ESKOM

APPLICATION FOR SUSPENSION OF THE NOx NEW PLANT MINIMUM EMISSIONS STANDARDS FOR THE ACACIA POWER STATION

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LIST OF ACRONYMS

AIR	Atmospheric Impact Report
AEL	Atmospheric Emission License
APPA	Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965)
AQMP	Air Quality Management Plan
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DOE	Department of Energy
EIA	Environmental Impact Assessment
ERP	Emission Reduction Plan
ESP	Electrostatic Precipitator
FGC	Flue Gas Conditioning
FGD	Flue Gas desulphurisation
GNR	Government Notice No.
HFPS	High Frequency Power Supply
FGD	Flue gas desulphurisation
GNR	Government Notice No.
IRP	Integrated Recourse Plan
IRR	Issues and Response Report
LNB	Low NO_x Burner
LPG	Liquid Petroleum Gas
NAAQS	National Ambient Air Quality Standards
NAQO	National Air Quality Officer
NEMAQA	National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NERSA	National Electricity Regulator of South Africa
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_X	Oxides of nitrogen ($NO_X = NO + NO_2$)
PM	Particulate Matter
PM_{10}	Particulate Matter with a diameter of less than 10 µm
$PM_{2.5}$	Particulate Matter with a diameter of less than 2.5 µm
RTS	Return to Service
SO_2	Sulphur dioxide
TSP	Total Suspended Particulates
µm	1 µm = 10^{-6} m
WHO	World Health Organisation

1 INTRODUCTION

Eskom, as South Africa's public electricity utility, generates, transmits and distributes electricity throughout South Africa. The utility also supplies electricity to neighbouring countries including Namibia, Botswana, Zambia, Zimbabwe and Mozambique. Eskom's principal generation technology is pulverised coal with approximately 90% of its current generating capacity lying in coal-fired power stations. Just under 6% of Eskom's totalled installed capacity is from gas turbine generated power stations, predominantly located on the Western and Eastern Cape. These Gas power stations form part of the Peaking electricity generation fleet. Peaking power stations operate during peak periods or during times when demand is higher than that which the base load power stations (that operate continuously) can supply. One such peaking power station is the Acacia liquid-fuelled Power Station (hereafter referred to as "Acacia"), which lies in the City of Cape Town Metropolitan Municipality in the Western Cape Province. The last of Acacia's generating units was commissioned in 1976. Acacia is unique in that in addition to being a peaking station it also serves as a back-up electricity supply to Koeberg Nuclear Power Station as per the National Nuclear Regulator licensing requirement.

In terms of the Integrated Resource Plan and the Eskom Consistent Data Set, power stations will generally be decommissioned at 50 years. The exact date of decommissioning is determined by current and future demand, the performance of other electricity generating plants and the cost of generation, as well as guided by the Integrated Resource Plan (IRP). Acacia is intending to decommission its units in 2026, no later than 2030.

In terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA), all of Eskom's coal and liquid fuel-fired power stations are required to meet the Minimum Emission Standards (MES) contained in GNR 1207 on 31 October 2018 ("GNR 1207") which was promulgated in terms of Section 21 of the NEMAQA[1]. GNR 1207 provides arrangements in respect of inter alia: a once off postponement with the compliance of minimum emissions for new plant for five years from the date of issue; no once off postponement will be valid beyond 31 March 2025; a once off suspension for plants being decommissioned by 31 March 2030; the National Air Quality Officer may grant an alternate emission limit or emission load if certain conditions are met. The application for any of these requests must be submitted by 31 March 2019. Eskom has however applied and received a condonation for the late submission of a Suspension application for Acacia until November 2019. A postponement application was issued to Acacia in 2015 which is reflected in the stations current AEL however with the amendment of the MES regulations in October 2018 it is necessary to further submit this application.

Acacia already achieves the new plant MES limit of 50 mg/Nm^3 for Particulate Matter (PM_{10}) and 500 mg/Nm^3 Sulphur dioxide (SO_2). Acacia complies with the existing plant standards for nitrogen oxide (NO_X -1100 mg/Nm^3). However, Eskom's Acacia Power Station will not be able to comply with the 2025 new plant MES for nitrogen oxides (NO_x) of 250 mg/Nm^3. In 2015 Acacia received postponement to the 2020 new plant limit with an approved alternative limit of 600 mg/Nm^3 – this was granted and valid until 2025. Eskom is requesting suspension of the need to comply with the NOx emission limit from the new plant limit of 250 mg/Nm^3 and continuation of the alternative 600 mg/Nm^3 NOx emission limit until decommissioning in 2026, no later than 2030. The emission limits are normalised to 15% O_2 on a dry basis.

The purpose of this document is to present an application to the National Air Quality Officer for the suspension of the requirement to meet the 2025 compliance date and propose an alternative limit for Acacia as required in terms of GNR 1207. The document has been structured to present the suspension request and the emission limits to which Acacia could be held which could then be included in the Atmospheric Emission Licence (AEL)

[1] GNR 893 amended the "original: MES regulations GNR 893 which were promulgated on 22 November 2013 in terms of Section 21 of the NEMAQA

are proposed. The legal basis for the suspension is presented, including the requirements that must be met in making such an application. Finally, the reasons for the application are presented.

2 ACACIA'S REQUESTED EMISSION LIMITS

The current limits listed in Table 1 are as in Acacia's AEL (ref: WCCT 023) and incorporate the NAQO approval to the postponement request received in 2015 (WC/ES-AC/20140227). The alternative emission limit that is requested for Acacia during normal operating conditions based for NO_x is also shown in Table 1:

Table 1: Current and requested alternative emission limits for Acacia

	Current Limit (from AEL/MES)			**Requested Emission Limits*** ** *273 K, 101.3 kPa, dry and 15% O_2*		
	Limit value (mg/Nm^3)	**Averaging period**	**Date to be achieved by**	**Limit value (mg/Nm^3)**	**Averaging period**	**Date to be achieved by**
Particulate Matter	75	Hourly	immediate	*No Change*		
	50	Hourly	1 April 2020			
Sulphur Dioxide	3500	Hourly	Immediately	*No Change*		
	500	Hourly	1 April 2020			
Nitrogen Oxides	1100	Hourly	Immediately	***600***	***Hourly***	***By 1 April 2025 Until Decommissioning (2026)***
	600**	Hourly	31 March 2025			

***This value is as a result of a granted alternative emission limit (revised from 250 **mg/Nm^3**) from the 2014 postponement application.*
****The requested alternate emission limits above are in mg/Nm^3 at 273 K, 101.3 kPa, dry and 15% O_2.*

In summary, the application submitted for Acacia is:

(i) Suspension of compliance for the new plant limit for NOx

(ii) An alternative NO_x limit from 2025 of $600mg/Nm^3$, until station decommissioning anticipated by 2026 (no later than 2030).

It is further requested that the proposed alternative limit only apply during normal working conditions, and not during start-up or shut-down periods and is represented in mg/Nm^3 (273 K, 101.3 kPa, dry and 15% O_2).

In terms of the existing license Acacia has to comply with an approved $600mg/Nm^3$ NO_x limit until 1 April 2025. It is therefore understood that this previously granted postponement of limits will remain in place until 2025 as a minimum, and thereafter beyond 2025 until decommissioning based on this request. Any other variations or amendments to the AEL are also considered to be unaffected by this application.

Based on the remaining life of the Acacia power station, the techno-economics and cost benefits assessment, any additional measures other than what was committed to above and the alternative emission limits requested are not financially viable.

3 LEGAL BASIS FOR DECISION-MAKING

3.1 Regulatory Requirements

In terms of Section 14(1) of the NEMAQA, the Minister of Environmental Affairs ("Minister") must designate an officer in the Department of Environmental Affairs (DEA) as the National Air Quality Officer. In this regard, Dr Thuli Khumalo has been designated by the Minister as the current National Air Quality Officer. Section 14(4)(b) of the NEMAQA provides that the National Air Quality Officer may delegate a power or assign a duty to an

official in the service of his/her administration. It is our understanding that no such delegation has been made for the area of jurisdiction in which the power station is located. Accordingly, Eskom submits this Application to the National Air Quality Officer (NAQO).

In terms of Paragraph (12)(a) – (c) of GNR 893 of 22 November 2013 (the Regulations) as amended by GNR 1207 of October 2018, the application must include:

1. An air pollution impact assessment compiled in accordance with the regulations prescribing the format of an Atmospheric Impact Report (AIR) (as contemplated in Section 30 of the NEMAQA), by a person registered as a professional engineer or as a professional natural scientist in the appropriate category;
2. A detailed justification and reasons for the Application; and
3. A concluded public participation process undertaken as specified in the National Environmental Management Act and the Environmental Impact Assessment (EIA) Regulations made under section 24(5) of the afore mentioned Act.

In respect of these requirements we have attached –

1. As Annexure A, a copy of the AIR prepared in respect of Acacia for the 2014 Postponement application. The AIR provides, *inter alia*, an assessment of how ambient air quality is likely to be affected by Acacia's requested emission limit by utilising, *inter alia*, atmospheric dispersion modelling. Eskom has appointed properly qualified consultants to prepare an updated AIR and will provide this to the NAQO when completed (anticipated to be May 2020). Eskom believes the status of air quality around the station now is substantively similar to that in 2014 and as such the information presented is appropriate for decision making purposes.
2. Detailed justifications and reasons for the Application (see Section 4 below) and,
3. A comprehensive report on the public participation process followed, and associated documentation (Annexure 4.1 and 4.2). The public participation report deals with the overall Eskom 2019 application process. The issues raised in the overall report will be a reflection of the issues relevant to Acacia as Acacia was included in the initial consultation on the Eskom 2019 application. Eskom will initiate a further round of public participation which will be completed based on the updated AIR and a supplementary public participation report will be provided to the NAQA when this is available (anticipated May 2020).

3.2 Changes in Regulatory Framework

In October 2018 the 2017 National Framework for Air Quality Management in the Republic of South Africa and the Amendment to Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of NEMAQA were published. While Eskom and the independent consultants appointed to complete the AIR have made every effort to provide complete information, Eskom reserves the right to supplement the information if it deems appropriate or if requested to do so by the NAQO.

There was, prior to October 2018, no requirement for Eskom to complete an immediate postponement application for Acacia as the station had a valid postponement decision until 2025. Eskom was unable to complete a further application by the deadline of March 2019 and as such requested approval for the late submission of an application in March 2019. Approval to submit an application by November 2019 was granted to Eskom in October 2019 by the Minister of Environment, Forestry and Fisheries. Eskom has complied with this request and undertakes to submit an updated AIR and Public Participation report when these are available. It is Eskom's opinion that information submitted with this application does provide sufficient substantive information for the NAQO to make a decision in respect of the application submitted.

3.3 The Need to Amend the Variation Requests

In terms of timing, Eskom is required to submit an AEL variation request parallel to this application. The variation request is prepared based on the assumption that this application is granted by the NAQO. If the NAQO decision is substantially different from that applied for, Eskom reserves its right to amend its variation request. Eskom will complete the variation request for the Acacia application during the planned public participation exercise.

4 REASONS FOR APPLYING FOR A SUSPENSION

As mentioned above, the Application must be accompanied by reasons. Such reasons are set out below and include the fact that Acacia generally operates to a limited extent (low load factor) and that emissions from the station will not result in non-compliance with National Ambient Air Quality Standards (NAAQS). The financial costs of compliance and the limited remaining life of the station must also be considered. It is Eskom's view that the benefit of compliance to the MES at Acacia and across the Eskom fleet does not justify the non-financial and financial costs of compliance (see Annexure 2 Summary report of Eskom's MES Applications for a discussion of the costs and impacts of compliance across the Eskom fleet). None of these reasons should be seen as exclusive (i.e. it is not one reason alone that prevents compliance) but rather all in combination.

As set out in the Constitution of the Republic of South Africa, there is the need to recognise the interrelationship between the environment and development. There is a need to protect the environment, while simultaneously recognising the need for social and economic development. There is the need therefore to maintain the balance in the attainment of sustainable development.

4.1 Load factor

Acacia is a peaking station, which is only used infrequently and in emergency situations. The load factor is given in the table below. The load factor represents a ratio of the actual energy produced over the reference period, divided by the nominal energy for the same period (if the load factor is 100% then the energy output was at its maximum). The average load factor for each engine at Acacia per year from 2016 to 2018 is given in the table below. It can be seen that each engine operated with an average low load factor of 0.04%. This is less than one day a year.

Table 2: Average load factor of each unit at Acacia from 2016 to 2018

Year	Average load factor of each engine
2016/17	0.01%
2017/18	0.01%
2018/19	0.11%
Overall average	0.04%

4.2 Remaining station life and cost of compliance

In terms of the Integrated Resource Plan and the Eskom Consistent Data Set, power stations will generally be decommissioned at 50 years. The exact date of decommissioning is determined by current and future demand, the performance of other electricity generating plants and the cost of generation, as well as guided by the Integrated Resource Plan (IRP). It is intended to decommission Acacia by 2026, and by no later than 2030.

In order to meet the MES new plant NOx limits at Acacia it would be necessary to:

- Modify the combustion system to allow water injection - estimated to cost between R15 mill to R20mill

- Implement high temperature selective catalyst reduction - estimated to cost between R50mill to R100mill

The technology already implemented at Acacia and the use of low sulphur fuels means that Acacia will comply with the MES limits for PM and SO_2.

Given the limited remaining life of the station, the financial viability of the modifications required to meet the full MES compliance requirements are not considered appropriate.

4.3 Impact on Ambient Air Quality

There are multiple sources of atmospheric emissions in Cape Town including industrial emissions, which are notably from the oil refinery in Milnerton, and motor vehicle emissions. Cape Town has a specific air quality problem, which is known as 'brown haze', which occurs during stable atmospheric conditions. Various studies have highlighted that the brown haze develops principally from emissions of diesel vehicles.

4.3.1 Nitrogen dioxide

An analysis of measured ambient NO_2 concentrations from 2016 to 2018 at the closest ambient monitoring station - Edgemead monitoring station, indicates full compliance with the NAAQS for both the hourly and the annual averaging periods. Dispersion modelling (2014 study) was used to assess the implication of the requested emission limits on ambient NO_2 concentrations. The predicted annual and 1-hour ambient NO_2 concentrations for Eskom's requested emission limits for Acacia Power Station are well below the respective NAAQS limit values throughout the modelling domain, even when assuming that the plant operated continuously. Acacia Power Station is a peaking station located in a residential area. This means the station is used as the electricity demand of the country dictates it. Consequently, the station operated for less than 1 day a year in the past 3 years, and it is expected that it will be used for a similar amount of time in future. The air quality impact of the station will be further assessed in the updated AIR estimated to be completed by May 2020, however it is anticipated that the risk of non-compliance with the NAAQS is very low, and the associated risk to human health and the environment would be negligible.

4.3.2 Particulate Matter

Acacia will comply with the MES requirement for new plant in respect of PM. Although the AIR with the previous postponement (2014) applications did not include an assessment of PM for Acacia, an analysis of measured ambient PM_{10} concentrations from 2016 to 2018 at the closest ambient monitoring station – Edgemead monitoring station, indicates compliance with the NAAQS. This will be further assessed in the updated AIR estimated to be completed by May 2020, however it is anticipated that the risk of non-compliance with the NAAQS is very low, and the associated risk to human health and the environment would be negligible.

4.3.3 Sulphur dioxide

Acacia will comply with the MES requirement for new plant in respect of SO_2. Although the previous AIR with the 2014 postponement applications did not include an assessment of SO_2 for Acacia, an analysis of measured ambient SO_2 concentrations from 2016 to 2018 at the closest ambient monitoring station – Edgemead monitoring station, indicates compliance with the NAAQS. This will be further assessed in the updated AIR estimated to be completed by May 2020, however it is anticipated that the risk of non-compliance with the NAAQS is very low, and the associated risk to human health and the environment would be negligible.

5 ESKOM'S EMISSION REDUCTION PLAN

Eskom has committed to implementing a range of initiatives to reduce the impact of its power station emissions and while this plan is not directly relevant to Acacia given the location of the station it is described below to

provide context to this application and illustrate Eskom's commitment to compliance with the MES (see Annexure 3 for more detail).

Eskom considers that it is not practically feasible or beneficial for South Africa (when considering the full implications of compliance and planned decommissioning) to comply fully with the 'new plant' MES by the stipulated timeframes. This is elaborated on in the sections below. As a result, Eskom proposes to adopt a phased and prioritised approach to compliance with the MES. Highest emitting stations will be retrofitted first. Reduction of Particulate Matter (PM) emissions has been prioritised, as PM is considered to be the ambient pollutant of greatest concern in South Africa. In addition, Eskom proposes to reduce NO_x emissions at the three highest emitting stations. Kusile Power Station will be commissioned with abatement technology to achieve the new plant standards. Medupi is commissioned with abatement technology which can meet PM and NOx new plant standards and will be retrofitted with flue-gas desulphurisation (FGD) so that will support compliance to the new plant SO_2 limit over time. There are six power stations which will be decommissioned before 2030, an additional two by 2035 and the remaining existing plants (excluding Majuba, Medupi and Kusile) by 2044.

Emission reduction interventions to achieve compliance with the new plant emission limit are planned for the following stations:

- Particulate Matter emission reduction: Tutuka, Kriel, Matla and Duvha Units 4-6, Matimba, Kendal and Lethabo;
- NO_x emission reduction: at Matla, Majuba, Tutuka, Camden; and
- SO_2 emission reduction: at Medupi and a pilot study which will confirm the appropriate technology for Matimba and Kendal.

Currently the Integrated Resource Plan 2019 is based on a general 50-year life for all coal fired power stations however the actual shut down and decommissioning dates of power stations are determined based on economic, technical and environmental criteria. For consistency in the Eskom applications the decommissioning dates as defined in the in the Eskom Consistent Data set (Eskom 36-623 rev 3) for planning have been used. To date, twelve (12) units between Grootvlei, Hendrina and Komati have been shut down prior to the 50 year life and put into extended storage and two into extended inoperability (at Eskom's most costly and oldest plants). The shutting down of these power plants reduces the cumulative emission load and pollution in Mpumalanga. The emissions load will continuously decrease ensuring that health impacts from Eskom's power stations will not increase.

The retrofits listed above are over and above the emission abatement technology which is already installed at Eskom's power stations, which is:

- Electrostatic Precipitators (ESPs) at Matimba, Kendal, Lethabo, Matla, Kriel, Tutuka, Komati 3 of the 6 units at Duvha. In addition SO_3 injection plants have also been installed at those stations with ESPs, except Tutuka, to improve the efficacy of the same;
- Fabric Filter Plants (FFPs) at Majuba, Arnot, Hendrina, Camden, Grootvlei, Medupi, Kusile and 3 units at Duvha;
- Boilers with Low NO_x design at Kendal and Matimba;
- Low NO_x Burners (LNBs) at Medupi, Kusile, Ankerlig, Gourikwa, and some units at Camden; and
- Flue gas desulphurisation (FGD) at Kusile.

Eskom was granted a first round of postponements between 2014 and 2015. Since then Eskom has updated its emission reduction plan to include the enhancement of existing particulate matter abatement technology currently installed at Kendal, Matimba and Lethabo Power Stations.

Implementing the emission reduction plan and installing more efficient emission control technology will reduce Eskom's emissions. The decommissioning of the older stations and an increased use of the newer less emitting Medupi, Kusile and the renewable IPPs will also result in a substantial decrease in Eskom's and South Africa's emissions over time. For example it is projected that compared to a 2020 baseline that by 2035 Eskom's relative PM emissions will reduce by 58%, SO_2 by 66% and NO_x by 46%.

Eskom's proposed atmospheric emission reduction plan is estimated to cost R 67 billion over the next 10 years. The costs have been included in the latest Multi Year Price Determination tariff application and the degree of execution is also largely dependent on the NERSA determination.

The retrofit schedule and projected emission reduction above clearly illustrates Eskom has been and remains committed to implementing emission reduction technologies to improve air quality in South Africa. Though there are delays in the implementation of the retrofit plan Eskom remains committed to ensuring these planned technology installations are completed.

A detailed discussion on Eskom's emission reduction plan is provided in the Eskom Summary Document (Annexure 3).

6 PUBLIC PARTICIPATION

The requirement that the public participation process for this application partially follows the process specified in the NEMA Environmental Impact Assessment (EIA) Regulations. Eskom supports and aligns its public participation process with the requirements as stipulated within the NEMA EIA Regulations. The public participation process followed for this application has increased the number of public meetings to include communities in the vicinity of the power stations. The public participation report (Annexure 4.1 and 4.2) deals with the overall Eskom 2019 application process. The issues raised in the overall report will be a reflection of the issues relevant to Acacia as Acacia was included in the initial consultation on the Eskom 2019 application. Eskom will initiate a further round of public participation specific to Acacia when the updated AIR is available and a supplementary public participation report will be provided to the NAQA when this is available (anticipated May 2020).

An AEL variation request, which will be submitted, will be subject to a public participation process that meets the requirements of Section 46 of NEMAQA.

7 EMISSION OFFSETS

Eskom is willing to implement emission offsets in areas where power stations impact significantly on ambient air quality, and where there is non-compliance with ambient air quality standards as a condition of an approved postponement. Eskom is of the view that in many cases household emission offsets are a more effective way of reducing human exposure to harmful levels of air pollution, than is retrofitting power stations with emission abatement technology. Emission retrofits at power stations also increase the cost of electricity, which may make electricity unaffordable for more people, resulting in an increase in the domestic use of fuels and deterioration in air quality in low income areas.

No specific need for offsets has been identified for Acacia based on the studies completed to date.

8 CONCLUSIONS

Eskom is committed to managing and operating its power stations with minimal risk to the environment and human health. As set out in the Constitution of the Republic of South Africa, there is the need to recognise the interrelationship between the environment and development. There is a need to protect the environment, while simultaneously recognising the need for social and economic development. There is the need therefore to maintain the balance in the attainment of sustainable development.

Acacia Power Station already complies with the existing and new plant limits for SO_2 and PM, and with the existing plant limit for NOx. However, Eskom is requesting suspension of the requirement to meet the NOx new plant limit and proposes an alternative limit from 2025 until decommissioning no later than 2030. Eskom contends that compliance with the new plant NOx MES limit at Acacia is not warranted because Acacia's operations do not result in non-compliance with ambient air quality standards. Acacia is only used in emergency situations (each unit is used on average for less than a day per year), and as a result the impact of Acacia's operations on ambient air quality is negligible. Further, the costs of any retrofit are inappropriate considering that Acacia will be decommissioned by 2026, no later than 2030.

Eskom has complied with the requirement to submit this application by November 2020 but intends to further supplement this application with an updated AIR and public participation report (anticipated to be completed by May 2020).

Eskom believes given the motivation presented above in terms of Acacia, its decommissioning schedule as well as Eskom's complete emission reduction plan and its implications, that this application for an alternative limit is appropriate and in line with the relevant Constitutional, regulatory and policy requirements and as such the application should be approved by the NAQO.