

2.5 Eskom's current installed generation capacity is 48 000 mega watts (MW) and the installed capacity of municipal, private and independent power producing (IPP) generators is 4 389MW. Eskom thus currently provides about 92% of the power.

2.6 In addition, 12 600MW coal plants are earmarked to be retired (decommissioned) from now to 2030. The Draft IRP states that the decommissioning of Eskom plants (totalling 28GW by 2040 and 35GW by 2050) will translate into less than 30% of energy supplied from coal by 2040 and less than 20% by 2050. The draft IRP2018 suggests that the Department of Energy is making way for other supply sources and seems to be promoting a reduction on coal reliance, which in turn will have a diminishing impact on Eskom's dominant role in South Africa's energy generation.

2.7 The electricity generation and distribution landscape in South Africa is changing at a rapid pace compared to the period leading up to 2010. In keeping to our climate change commitments, the country has also introduced renewable energy through independent power producers (IPPs).

3. The IRP review timeline

3.1 The IRP development process unfolded as follows since 2010:

- March 2011 – IRP 2010-30 promulgated. IRP 2018 will be the new plan replacing the outdated 2010 version;
- 2013 – First draft of an updated IRP was issued but nothing further transpired;
- October 2016 – Draft IRP 2016 released for public comment;
- March 2017 – Comments on Draft IRP 2016 closed. This document was never finalised;
- 27 August 2018 – Draft IRP 2018 (the updated Draft IRP 2016) released for public comment; and
- 26 October 2018 – Deadline for public comment on Draft IRP 2018.

3.2 OUTA recommends that the DoE commits to reviewing the IRP on set intervals at every **24 months and no longer than 36 months,** given the reality of a rapidly changing energy landscape, technological advancements, key input parameters and assumptions used becoming obsolete/invalid.

4. The Draft 2018 IRP in perspective

4.1 South Africa currently has about 52 000MW of electricity generation capacity, with 92% owned by Eskom and the remainder being provided by private and independent power producers (IPPs). The plan focuses on the **next 11 years**, estimating that about 75 000MW will be required by 2030 to meet projected demand.

4.2 The IRP envisions additional new generation capacity by 2030 of 8 100MW from wind and 8 100MW from gas, 1 000MW from coal, 2 500MW from hydro and 5 670MW from photovoltaic.

4.3 The Draft 2018 IRP further indicated the decommissioning of Eskom plants would see less than 30% of energy supplied from coal by 2040 and less than 20% by 2050.

4.4 It is envisaged that by 2030, wind should make up just over 15% of the country's power mix according to the South African Wind Energy Association (SAWEA).

5. Scenarios modelled

5.1 Four main scenarios are modelled, with combinations of three base scenarios of low, median (middle) or high electricity demand as outlined below:

i. **IRP 1**: Assumes median growth in electricity demand, plus no limit on building renewable energy generation. This is the least-cost option to 2030 and is punted as the strongest option;
ii. **IRP 2**: A base scenario, assuming high growth in electricity demand (average annual growth of 3.18% in GDP and 2.0% in electricity demand);
iii. **IRP 3**: A base scenario, assuming median growth (4.26% GDP and 1.8% electricity demand);
iv. **IRP 4**: A base scenario, assuming low growth (1.33% GDP with 1.21% electricity demand);
v. **IRP 5:** Assumes a market-linked gas price (potentially higher than all other options which assume gas prices are inflation-based increases); assumes median growth;
vi. **IRP 6:** The carbon-budget option, to reduce greenhouse gases, with median demand growth; and
vii. **IRP 7:** Assumes both carbon-budget and market-linked gas price, with median demand growth.

5.2 What's in scenario IRP1?

5.2.1 **IRP1** is the recommended least-cost scenario. This is perceived as the best case for South Africa at this point in time.

It assumes that Eskom's new coal power stations currently under construction (viz. Medupi and Kusile) will be finished and that all IPPs (Independent Power Producers) already contracted will be built. It assumes no annual limits on the amount of further renewable energy generation built by IPPs and a median growth in the demand for electricity as depicted in the **table 1** below.

IRP1 plan for new generation by 2030	
Type	**Quantity (MW)**
Wind	8 100
Gas	8 100
Solar Photo Voltaic (PV)	5 670
Hydro	2 500
Coal	1 000
TOTAL	**25 370**

5.2.2 How much will be the total installed electricity generation capacity by 2030?

The recommended plan will result in a total generation capacity of about 75 000MW by 2030, compared to the current capacity of about 52 000MW (both including Eskom, IPPs and private generation) as reflected in the **table 2** below.

Type	**Quantity (MW)**	**Percentage (%)**
Coal	34 000	45%
Nuclear	1 860	2%
Hydro	4 696	6%
Pumped Storage	2 912	4%
Wind	11 442	15%
Solar photovoltaic (PV)	7 958	11%
Concentrated Solar Power (CSP)	600	1%
Gas	11 930	16%

TOTAL	**75 398**	**100%**

6. 2010-2030 IRP Assumptions

6.1 It is a known fact that electricity is the lifeblood of the economy and the current planning philosophy aims to minimise the cost of electricity while ensuring South Africa's adherence to its global climate and environmental commitments.

6.2 A number of assumptions used in the IRP 2010 have since changed or not materialised. The following are noticeable changes:

a) The electricity demand on the grid continues to decline on an annual basis and we are currently sitting at volumes similar to those of the year 2007. For the financial year ending March 2018 the actual 212 190GWh total electricity consumed is about 30 percent less than what was projected in the IRP 2010.
b) Eskom existing generation plant performance is not at expected levels. Eskom's own reports show that plant availability is below the IRP 2010 assumptions of 80 percent and above.
c) To date additional 18 000 megawatts of new generation capacity in the form of coal, pumped storage and renewable energy has been committed to, with most of the capacity already connected to the grid and the rest to be realised between now and year 2022.
d) Cost of new generation technologies has significantly come down and this can be seen in the costs of wind and PV based on the projects procured to date

7. Key Assumptions in the 2018 Draft IRP

7.1 The following key assumptions form the core drivers of the Draft 2018 IRP:

a) 30% less than 2010 prediction of demand forecast (this can be ascribed to high electricity price increases culminating in fuel switching, embedded generation and people starting to use gas for their cooking)
b) Lower than expected plant performance
c) Constraints on renewables, putting annual limits
d) Technology costs changing rapidly than anticipated
e) Decommissioning of Eskom coal plants is based on a 50 year plant life
f) 4% of growth in GDP is assumed

g) Gas scenario is premised or aligned to on price increase in accordance to inflation increases/adjustments and imported gas is linked to spot prices as per the International Energy Agency (IEA).
h) Emission reduction scenario is based on the peak plateau decline – i.e. plateau trends/shifts after Medupi power station construction….
    - The Carbon budget per sector considered
    - DOE tested the figures it acquired from the Department of Environmental Affairs (DEA)
i) Adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in future unless affordable cleaner forms of coal-to-power are available.
j) The projected unit cost of electricity differs significantly between the scenarios tested. It must be noted that a change in fuel cost (gas, for example) can significantly affect the projected cost.
k) The scenario without renewable energy annual build limits provides the least-cost option by 2050.

8. Electricity Price Path

8.1 DoE confirmed that electricity consumers will pay 1.9c/kWh more by 2030 on a projected electricity tariff of 119c/kWh to accommodate the two independent power producer (IPP) coal-fired power stations included in the Draft 2018 Integrated Resource Plan (IRP 2018).

9. Two IPP Coal Plants

9.1 The two coal plants were procured in accordance with IRP 2010 and a Ministerial Determination published on December 21, 2012, were anticipated to begin producing electricity from 2023.

9.2 Subsequent to the publication of the above determination for the procurement of 2 500 MW of coal-fired capacity, government issued a request for proposals in December 2014.

9.3 Only two bids, with a combined capacity of 863 MW, were received, i.e. the 557MW Thabametsi project proposed for development near Lephalale, in Limpopo and the 306MW Khanyisa coal-fired power station project, located in Mpumalanga.

9.4 The Thabametsi project is being pursued by a consortium led by Marubeni, of Japan, while ACWA Power, of Saudi Arabia, is leading the consortium selected to build the Khanyisa project.

9.5 The Draft IRP 2018, indicates that the least-cost new generation pathway for South Africa is a mix based on solar photovoltaic and onshore wind, complemented by flexible generation sources, such as gas-fired power plants. Therefore, Thabametsi and Khanyisa were included in the document only after policy adjustments were made to the least-cost IRP.

9.6 The DoE asserts that government will not be providing any money directly to the IPPs, which are required to raise their own capital to build the plants. In the case of the two projects, they are expected to raise approximately R40-billion to build the power plants, which will be paid for by the consumer through the tariff.

10. New Generation Capacity installed/commissioned since 2010

10.1 Since the promulgated IRP2010-2030, the following capacity developments have taken place:

- A total 6 422MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 272MW operational and made available to the grid.
- Under the Eskom build programme, the following capacity has been commissioned –
    - 1 332MW of Ingula pumped storage;
    - 1 588MW (out of 4800MW) of Medupi coal plant
    - 800MW (out of 4800MW) of Kusile coal plant;
    - 100MW of Sere Wind Farm
- Commissioning of the 1 005MW Open Cycle Gas Turbine (OCGT) peaking plant.

10.2 In line with the planned capacity in the promulgated IRP 2010-2030 and in accordance with Section 34 of the Electricity Regulation Act No. 4 of 2006, the Minister of Energy has, to date, determined that 39 730MW of new generation capacity must be developed. Of the 39 730MW determined, about 18 000MW has been committed (viz. refers to the capacity commissioned or contracted for development) to date. This new capacity is made up of 6 422MW under the REIPPP with a total of 3 772MW operational on the grid.

11. Existing Plant Performance

11.1 The existing Eskom plant availability was assumed to be 86% in the promulgated IRP 2010-2030. The actual plant availability at the time was 85%. Since then, Eskom plant availability declined steadily to a low of 71% in the 2015/16 financial year before recovering to over 77.3% in the 2016/17 financial year and ending at 78.61% as at 31st March 2018. This drop in availability was a major contributor to the constrained capacity situation between 2011 and 2015. For the foreseeable future, the existing Eskom fleet remains the bulk of the South African electricity supply mix. The performance of these plants is critical for the electricity supply planning and security".

11.2 In accordance to Eskom's weekly system status update report, during week 40 of the 2018/19 financial year, the energy availability factor is 71.13%. this implies that energy availability factor (EAF) is not improving but instead, Eskom's plants performance is deteriorating.

11.3 OUTA – the assumption that Eskom's plant availability factor is one of the key input parameters in the IRP modelling should be reconsidered or a conservative estimate should be used rather than the unstable/erratic Eskom performance.

12. Economic Parameters

12.1 The reported Gross Domestic Product (GDP) for the period 2010-2016 was significantly lower than the GDP projections assumed in the promulgated IRP2010-2030. The compounded average growth rate for the years 2010 to 2016 was 2,05%. This lower GDP growth compared with the expectations in 2010 had an impact on the resulting electricity demand.

12.2 The actual net electricity energy sent-out for the country declined at an average compound rate of -0.6% over the past years. That was in stark contrast with the expectation of an average growth rate of 3.0% in the promulgated IRP2010-2030. The result was the actual net sent-out in 2016 was at 244TWh in comparison with the expected 296TWh (18% difference).

13. IRP Study Key Periods

13.1 "The period up to 2020 is mainly covered through the Medium-term System Adequacy Outlook (MTSAO) compiled annually by Eskom and published by NERSA in line with the Grid Code requirements.

13.2 The period 2021-2030 is termed a 'medium-to-high' period of certainty, with new capacity requirements driven by the decommissioning of old Eskom power plants and marginal demand growth. While demand and technology costs are likely to change, the decommissioning of old plants will definitely result in the requirements for additional capacity".

13.3 The decommissioning of coal plants (total 28GW by 2040 and 35GW by 2050), together with emission constraints imposed, imply coal will contribute less than 30% of the energy supplied by 2040 and less than 20% by 2050".

13.4 The Draft 2018 IRP indicates that the period 2031-2040 is termed an 'indicative period', as the uncertainty regarding the assumptions begins to increase. The output for this period is relevant to the investment decisions of the 2021-2030 period because it provides information needed to understand various future energy mix paths and how they may be impacted by the decisions made today".

13.5 OUTA contends that it is imperative to use conservative assumptions during this period so that any discrepancy between planned and actual data is minimal and long term investment decisions are more responsive to the changing technological landscape and cost implications in the energy sector value chain.

13.6 The period 2041-2050 is even more uncertain than the period before 2040. The results were analysed in line with the objectives of the IRP, which are to balance cost, water usage, emission reduction and security of supply. However, OUTA believes that as long as flexibility measures are in place, security of electricity supply could be maintained in the economic and national interest.

14. Increased Embedded Generation

14.1 There is evidence of growing rooftop Photovoltaic (PV) installations. Current installed capacity is still very small. However, it is likely to increase in the medium to long term.

14.2 OUTA believes the **200MW** allocated to embedded generation for own use (within the existing threshold prescripts between 1MW and 10MW starting in 2018) is a gross understatement, given the number of households, commercial and industrial customers migrating away from the grid due to unreliable and costly supply interruptions by Eskom.

15. Electricity Intensity

15.1 The DoE conceded that eelectricity demand on the grid has been declining on an annual basis. Current volumes are similar to those in the year 2007. "For the financial year ending March 2018, the actual total electricity consumed is about 30% less than what was projected in IRP 2010," asserted Minister of Energy, Mr Jeff Radebe on the media briefing on the publication of the Draft 2018 IRP.

15.2 Further analysis of the historic electricity intensity trend indicated that electricity intensity also continued to decline over the past years, exceeding the decline expectation in the promulgated IRP2010-2030 forecast. This points to possible decoupling of GDP growth from electricity intensity, which generally indicates a change in the structure of the economy.

15.3 Equally, there is increasing use of LPG for cooking and space heating that will impact on both energy (kWh) and peak demand (kW). In line with municipal by-laws on building, new developments are installing solar water heaters instead of full electric geysers. Voluntarily, consumers are also increasingly replacing electric geysers with solar water geysers to reduce their electricity bills. These developments impact on overall electricity demand and intensity and must therefore be considered when projecting future demand and supply of electricity.

15.4 Due to the limited data at present and for the purpose of this IRP Update, these developments were not modelled as stand-alone scenarios, but considered to be covered in the low demand scenario. The assumption was that the impact of these would be lower demand in relation to the median forecast demand projection.

16. Greenhouse Gas Emissions – South Africa

16.1 Decarbonisation of electricity as per IRP 2018 is part of the solution, given that total SA emissions in 2015 amounted to 540 Mt CO2e.

16.2 South Africa has a GHG emissions problem as indicated in **table 3** below on how we rank compared to other countries:

- SA uses more than twice the world average energy per unit of GDP
- SA has an energy-intensive economy
- There is a very high proportion from fossil fuels - particularly coal (70%).
- Coal-fired electricity generation results in 45% of SA's GHG emissions, so tackling electricity emissions is part of the solution.

Country	MJ energy per $ GDP
South Africa	8.7
Russia	7.9
China	7.0
USA	5.3
India	4.7
World	4.1
Brazil	3.8
Japan	3.7
European Union (EU)*	3.2

*EU = average of UK, Italy, France, Germany

(Source: World Bank 2014)

16.3 SA's emissions reduction ambition is embedded in its Paris Agreement commitment (NDC):

- This falls short of what is required to avoid a global 2°C rise.
- Climate Action Tracker** rates SA's NDC (Nationally Determined Contribution) in 2030 as "highly insufficient".

16.4 If all countries were to follow SA's approach, global average warming would reach over 3°C and up to 4°C (median projection).
https://climateactiontracker.org/

16.5 Thabametsi project has been listed as one of the "Dirty Dozen projects", twelve fossil fuel projects worldwide and environmental groups are having serious concerns about it, by disclosing that they have studied the project's impact assessment said the plant's emissions - 8.2 million tons of CO2 equivalent per year - are worse than existing and older Eskom plants. This would make it one of the highest emitting plants, emitting 60% more than Medupi or Kusile.

17. Expected Electricity Demand Forecast to 2050

17.1 The following extracts reflected on page 20 of the Gazetted IRP2018 (Notice No. 41865) have reference:

a) "The upper forecast was based on an average 3.18% annual GDP growth, but assuming the current economic sectoral structure remained. This forecast

resulted in an average annual electricity demand growth of 2.0% by 2030 and 1.66% by 2050."

b) "The median forecast was based on an average 4.26% GDP growth by 2030, but with significant change in the structure of the economy. This forecast resulted in an average annual electricity demand growth of 1.8% by 2030 and 1.4% by 2050. The median forecast electricity intensity dropped extensively over the study period (from current 0.088 to 0.04 in 2050). That reflects the impact of the assumed change in the structure of the economy where energy-intensive industries make way for less-intensive industries."

17.2 OUTA is of the view that the "median" forecast should not be higher than the "upper" forecast, as reflected above. However, we suggest the DoE qualifies the rational behind these statements in the Gazette by being more conservative rather than being over-optimistic.

17.3 The lower forecast had a 1.33% GDP growth to 2030, which resulted in a 1.21% average annual electricity demand growth by 2030 and 1.24% by 2050. The lower forecast assumed electricity intensity initially increased before dropping all the way to 2050. In developing the forecast, the main assumption was that mining output would continue to grow while other sectors of the economy would suffer as a result of low investment. This scenario was developed when the country faced possible downgrading decisions by the rating agencies.

18. Impact of Embedded Generation, Energy Efficiency and Fuel Switching on Demand

18.1 With the changing electricity landscape and advancements in technology, there is an increasing number of own-generation facilities in the form of rooftop PV installations in households. There is also an increasing number of commercial and industrial facilities that are installing PV installations to supplement electricity from the grid.

18.2 High electricity prices, as well as technology advancements (improved equipment efficiency), are also resulting in increased energy efficiency among consumers.

18.3 "The projected unit cost of electricity by 2030 is similar for all scenarios, except for market-linked gas prices where market-linked increases in gas prices were assumed rather than inflation-based increases".

18.4 OUTA is concerned that imported gas and infrastructure/network establishment costs could have a severe/higher impact on the overall electricity price when the basket or wholesale price is determined as an average price.

19. Technology costs

19.1 The IRP analyses mainly entailed balancing supply and demand at least-possible cost. Costs of technology, fuel and externalities were therefore major input assumptions during option analysis.

19.2 As part of the development of the promulgated IRP 2010-2030, the DoE through Eskom, engaged the Electric Power Research institute (EPRI) in 2010 and 2012 to provide technology data for new power plants that would be included in the IRP. That resulted in an EPRI Report, which was revised in 2015, taking into account technical updates of the cost and performance of technologies, market-factor influences and additional technology cases.

19.3 The EPRI Report incorporates cost and performance data of a number of power-generation technologies applicable to South African conditions and environments. It presents the capital costs, operating and maintenance (O&M) costs and performance data as well as comprehensive discussion and description of each technology.

19.4 Some of the technology costs, such as coal, nuclear and concentrated solar power (CSP), showed much higher costs in 2017 relative to the assumed values in the promulgated IRP 2010-2030. That was mainly due to the higher exchange rate in 2017, which impacted all technologies with the exception of some of the renewable energy technologies as a result of learning-related reduction in costs experienced over the last few years.

19.5 OUTA would like to register its serious reservations about this. For instance, the pumped storage costs were based on the recently commissioned Eskom Ingula pumped storage scheme and contends that these costs are not the true reflection of the actual/real construction costs.

19.6 OUTA challenges this because it inflates the pricing due to the reality of Ingula's initial costs being R9.8bn but escalated to a massive R36bn upon completion with excessive cost overruns.

19.7 OUTA recommends that these costs should be conservatively considered, and a reasonable/objective forecast be applied rather than use the grossly inflated Eskom figures.

20. Existing Eskom Plant Life (Decommissioning)

20.1 "Decommissioning of plants is a major consideration in the IRP Update. Eskom coal plants were designed and built for 50-year life, which falls within the 2050 study period of the IRP Update.

20.2 The full impact of decommissioning the existing Eskom fleet does not appear to be fully reviewed as part of the IRP Update, including the full costs related to coal and nuclear decommissioning, rehabilitation and waste management.

20.3 OUTA views this as a serious gap that must be mitigated against to minimise unforeseen situation such as collapse of mining towns, nuclear radiation risks to communities in close proximity to the nuclear plant or waste disposal sites. These scenarios must be modelled accordingly to provide a clear picture about South Africa's future energy outlook. Another question will be what is the cost vs benefit of plant closure versus extending the life of Koeberg?

20.4 The socio-economic impact of the decommissioning of these plants on the communities who depend on them for economic activity does not appear to have been quantified.

20.5 In line with the decommissioning schedule – it is reported that about 12 600MW of electricity from coal generation by Eskom will be decommissioned cumulatively by 2030 and that will increase to 34 400MW by 2050.

20.6 It is also expected that 1 800MW of nuclear power generation (Koeberg) will reach end-of-life between 2045 and 2047.

20.7 The decommissioning schedule is linked to Eskom complying with the minimum emission standards in the Air Quality Act No. 39 of 2004 in line with postponements granted to them by the Department of Environmental Affairs (DEA).

20.8 It is reported that a number of Eskom power plants (viz. Majuba, Tutuka, Duvha, Matla, Kriel and Grootvlei) require extensive emission abatement retrofits to ensure compliance with the law. It has been highlighted that failure to comply is likely to result in the affected plants becoming unavailable for production, which could lead to the early retirement of some of the units, thus lowering Eskom's plant availability factor.

20.9 Assumptions applied in the Draft 2018 IRP state that "the decommissioning of coal plants (total 28GW by 2040 and 35GW by 2050), together with emission constraints imposed, imply coal will contribute less than 30% of the energy supplied by 2040 and less than 20% by 2050".

20.10 The Draft 2018 IRP disclosed that imposing annual build limits on renewable energy generation will restrict the cumulative renewable energy installed capacity and the energy mix for the period under review.

20.11 The Draft 2018 IRP indicated that the projected unit cost of electricity by 2030 is similar for all scenarios, except for market-linked gas prices where market linked increases in gas prices were assumed rather than inflation-based increases.

20.12 In terms of the Draft 2018 IRP, adopting no annual build limits on renewables or imposing a more stringent GHG emission reduction strategy implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal to power are available.

20.13 Without policy intervention, all technologies included in the promulgated IRP 2010-2030 where prices have not come down like in the case of PV and wind, cease to be deployed because the least-cost option only contains PV, wind and gas.

21. Recommended Studies – Post 2030

21.1 The following studies are recommended to inform the discussions studies of the Post 2030 electricity mix at next IRP Update iteration.

a) Detailed analysis of gas supply options (international and local) to better understand the technical and financial risks and required mitigations for a renewable energy and Gas dominated electricity generation mix post 2030;
b) Detailed analysis of the appropriate level of penetration of renewable energy in the South African national grid to better understand the technical risks and mitigations required to ensure security of supply is maintained during the transition to low carbon future;
c) Detailed analysis of other clean energy supply options ([clean] Coal [technologies], Hydro, Nuclear and others) including their associated costs and economic benefits;
d) Detailed socio-economic impact analysis of the decommissioning of old coal fired power plants that would have reached their end of life; and
e) Any other study as recommended by stakeholders.

22. Hydro Allocation - 2500MW

22.1 **Concerns – Investment in Grand Inga -** According to a **World Bank report** on the project in May 2018, Inga 3 was to provide 4 800MW of hydropower on the Congo River, with South Africa taking up 2 500MW of this. South Africa's

involvement was supposed to increase the bankability of the project, as Eskom was a creditworthy institution at the time. A treaty on the DRC-SA electricity trade on Inga was signed in October 2013, during President Jacob Zuma's presidency.

22.2 Inga 3 was expected to cost US$106.5m with the World Bank financing US$73.1m of the total amount. However, in September 2016, the Bank withdrew from the project following "substantial breaches" to the financing agreement by the DRC. The Bank said the tender process was revised away from competitive bidding towards a negotiated deal so "the risk of rent capture by investors was significantly increased".

23. Conclusion

23.1 The significant change in the energy mix post 2030 indicates the sensitivity of the results observed to the assumptions made. A slight change in the assumptions can therefore change the path chosen. This considered with the low degree of certainty of the assumptions post 2030 requires in-depth analysis of the assumptions, technical and economic implications of the electricity infrastructure development path choices for the period post 2030.

23.2 OUTA supports the chosen option to conduct in-depth analysis post 2030 so as to avoid locking the country in long-term choices which might not be relevant or best for the country at a future state. However, proper due diligence of options available must be objectively undertaken and costed in the national interest.

23.3 Gas volumes would be reduced if battery storage, demand flexibility and electric vehicles were taken into account in the Draft IRP2018. South Africa would require gas capacity and volumes of approximately 8GW/9TWh by 2030, translating into roughly 80 PJ per annum of gas required by 2030 which is tantamount to approximately 1.3 million tonnes per year of LNG. However, South Africa does not have a wholesale capacity or energy market.

23.4 The Draft 2018 IRP is silent on the quantity, price and source of gas for the proposed peaking. However, the Gauteng Province sits on a gas line, but one cannot develop a viable business case because of high price of gas. The problem is the formula used to set the price of piped gas links it to the price of coal, Eskom price of electricity and the price of oil. As long as gas price is linked to Eskom prices, it can never become a competitive alternative.

24. RECOMMENDATIONS

As OUTA advances its comments, it recommends that:

24.1 Government provides its vision as per the NDP in giving effect to its policy position and outline the envisaged role of nuclear in the future energy mix in the medium to long term?

24.2 A balanced approach should be adopted in the choice and application of the IRP assumptions to ensure that an objective long term plan is devised in the national interest. The final 2018 IRP that will be promulgated should reflect that.

24.3 In order to give a full picture of all scenarios and eventualities having been modelled, the role of nuclear should have been considered in an objective manner rather than it be considered in hindsight or obscurity without transparency as the Draft IRP is silent on whether Koeberg's economic life will be extended or not given the envisaged decommissioning not later than 2047.

24.4 DoE provides a clear directive about what would happen to the balance of the 2500MW coal power that was supposed to be procured from IPPs as per the original 2014 Ministerial Determination, given that only 863MW was procured. Is the DoE not going to pursue the procurement of the outstanding 1637MW or will the coal determination be applicable in the foreseeable future or will it be rescinded?)

24.5 There must be a clear correlation to the Eskom plant decommissioning schedule and the new generation capacity construction lead times (build programme) to ensure that retired capacity does not leave the country with electricity supply gap (i.e. shortage) given the realities of unforeseen events during project construction. Is this eventuality factored and mitigated in the Draft 2018 IRP equation?

24.6 A schedule outlining the sequencing of the Ministerial Determinations as per section 34 of the ERA is developed and published by the DoE to demonstrate how new capacity replaces the to-be decommissioned capacity including the timelines. This will help to eliminate the uncertainty relating to the question of, is the same quantities of renewables procured and to-be constructed (ready for dispatch) equivalent to the existing coal capacity to-be decommissioned?

24.7 Clarity be provided on the allocation 8100MW allocated to gas. As disclosed in the Draft 2018 IRP, detailed studies and analysis of the impact of gas still has to be undertaken as reflected in **Section 22** above. OUTA is very concerned that a huge allocation has been given for open cycle gas turbine (OCGT)

without a proper cost benefit analysis and due diligence being conducted – hence, we ask for the rationale for the 16% allocation to gas?

24.8 The 2500MW allocated for hydro be reviewed. It would be wise for government to allocate the investment in new generation capacity based on due diligence and project viability. The Democratic of Republic of Congo Grand Inga Project has been "in-the-making" for many years and until now, nothing has come to fruition. What makes the DoE believe that this time it will materialise? OUTA would like to suggest that the 2500MW be allocated to local embedded generation to unlock our electricity supply industry.

24.9 The final 2018 IRP must provide a clear outline about how any build limits of RE will be lifted, given the need for South Africa to fully transition to a low-carbon economy and ensure the maximisation of renewables in the future energy mix as part of reaping the benefits of cheaper technologies and achieving the climate change objectives/targets in accordance to South Africa's international obligations.

24.10 Eskom's System Operator or ISMO in case it is independently established clarifies the issue of grid stability if South Africa's energy mix is more bias towards renewables. Therefore, this transcends into clear allocations in future IRPs for energy storage capacity and the role of embedded generation in the overall energy mix.

24.11 Eskom System Operator must requested to provide clarity or do necessary modelling and formulate appropriate assumptions of how the grid is envisaged to perform given the decommissioning of coal plants during this period and must indicate any risks or threats to grid stability including but not limited to indicating what kind of investments will be required to modernise and strengthen the transmission grid/network to meet future technical requirements.

24.12 Government (viz. the DoE) conduct extensive/ comprehensive studies about the impact of the diminished role of coal in the power generation sector and the associated inherent risks and benefits to the country (economy).

24.13 In the interest of providing policy certainty, the DoE and National Treasury must formulate a solid policy position that will boldly state that South Africa's directive on the future construction and financing thereof of coal-fired power stations (similar to how Standard Bank announced its position of no longer financing coal plants).

24.14 A comprehensive integrated policy framework or strategy should be crafted that will serve as a clear roadmap from a technical and socio-economic point of view. For instance, if coal is to continue to be used as a fuel for power

generation, clean coal technologies must be identified, and appropriate limitations be imposed to guide the application.

24.15 OUTA is seriously concerned about how integrated planning is unfolding in South Africa, for instance, under normal circumstances, a least cost option must be done on cost benefit analysis, but the IRP doesn't take that into account. For instance, solar panels and wind turbines will continue to be imported and not locally produced.

24.16 Eskom must be requested to provide its abatement retrofit programme/ schedule of identified power plants and this should be factored into the IRP planning process as this could have unintended negative effects on security of electricity supply and the commissioning or commercialisation of the replacement power generating units from renewables, should the worst case of plant unavailability materialise due to non-compliance.

24.17 Eskom's role in the electricity generation/supply should be redefined given the decommissioning of its plants. This implies that once 35GW of coal is taken off the grid as indicated in the Draft 2018 IRP, coal supply will only be from Medupi and Kusile power stations augmented by the 836MW from the coal IPPs. This means that Eskom's current business model will not be sustainable.

24.18 The most reasonable allocation for embedded generation should be between 3 000MW and 5 000MW and this should be factored into the finalised policy adjusted IRP 2018 set for promulgation. Furthermore, by setting these higher realistic targets, the DoE will signal and drive the full potential of this sector.

24.19 The final policy adjusted IRP2018 must allocate specific quantities for energy storage within a set time limit and all these be factored into the promulgated 2018 IRP

24.20 Additional scenarios on growth assumptions must be undertaken to reflect on the current realities of very low economic growth (GDP) levels to the highest.

24.21 DoE must also take cognisance of the fact that given the reality that government (the country) needs to achieve perpetual economic growth rate of more than 3.5% in order to make a serious dent on the high unemployment levels, this scenario has to be modelled as part of option analysis. For instance, if government succeeds and attracts more-than-expected foreign direct investment and economic growth accelerate above 5%, will the energy sector be geared or ready to meet the ensuing related electricity demand in the next 5 years of more?

24.22 The impact of gas in the generation mix must be extensively analysed and quantified throughout the future electricity supply value chain, from both supply side and demand side points of view.

25. ANNEXURE A

25.1 Errors in Draft 2018 IRP document

25.1.1 Page 31 – there is an error in Table 4: CODs for Eskom new Build - The commercial operation date of Medupi's Unit 4 is captured as 2017 December and we have already passed that date… shouldn't it be Dec 2018?

25.1.2 A total 6 422MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 272MW (is it 3772MW?) operational and made available to the grid. (page 31)

25.1.3 Under the Eskom build programme, the following capacity has been commissioned –

- 1 332MW of Ingula pumped storage;
- 1 588MW (is it 2172MW?) (out of 4800MW) of Medupi coal plant – OUTA requires the DoE to provide accurate numbers;
- 800MW (out of 4800MW) of Kusile coal plant; (page 31)

25.1.4 "Detailed analysis of other clean energy supply options (coal, hydro, nuclear and others)– including associated costs and economic benefits. The NDP Update acknowledges the potential to increase the efficiency of coal conversion and calls for any new coal-power investments to incorporate the latest technology. The NDP Update calls for cleaner coal technologies to supported through research and development, and technology transfer agreements in ultra-supercritical coal power plants; fluidised-bed combustion; underground coal gasification; integrated gasification combined cycle plants; and carbon capture and storage, among others". **(p.43)** .