



Centre for Environmental Rights

Advancing Environmental Rights in South Africa

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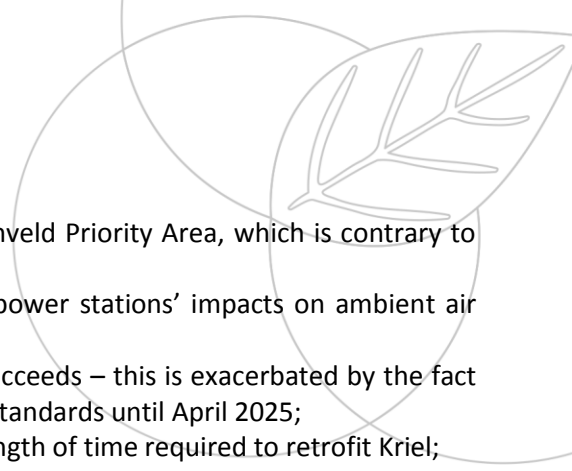
Our ref: CER/33.5/RH/SK
Date: 11 December 2013

Dear Mr Zimbwa

OBJECTIONS TO THE VARIATION OF THE ATMOSPHERIC EMISSION LICENCE FOR ESKOM'S KRIEL POWER STATION

1. We address you on behalf of groundWork, Earthlife Africa Johannesburg, the Vaal Environmental Justice Alliance, and the following community groups: Middelburg Environmental Justice Network; Greater Middelburg Residents' Association; Guqa Community Service Centre; Southern Africa Green Revolutionary Council; Greater Delmas Civic Movement; Highveld Environmental Justice Network; Wonderfontein Resettlement Forum; Mpumalanga Youth Against Climate Change; Outrageous Courage Youth and Schoongesicht Community Movement. Our clients are interested and affected parties in Eskom's applications for postponement of and/or exemption from the compliance time-frames for the minimum emission standards (MES) published in terms of section 21 of the National Environmental Management: Air Quality Act, 2004 (AQA).
2. In this letter, we make preliminary representations against the granting of Eskom's application to vary the atmospheric emission licence (AEL) for its Kriel Power Station. Our clients reserve the right to make detailed submissions once they have had the "reasonable opportunity" to which they are entitled by the AQA. We elaborate on this below.
3. In summary, the reasons this application should fail are the following:

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- 3.1. granting the application will exacerbate poor air quality in the Highveld Priority Area, which is contrary to the declaration of the area as a priority area;
 - 3.2. Eskom's modelling is flawed and significantly under-estimates its power stations' impacts on ambient air quality – this is also the case for Kriel;
 - 3.3. there are likely to be significant health impacts if the application succeeds – this is exacerbated by the fact that Eskom does not intend to comply with the minimum emission standards until April 2025;
 - 3.4. Eskom has substantially exaggerated the costs of compliance and length of time required to retrofit Kriel;
 - 3.5. Eskom's poor planning is the cause of the "emergency" situation at Kriel; and
 - 3.6. Eskom has a history of non-compliance with environmental legislation.
4. We make submissions on these aspects below. Before doing so, we address Eskom's flawed public participation process.

5. No reasonable period provided for comment on the Kriel variation application

- 5.1. Upfront, we are instructed to raise our clients' serious concerns regarding the public participation process Eskom has followed in relation to this variation application. AQA provides that, in circumstances where a licence-holder requests a variation of its AEL: *"the licensing authority must require the holder of the licence to take appropriate steps to bring the request to the attention of relevant organs of state, interested persons and the public if— (a) the variation of the licence will authorise an increase in the environmental impact regulated by the licence; (b) the variation of the licence will authorise an increase in atmospheric emissions; and (c) the proposed variation has not, for any reason, been the subject of an authorisation in terms of any other legislation and public consultation"*.¹ These steps "must include the publication of a notice in at least two newspapers circulating in the area in which the listed activity authorised by the licence is, or will be, carried out—(a) describing the nature and purpose of the request; (b) giving particulars of the listed activity, including the place where it is or will be carried out; (c) stating a reasonable period within which written representations on or objections to the request may be submitted, and the address or place where representations or objections must be submitted; and (d) containing such other particulars as the licensing authority may require"² (our emphasis).
- 5.2. The first time we or any of our clients were aware of the request was on 26 November 2013, when we received annexure 1 – the notification from Iliso (Eskom's consultants). On both 27 and 28 November 2013, we followed up with Iliso as to the implications of this notification for time-frames in the minimum emission standards process (described from paragraph 6.8 below). We also pointed out that 8 working days was far from the "reasonable period" for comment required by the AQA, and that we required urgent clarification in this regard, so that we could advise our clients and experts accordingly. We also asked for clarification regarding the intention to bring the variation application before a decision had been taken on Eskom's applications for postponement and/or exemption from the minimum emission standards. Iliso indicated that it would take instructions from Eskom on this aspect and respond to us by 29 November 2013. Having received no response regarding this aspect, we followed up again with Iliso on 29 November 2013, indicating that it was still not clear to us why the variation requests would be made before the outcome of the minimum emission standards process. Having still received no clarity on this aspect, we again followed up on 2 December 2013, asking that the process regarding Kriel be urgently clarified, and once again indicating that the variation applications were inextricably linked to the outcomes of the postponement applications. On 3 December 2013, Iliso indicated that a response would be provided once there were instructions on this from the "technical team". We reiterated, on 3 December 2013, that we required this response on an urgent basis, given that the notice of intention to apply for the variation of Kriel's AEL indicated that comments were due by 6 December 2013. On 3 December 2013, Iliso indicated: *"the Kriel variation request is not related to the MES postponement applications. It is a completely separate process.*

¹ S46(3).

² S46(4).

Eskom has requested that the emission limits in Kriel's AEL be changed with immediate effect." In response to yet another query regarding the time period for response to the notification, Iliso confirmed - after 3pm on 3 December 2013 - that 6 December 2013 remained the deadline for comment. On 4 December 2013, Iliso indicated to Greenpeace (which had also advised Iliso that 8 working days was far from "a reasonable period" as required by legislation) that Eskom had advised that this was "an emergency application".³

- 5.3. On 5 December 2013, as appears from annexure 2 hereto, Iliso indicated that, as comments had been received from stakeholders indicating that more time was required to comment on the variation request, comments could be made until 11 December 2013.
- 5.4. It appears from Eskom's variation request dated 15 December 2013 that *"steps will be taken to bring the request to the relevant organs of state, interested persons and the public, as required in terms of section 46 (3) and section 46 (4) of the Air Quality Act. These steps will include publication of a notice in two local newspapers, namely Witbank News and Ridge Times, and letters will be sent to all Interested and Affected Parties. Proof of publication of the newspaper notices will be submitted once the notices have been published."* It is not clear when such notices were published. It appears that Eskom – as opposed to the licensing authority – decided on the notice period for comment. As set out above, section 46(3) of the AQA indicates that the licensing authority must require the holder to take appropriate steps to notify the public. Eskom has failed to take the "appropriate steps" required by s46(3) of AQA.
- 5.5. Eskom and its consultants are well aware that the CER acts for numerous parties in its process to postpone compliance with and/or be exempt from minimum emission standards published in terms of section 21 of AQA. The CER has, on behalf of various clients, been actively involved in this process, commenting on the background information document (BID), the plan of study for atmospheric dispersion modelling, and regularly corresponding with Iliso and Eskom regarding clarity on various aspects of the applications. In addition, our clients have been identified as key stakeholders in this process. As a result, a meeting was arranged specifically for our clients (and attended by Iliso and Eskom) on 19 September 2013, and our clients and other key stakeholders attended a workshop on this process on 21 November 2013. These were in addition to the other public meetings. In addition, the CER has been engaging with Eskom for many months regarding its AELs. It is submitted that there was no basis for Eskom not to make the variation request available to the CER at least on 15 November 2013 – when it applied for variation. Instead, it only notified us of its intention to apply for variation 11 days later, indicating that since it was an "emergency", only 8 working days were available for comment. As indicated above, this period was extended to 11 working days.
- 5.6. It is submitted that the period for comment is wholly unreasonable. It does not afford our clients and other interested and affected parties an adequate opportunity to review the application and other relevant documents, or to consult with its members, partners and technical and/or legal experts and to make submissions. A period of 21 days is generally regarded as an acceptable period for comment. Instead, Eskom relies on its poor planning and a self-created "emergency" to limit public participation in a manner which is unfair and unreasonable. There is no basis for Eskom to shortcut the proper procedures when it delayed in launching a variation application. The urgency is of its own making and interested and affected parties should not be prejudiced as a result.
- 5.7. Unless interested and affected parties are provided with a meaningful opportunity to make input in this process, any decision made on Eskom's application will be subject to judicial review in terms of section 6 of the Promotion of Access to Information Act, 2000 (PAJA). This is because decisions will be made without the benefit of all relevant information, without considering all relevant considerations, and on the basis of a procedurally unfair process.

³ This correspondence is available, should copies be required.

5.8. For all of these reasons, our clients' ability to make meaningful inputs regarding the Kriel variation application is severely limited, and it is only able to do so on a preliminary basis. All of our clients' rights in this regard are reserved.

6. Background to the variation application and Eskom's applications to be exempt from and/or postpone compliance with minimum emission standards

6.1. The AQA commenced on 11 September 2005. It has the following objects:—(a) to protect the environment by providing reasonable measures for—(i) the protection and enhancement of the quality of air in the Republic; (ii) the prevention of air pollution and ecological degradation; and (iii) securing ecologically sustainable development while promoting justifiable economic and social development; and (b) generally to give effect to section 24 (b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

6.2. Section 9 of the AQA requires that the Minister: must identify substances or mixtures of substances in ambient air which, through ambient concentrations, bioaccumulation, deposition or in any other way, present a threat to health, well-being or the environment or which the Minister reasonably believes present such a threat; and must, in respect of each of those substances or mixtures of substances, establish national standards for ambient air quality, including the permissible amount or concentration of each such substance or mixture of substances in ambient air. One such substance is particulate matter (PM). Ambient air quality standards (AAQS) were published on 24 December 2009 for various substances, including for PM₁₀, and on 29 June 2012, for PM_{2.5}.

Setting the Minimum Emission Standards

6.3. Section 21 (which commenced on 1 April 2010) requires the Minister to publish a list of activities which result in atmospheric emissions and which the Minister or MEC reasonably believes have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage; and must establish minimum emission standards in respect of a substance or mixture of substances resulting from a listed activity and identified in the notice, including— (i) the permissible amount, volume, emission rate or concentration of that substance or mixture of substances that may be emitted; and the manner in which measurements of such emissions must be carried out.

6.4. From about 2004 and over about a 5 year period, a multi-stakeholder process was convened to determine appropriate minimum emissions standards (MES) for these so-called listed activities. As indicated in a press statement published by the Department of Environmental Affairs (DEA) on 4 December 2014:⁴

"It is important to note that the development of the Section 21 Notice constituted an elaborate consultation and participation processes in terms of Section 56 and 57 of the AQA. All affected stakeholders (including Eskom) were part of these processes and they made contributions regarding limits that are achievable with the view of upholding the constitutional right of all people in the country to an environment that is not harmful to health and well-being.

....

An extensive consultation process was followed in setting these emission standards over a 5 year period. This process:

- *continuously engaged with all stakeholders around the identification of listed activities and their associated minimum emission standards; and*

⁴ <http://www.gov.za/speeches/view.php?sid=42405>

- reviewed current national and international work related to the identification of activities and their related minimum emission standards
- Eskom participated directly in this process, and standards seek to balance the economic, social and environmental imperatives.”*

6.5. Section 22 of AQA provides that no listed activities may commence without an AEL, and section 59 prohibits exemptions from section 22. The effect of this is not only that there can be no exemption from the requirement to obtain an AEL to conduct a listed activity, but also that there can be no exemptions from the MES. As these are minimum standards, the MES cannot be varied to allow greater atmospheric emissions than the MES. Unless compliance is postponed following a successful postponement application, all industries are required to comply with the MES (or stricter standards) when they commence on 1 April 2015. We elaborate on this below.

6.6. On 31 March 2010, the section 21 list of activities (list of activities) was published.⁵ It contained the following MES for solid-fuel combustion installation (such as Eskom’s power stations):

Description:	Solid fuels combustion installations used primarily for steam raising or electricity generation.		
Application:	All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used.		
Substance or mixture of substances		Plant status	mg/Nm³ under normal conditions of 10% O₂, 273 Kelvin and 101.3 kPa.
Common name	Chemical symbol		
Particulate matter	N/A	New	50
		Existing	100
Sulphur dioxide	SO ₂	New	500
		Existing	3500
Oxides of nitrogen	NO _x expressed as NO ₂	New	750
		Existing	1100

6.7. Existing plants (which include all of its Eskom’s power stations) are required to meet existing plant MES by 1 April 2015, and new plant MES by 1 April 2020.⁶ The list of activities,⁷ read together with the 2007 Framework for Air Quality Management (Framework)⁸ also permits the postponement of compliance time-frames for existing plants in certain circumstances.

Eskom’s application to be exempt from and/or postpone compliance with the MES

6.8. In June 2013, Eskom announced, by way of a BID, that it was applying for postponement and/or exemption from the MES. Draft applications for postponement and exemption, together with Atmospheric Impact Reports (AIRs) and supporting documents were made available for comment on 28 October 2013. The draft applications made by Eskom were very different from those presented in the BID. For instance, the BID

⁵ On 22 November 2013, an updated list of activities was published. The relevant MES remain the same.

⁶ Paragraphs 9-10 of the list of activities.

⁷ Paragraph 11-14.

⁸ Section 5.4.3.5.

reflected that 14 postponements and 38 exemptions would be requested, whereas, in fact, 9 postponements and 49 exemptions were requested.

6.9. In relation to Kriel, table 3 on page 8 of the exemption application (annexure 3) reflects that the requested emission limits sought by Eskom are:

6.9.1. for PM (limit in AEL is 125 mg/Nm³; 2015 MES is 100mg/Nm³ and 2020 MES is 50mg/Nm³):

6.9.1.1. **from now until 31 March 2025: 400 mg/Nm³;**

6.9.1.2. **from 1 April 2025: 50 mg/Nm³;**

6.9.2. for NOx (limit in AEL is 1700 mg/Nm³; 2015 MES is 1100mg/Nm³ and 2020 MES is 750mg/Nm³):

6.9.2.1. from now until 31 March 2025: 1600mg/Nm³;

6.9.2.2. from 1 April 2025: 750mg/Nm³; and

6.9.3. for SO₂ (limit in AEL is 4000 mg/Nm³; 2015 MES is 3500mg/Nm³ and 2020 MES is 500mg/Nm³):

6.9.3.1. from now until decommissioning: 2800 mg/Nm³.

6.10. In late November 2013, Eskom changed its plans and told stakeholders that, instead of seeking exemptions, it now intends to apply for “rolling” postponements, reapplying for postponement every 5 years. This is contrary to the provisions of paragraph 13 of the AQA list of activities. The applications will apparently be updated accordingly so that they are all for postponements. From correspondence with Iliso, it appears that the requested emission limits will not change in the updated applications. These updated applications, together with applications to vary all of Eskom’s AELs, will apparently be made available for 30 days’ comment on 6 January 2014.

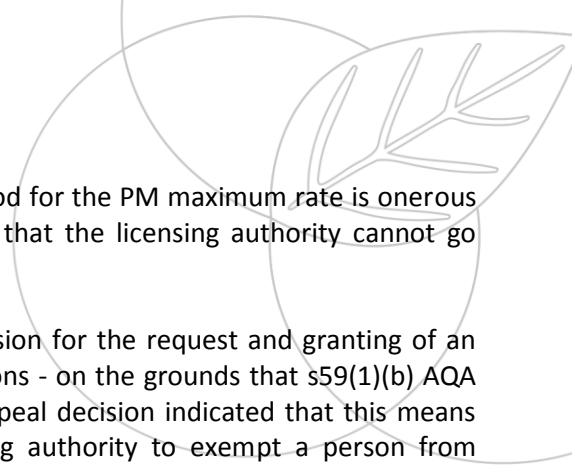
6.11. It is not completely clear what is meant by “rolling postponements”, but it is evident from paragraph 13 of the section 21 list of activities that Eskom cannot lawfully be granted postponements of longer than 5 years in a single application. It is, in any event, clear that postponements longer than 5 years will have the same effect as exemptions - this is especially so if Eskom applies for consecutive postponements. If its requested postponements are granted, and Eskom seeks additional postponements, it is required to follow the process prescribed in the Framework and list of activities for postponement applications – including AIRs and public participation as per the Environmental Impact Assessment Regulations, 2010.

6.12. On 21 November 2013, the CER, its clients and other key stakeholders attended a workshop hosted by Eskom in order to discuss our concerns arising from the Eskom AIRs and postponements and/or exemption applications. We refer to discussions at this workshop below.

The Kriel AEL and Eskom’s unsuccessful appeal

6.13. As you are aware, the Mpumalanga Department of Economic Development and Tourism (MDEDET), as the relevant licensing authority, issued Eskom an AEL for Kriel during May 2012. Dissatisfied with certain aspects of the AEL, Eskom appealed to the MEC. Appeals were also launched against conditions in the AELs for Duvha, Matla, and Kusile. It appears that Eskom received the outcome of the appeals on 24 May 2013 and that a new Kriel AEL was issued on 11 June 2013. Among other things, the Kriel appeal outcome:

6.13.1. dismissed the ground of appeal that the maximum release rate for PM is onerous and not in line with international practice. The MEC pointed out that the AEL contains emission standards under normal working conditions and operating conditions and requirements under normal start-up, maintenance and shut-down conditions, as per s43(1)(g) AQA; however, s43 AQA does not provide the licensing authority with a legal mandate to deal with abnormal conditions;

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- 6.13.2. dismissed the ground of appeal that the lack of a grace period for the PM maximum rate is onerous and not in line with international practice - on the basis that the licensing authority cannot go beyond the provisions of the AQA; and
- 6.13.3. dismissed the ground of appeal regarding the lack of provision for the request and granting of an exemption when there is plant breakdown or upset conditions - on the grounds that s59(1)(b) AQA provides that no exemptions from s22 are possible. The appeal decision indicated that this means that there is no legislative provision allowing the licensing authority to exempt a person from obtaining an AEL and the relaxation of the MES.
- 6.14. The current AEL is valid until 20 May 2017. Its point-source emission rates (under normal working conditions) are: **PM: 125mg/Nm³**; SO₂: 4000 mg/Nm³; and NO_x: 1700 mg/Nm³ (section 7.2 of the AEL). In other words, the PM standard is 25 mg/Nm³ higher than the MES that will take effect on 1 April 2015.
- 6.15. This section of the AEL also indicates, *inter alia*, that:
- 6.15.1. further review of conditions may be introduced to align to the implementation of the Highveld Priority Area;
- 6.15.2. Eskom is liable to prevent and mitigate against the risk of harm to human health and the environment and shall put in place measures necessary to prevent and/or mitigate against such risks; and
- 6.15.3. all units are to be fitted with continuous emission monitoring for PM, SO₂ and NO_x by 2015.
- 6.16. In relation to maximum emission rates (under start-up, maintenance and shut-down conditions), it is indicated, *inter alia*, that, in order to put into effect s42 of AQA (which deals with issuing AELs), the licensing authority may review the conditions and set maximum emission limits to be adhered to by Eskom during start-up, maintenance and shut-down (section 7.3).
- 6.17. In relation to point source emission monitoring and reporting requirements (section 7.4) it is indicated that:
- 6.17.1. regarding sampling for SO₂, NO_x, there must be biannual sampling and reporting; and
- 6.17.2. regarding monitoring for PM, there must be biannual sampling and reporting.
- 6.18. This section indicates that gaseous continuous emission monitoring systems are to be verified during 2011. Reporting is to commence once verification is complete, at the latest by 1 April 2012. Sampling and monitoring is as per Schedule A of the list of activities.
- 6.19. Table 7.7 requires that there be an investigation to measure, ascertain and accurately determine the maximum release rates under normal, start-up, maintenance and shut-down operating conditions by 31 July 2013 (or 1 year after the first issue of the AEL – which happens first).

Eskom's variation application

- 6.20. On 26 November 2013, Eskom (via Iliso) made available its notice of request for variation of the Kriel's AEL, indicating that comments on the request were to be submitted by 6 December 2013 to the Mpumalanga MEC and Nkangala Municipality, and that a copy of the variation request could be obtained from Eskom.
- 6.21. It appears that Eskom made this variation application on 15 November 2013. In a letter to the MEC and the Municipal Manager of Nkangala District Municipality of this date, Eskom refers to a letter dated 28 August

2013 “providing information on the current state of compliance of Kriel, Duvha and Matla power stations with their respective [AELs]”. This 28 August 2013 letter has not been made available to us, and its contents are therefore unknown to our clients. According to the application, “the circumstances under which Eskom’s power stations are currently operating are far from normal, and so we request additional leniency at Kriel until particulate emissions have been reduced to the extent that Kriel can comply with the emission limits. The units will be brought into compliance between 2018 and 2023, when fabric filter plants are retrofitted”. According to Eskom, the variation is “necessary or desirable to accommodate demands brought about by impacts on socio-economic circumstances, and it is in the public interest to meet those demands”.

6.22. Eskom requests the variation of 4 conditions of the Kriel AEL, for the reasons summarised below:

- 6.22.1. The maximum release rate for PM until 1 April 2015 should be changed from 125mg/Nm³ to 350mg/Nm³ (and 550 mg/Nm³ for 4 days in the month). Eskom indicates that the “old technology” at Kriel is unable to achieve the emission rate of 125mg/Nm³ and a fabric filter plant retrofit is planned to enable compliance with a stricter limit from 2018-2023. This retrofit is, according to Eskom, “one of the highest priority fabric filter plant retrofits in Eskom’s fleet”, and is planned for 2018, “although it is subject to planning approvals and funding availability. Thereafter, one unit per year will be retrofitted. The (nominal) cost of the fabric filter plant retrofit and dust handling plant upgrade for all six units (including financing costs and interest during construction) is estimated to be R9.1 billion.” The variation request indicates that *emissions at Kriel are currently highly erratic, as a result of the unreliability of many of the plant components,*” and the “only way” that Kriel can currently comply with the stipulated emission limit is by shutting down 3 of the 6 units, which impacts security of electricity supply. Load-shedding will “affect health and emergency services and put lives at risk”. The higher emission limit requested will, Eskom alleges, not result in non-compliance with AAQS.
- 6.22.2. The emission limit applicable to normal operations should not apply to each stack for up to 37 days per year, to enable maintenance to be conducted on-line. Eskom seeks to amend condition 7.3.2 in the AEL, which provides that “normal maintenance and shut-down conditions shall not exceed a period of forty-eight hours”. Eskom states: “given the constrained electricity supply situation and the fact that Kriel is an old power station and needs large amount of maintenance,... it is not possible to shut down power stations when planned maintenance, which would push emissions over the limit, needs to be done”.
- 6.22.3. The “contradictory” requirements for continuous emission monitoring should be resolved. According to Eskom, continuous emission monitoring is currently done for PM on both stacks, and for sulphur dioxide and nitrogen oxides on one stack. Continuous emission monitoring for sulphur dioxide and nitrogen oxides will apparently commence on the other stack by 2015 once testing of the system has been completed.
- 6.22.4. The deadline for the study to determine emission rates during start-up, maintenance and shut-down conditions should be postponed to the end October 2014. The AEL currently stipulates that the study needed to be completed by 31 July 2013, which, according to Eskom did “not allow sufficient time to place a contract and coincide measurements with a planned start-up”.

6.23. It is worth highlighting the fact that the increase Eskom seeks for its PM emissions (350 mg/Nm³) is almost three times the limit in its AEL (125 mg/Nm³) for 26 or 27 days a month and nearly four-and-a-half times (550 mg/Nm³) its AEL limit for 4 days in the month. If the amount Eskom stipulates in its exemption application (400 mg/Nm³) is used, the increase it seeks is more than three times the AEL limit. Effectively, it is seeking permission to operate with non-functional emission control equipment and allow only partially controlled emissions. It is also worth pointing out that Eskom is seeking emission limits which are less

stringent than its Atmospheric Pollution Prevention Act, 1965 registration certificate. As appears from the DEA's Atmospheric Emission Licence: Manual for Licensing Authorities, July 2010.⁹

6.24. Eskom seeks this variation until 1 April 2015. As explained above, unless Eskom obtains a postponement of the 2015 MES, its plants have to meet these standards by 1 April 2015. Similarly, unless Eskom obtains a postponement of the 2020 MES, its plants have to meet these standards by 1 April 2020. As indicated above, Eskom will apparently request the same emissions in its updated postponement application as requested in its draft applications. In other words, although, in this variation application, Eskom indicates that it only seeks a postponement until 1 April 2015, it appears that it intends to seek an emissions limit until 31 March 2025 of 400 mg/Nm³, and then, from 1 April 2025, of 50 mg/Nm³. In other words, for PM:

6.24.1. from now until 1 April 2015: Eskom seeks an emission limit of 350 mg/Nm³;

6.24.2. from 1 April 2015 until 31 March 2025: Eskom seeks an increase of the emissions limit to 400 mg/Nm³; and

6.24.3. from 1 April 2025 to 50 mg/Nm³.

6.25. Therefore, irrespective of whether Eskom's variation is granted, it does not intend to comply with the 2015 MES when they take effect on 1 April 2015. Rather, it seeks to emit four times the MES for 5 years, and then, for another 5 years, to emit eight times the MES. It only intends to comply with the 2020 MES by 1 April 2025.

6.26. Given the unreasonable period provided for comment, these preliminary submissions will focus on Eskom's requested amendment to the PM emission limit. We also make certain general submissions as to why the variation application should fail.

7. Kriel (like all Eskom's coal-fired power stations) is in a Priority Area

7.1. The AQA provides for the declaration of an area as a priority area if the Minister (or MEC) reasonably believes that—

7.1.1. AAQS are being, or may be, exceeded in the area, or any other situation exists which is causing, or may cause, a significant negative impact on air quality in the area; and

7.1.2. the area requires specific air quality management action to rectify the situation.¹⁰

7.2. A priority area air quality management plan (AQMP) must be developed to: co-ordinate air quality management (AQM) in the area; address air quality issues; and provide for its implementation by a committee representing relevant role-players.¹¹

7.3. The aim of declaring priority areas is to target limited AQM resources to the areas that require them most.¹² Once an AQMP is implemented, air quality in the area should - within agreed timeframes - be brought into sustainable compliance with AAQS.¹³

7.4. The Minister (or MEC) may withdraw the declaration of an area as a priority area if the area is in compliance with AAQS for a period of at least two years.¹⁴

⁹ p.5.

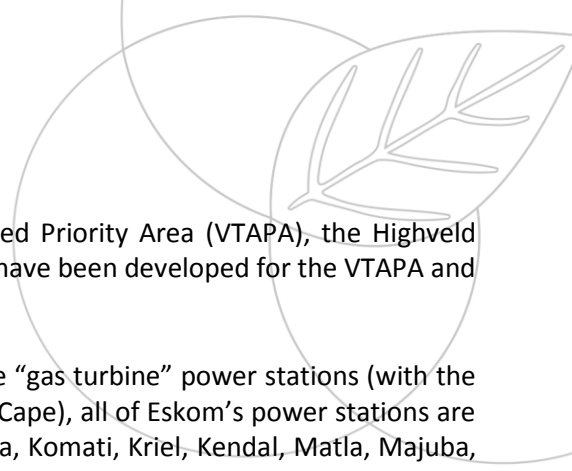
¹⁰ s.18(1).

¹¹ s.19(1)-(5), (6)(b).

¹² "Priority areas under the Air Quality Act" *Engineering News Online* 3 June 2011, available at <http://www.engineeringnews.co.za/print-version/priority-areas-under-the-air-quality-act-2011-06-03>.

¹³ "Deputy Minister of Water and Environmental Affairs launches Waterberg-Bojanala priority area" 20 July 2012, available at <http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=29236&tid=77119>

¹⁴ s.18(5).

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- 7.5. Three priority areas have been declared – the Vaal Triangle Airshed Priority Area (VTAPA), the Highveld Priority Area (HPA) and the Waterberg Priority Area (WPA). AQMPs have been developed for the VTAPA and the HPA. The VTAPA AQMP mid-term review is currently underway.
- 7.6. Apart from Ankerlig, Gourikwa, Acacia and Port Rex, all of which are “gas turbine” power stations (with the first three located in the Western Cape and Port Rex in the Eastern Cape), all of Eskom’s power stations are located in priority areas. Arnot, Camden, Duvha, Grootvlei, Hendrina, Komati, Kriel, Kendal, Matla, Majuba, Tutuka, Kusile are all situated in the HPA; Lethabo is in the VTAPA; and Medupi and Matimba are in the WPA.
- 7.7. In other words, air quality in the areas in which the vast majority of Eskom’s power stations are situated is already problematic – with numerous exceedances of AAQS - and attempts are underway to rectify the significant negative impact on air quality. We are able to provide evidence supporting these numerous exceedances, should this be required.
- 7.8. Kriel, together with the vast majority of Eskom’s power stations, is in the HPA. Air pollution in the HPA acts in a regional manner. The fact that the substances measured track each other seems to suggest that, in the HPA, defined sources are responsible for air pollution. In meetings attended by our clients regarding the VTAPA and HPA, the DEA has maintained that the exceedances of PM₁₀ and PM_{2.5} in the Vaal and Highveld (especially over the winter period) happen over 5-7 days – that pollutants are regional and the meteorology acts as a driver to exceedances. The DEA has also indicated in these meetings that the pollution signatures are indicative for broader areas and that, in the VTAPA, episodes extending across all monitoring network (Sebokeng, Sharpville, Klipriver and Diepkloof are suggestive of non-localised influences.¹⁵
- 7.9. Below we provide more information about the HPA and its AQMP.

Highveld Priority Area (HPA)

- 7.10. Elevated concentrations of pollutants occur in this area, many from industrial sources. This priority area was declared on 23 November 2007. As set out above, 12 of Eskom’s power stations fall within the HPA.
- 7.11. One of the seven goals of the AQMP – towards achieving the main goal of ambient air quality in the HPA complying with all AAQS – is that, by 2020, industrial emissions are equitably reduced to achieve compliance with AAQS and dust fallout limit values.¹⁶ Industries have a number of obligations in order to meet that goal.¹⁷
- 7.12. According to the AQMP, industrial sources are by far the biggest contributor of emissions in the HPA, accounting for 89% of PM₁₀, 90% of NO_x and 99% of SO₂. Power generation contributes 12% of PM₁₀, 73% of NO_x and 82% of SO₂ emissions.¹⁸ AAQS for PM₁₀, Ozone (O₃) and SO₂ are exceeded in nine extensive areas in the HPA.¹⁹ We note that, in relation to the estimated power generation contribution of 12% of PM₁₀, the AQMP emission inventory does not include the regulated PM_{2.5}, and that the PM₁₀ estimates do not include estimates for secondary particulates that are formed from Eskom’s SO₂ and NO_x emissions.

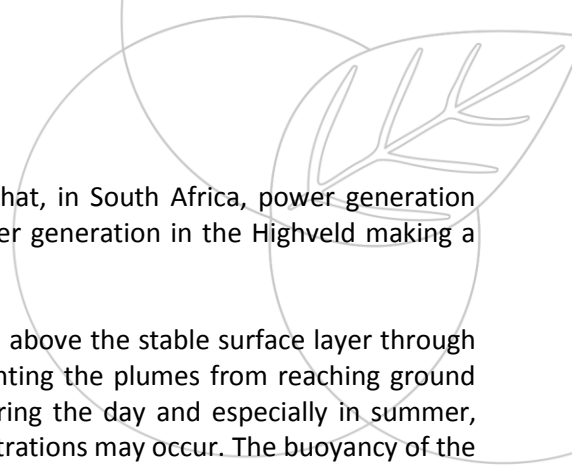
¹⁵ In this regard, we refer, for example to the following, all of which are available on the SAAQIS website (www.saaqis.org.za): the DEA presentation of 13 September 2010 to the VTAPA Implementation Task Team; the minutes of and DEA presentation at the HPA Multi-stakeholder Reference Group (MSRG) of 15 February 2013; the minutes of the HPA governance meeting of 15 February 2013; the minutes of and DEA presentation at the VTAPA MSRG of 20 and 21 February 2013.

¹⁶ xvi, 108.

¹⁷ xxiv-xxviii; 117-121; 172-233.

¹⁸ x-xi; 19-22.

¹⁹ xii-xiv; 43-33; 106.

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- 7.13. The AQMP also highlights the concerns regarding mercury, and that, in South Africa, power generation accounts for some 75% of the total mercury emissions, with power generation in the Highveld making a significant contribution.²⁰
- 7.14. According to the AQMP, power station emissions are released well above the stable surface layer through tall stacks, with the evening surface temperature inversion preventing the plumes from reaching ground level, and dispersion occurring above the inversion. However, during the day and especially in summer, convection can bring the plumes to ground level when high concentrations may occur. The buoyancy of the plumes results in maximum ground level concentrations a considerable distance from sources. Modelled exceedances of ambient 1-hour and 24-hour SO₂ AAQS from power generation emissions occur across the central HPA – the southern parts of the eMalahleni Local Municipality and the northern parts of the Govan Mbeki Local Municipality and close to the individual stations of Matla, Kriel, Duvha, Kendal and Hendrina.²¹
- 7.15. The serious health impacts of air pollution are also addressed in the AQMP.²² Power generation activities were estimated to be the primary driver of hospital admissions in Mpumalanga, with a 51% contribution. SO₂ exposure was also found to be three times greater in Mpumalanga.²³ SO₂ emissions are generally associated with the combustion of coal.²⁴
- 7.16. Industrial Intervention Plans are contained in Appendix 6 to the AQMP. In its plan,²⁵ Eskom promises numerous interventions to reduce atmospheric emissions – including: several upgrades of pollution abatement technology; plans for raw material modification; improved fugitive emissions management system; construction of rail infrastructure; ambient air quality monitoring; stack emission monitoring; offset project pre-feasibility study; and energy efficiency improvement. Eskom should be required to disclose the extent to which it has met – or is on track to meet – its obligations in this regard. The impact on these commitments if the applications – including the Kriel variation application - are granted, must also be disclosed.
- 7.17. In the regard, it was raised at the 21 November 2013 workshop that the applications by Eskom (and now also Sasol and Natref, and possibly others) would serve to undo much of the hard work that has been done over the years in reducing atmospheric emissions in the priority areas. It was proposed that the Department consider all of these previous proposals, presentations, undertakings and agreements that Eskom made over the years, together with what Eskom is presenting now, and that this information should then be presented to stakeholders by the Department, explaining how it will be considered in the final decision.
- 7.18. It cannot be disputed that if Eskom’s applications – including the Kriel variation - are granted, this will only serve to exacerbate the already poor air quality in these priority areas. Eskom does not deny this. The deterioration of air quality is clearly not what is envisaged by the declaration of priority areas and it is submitted that the applications should fail for this reason alone.

8. Eskom’s inaccurate and misleading data and modelling

- 8.1. In detailed submissions on Eskom’s proposed Plan of Study Report (PoS) for dispersion modelling (annexure 4), our clients highlighted the numerous inadequacies of the approach Eskom proposed to follow, and suggested a more appropriate approach, which would yield more accurate results. These recommendations

²⁰ 47.

²¹ 47-48.

²² xiv-xv; 142-154.

²³ 72-75.

²⁴ 97.

²⁵ 212-224.

were not followed – apparently on the basis that there was insufficient time to do so. As our clients had warned, the results of this modelling are simply inaccurate and misleading.

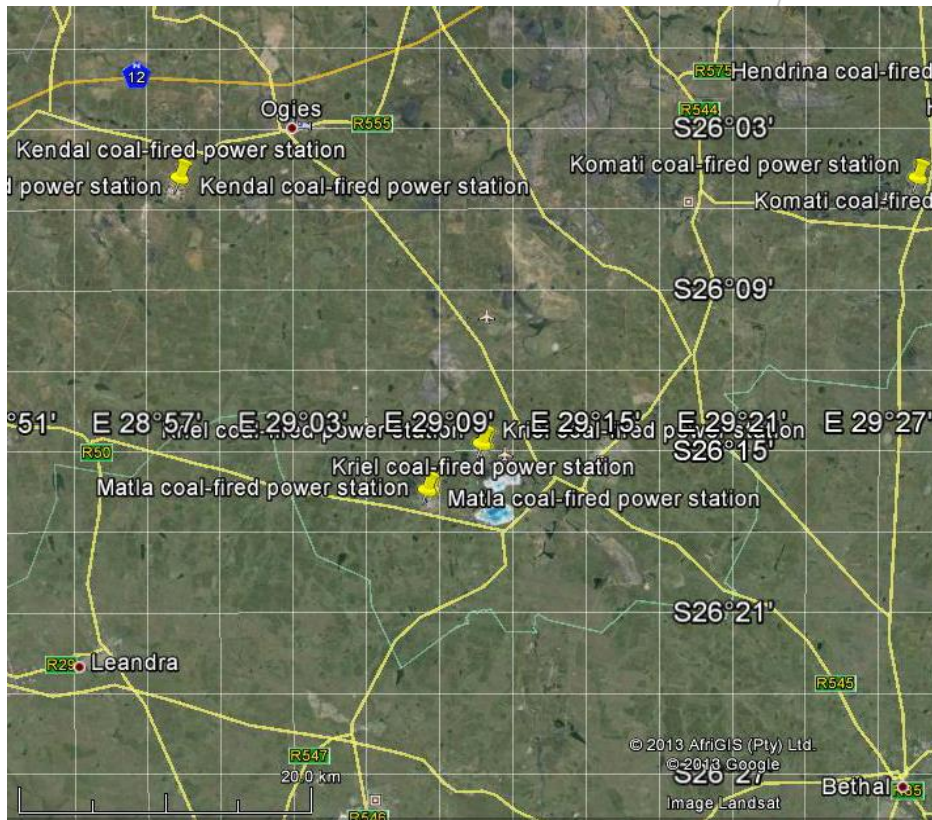
- 8.2. What is worse, after reviewing the AIRs, it was noted that each power station was modelled in isolation from every other power station, including, in the majority of cases, other power stations in the same modelling domain (area), in this instance, the Kriel power station domain. It is worth pointing out that the Matla power station is less than 10km from Kriel, and Komati and Kendal power stations are less than 40km from Kriel. Of the four power stations, Kriel PM emission rates are the largest. Emissions from other Eskom power stations were labelled by Eskom as “unknown sources” and ignored in the modelling. Since ambient concentrations are the result of the combined impacts of all pollution sources within an airshed, and certainly within the more narrowly defined modelling domains used in the AIRs, this underestimates - in some cases, grossly - the ambient concentrations of all three pollutants (sulphur dioxide, oxides of nitrogen (NOx) and particulate matter). In other words, all other emission sources – including of other power stations within the modelling domain – were simply ignored, so that the impact of non-compliance with the MES on the ambient air quality is incorrectly reflected as being negligible. This is also contrary to what was indicated in the PoS: “[t]he relative contribution of other power stations to ambient concentrations will be considered where power stations are relatively close to one another and where modelling domains for individual power stations overlap. This is particularly relevant for [K]riel, Matla and Kendal, and for Kusile once it is in operation”.²⁶ As pointed out, Komati is also close to these stations.
- 8.3. Eskom proceeded to model Kriel power station on its own and in its AIR for the application from exemption from and postponement of the MES (annexure 5), the Kriel AIR executive summary stated that:

*"The dispersion modelling study to assess the implication of these requests reveals that predicted ambient PM₁₀, SO₂ and NO₂ concentrations resulting from current emissions from Kriel Power Station comply with the respective [AAQS]. Although somewhat higher than for current emissions, the predicted ambient concentrations for the requested emission limits are also below the respective [AAQS]. There is a risk of non-compliance with short-term ambient SO₂ standards if SO₂ emissions are consistently at the requested emission limit, but the emission limit is a conservative value, and actual SO₂ emissions should be 30-40% below the requested limit."*²⁷

- 8.4. The following figure shows the location of all four power stations (Kriel, Matla, Kendal and Komati) within the Kriel AIR modelling domain.

²⁶ p.15.

²⁷ p.iii.

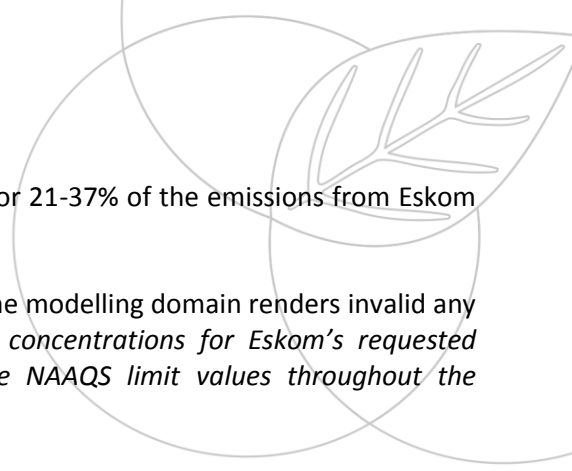


Kriel modelling domain showing all four power stations within the domain

- 8.5. Good modelling practice requires the inclusion of all significant sources of the pollutants to be modelled. Even if other sources such as road traffic emissions or emissions from domestic fuel burning could not be quantified, there can be no justification for not including known and clearly significant-in-magnitude emissions from other power stations within the modelling domain.
- 8.6. Table 1 is a three year (2010, 2011, 2012) annual average stack emissions from Kriel, Matla, Kendal and Komati power stations.

		Current emissions, t/a		
		NO _x	SO ₂	PM10
Kriel	Stack 1	50272	56167	7610
Kriel	Stack 2	50272	56167	7610
Matla	Stack 1	56520	89082	6773
Matla	Stack 2	56520	89082	6773
Kendal	Stack 1	45772	109019	5144
Kendal	Stack 2	45772	109019	5144
Komati	Stack 1	11150	11462	1253
Komati	Stack 2	11150	11462	1253
Totals		327428	531460	41560
Kriel emissions as % of total emissions		31%	21%	37%

Table 1: Annual average stack emissions from Kriel, Matla, Kendal and Komati power stations. Source: Respective AIRs for the four power stations

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- 8.7. As depicted, the emissions modelled in the Kriel AIR only account for 21-37% of the emissions from Eskom power stations within the stated modelling domain.
- 8.8. The failure to include emissions from other power stations within the modelling domain renders invalid any conclusions such as *"the predicted ambient SO₂, NO₂ and PM₁₀ concentrations for Eskom's requested emission limits for Kriel Power Station are below the respective NAAQS limit values throughout the modelling domain."*²⁸
- 8.9. After making this point several times at the 21 November 2013 workshop, previous public meetings and in questions that had been sent to Iliso before the workshop, it was revealed during the workshop that Eskom had subsequently done some modelling to include other power stations. This updated document - inclusive of the combined emissions of the power stations in a modelling domain approximately 120km x 100km - is attached as annexure 6.
- 8.10. Annexure 6 depicts modelling results of the emissions from 7 power stations. Eskom modelled for Scenario 1 "actual" emissions, and Scenario 2 "requested" emissions. The results show that the predicted ambient concentrations are much higher than those given in the AIRs of 28 October 2013. We request that the modelling be redone to include all emissions from power stations within the relevant – and, if necessary, expanded - modelling domains, and be made available for public comment.
- 8.11. PM_{2.5} (particulate matter less than 25 microns in diameter), a pollutant regulated in terms of the AAQS, was excluded from consideration in the modelling of impacts and compliance with the AAQS considerations. Only the dispersion of primary (directly emitted) PM₁₀ was included in the modelling. Modelling did not include an estimate of the formation of secondary PM_{2.5}, in particular the formation of particulate sulphates and nitrates that are formed from Eskom's sulphur dioxide (SO₂) and nitrogen oxides (NOx) emissions. The formation and dispersion of particulate sulphates and nitrates, and the contribution of these components of secondary PM_{2.5}, could have been included in the CALPUFF modelling system which includes these modelling capabilities. Secondary sulphates and nitrates formed from Eskom's SO₂ and NOx emissions may constitute as much as 75% of total ambient PM_{2.5} caused by Eskom's emissions.²⁹

9. The impact on AAQS of Eskom's request to increase its emissions

- 9.1. The 2012 Framework for Air Quality Management (Framework) provides as follows (at 5.4.3.5) in relation to the postponement of the MES:

²⁸ Ibid.

²⁹ Derived by Prof Eugene Cairncross using Foley and Baker correlations (Foley & Baker "A nonlinear regression model estimating single source concentrations of primary and secondarily formed PM_{2.5}" *Atmospheric Environment* 45 (2011) 3758-3767).

Given the potential economic implications of emission standards, and mindful that emission standard setting in South Africa was not based on comprehensive sector-based CBA (at least not for the initial group of Listed Activities as the intention was to ensure that there is no regulatory vacuum when the APPA was repealed), provision has been made for specific industries to apply for possible extensions to compliance time frames, provided ambient air quality standards in the area are in compliance and will remain in compliance even if the postponement is granted. The proponent of a Listed Activity is allowed to apply for a postponement of the compliance date according to Section 21 of the Act, and for such application to be positively considered, the following conditions must be met:

- An air pollution impact assessment being compiled in accordance with the regulations prescribing the format of an Atmospheric Impact Report (as contemplated in Section 30 of the AQA) by a person registered as a professional engineer or as a professional natural scientist in the appropriate category;
- Demonstration that the facility's current and proposed air emissions are and will not cause any adverse impacts on the surrounding environment;
- A concluded public participation process undertaken as specified in the NEMA Environmental Impact Assessment Regulations;
- Any reasonable additional requirements specified by the National Air Quality Officer;
- The application must be submitted to the National Air Quality Officer at least 1 year before the specified compliance date.

This provision would ensure that any requirement to upgrade is informed by an understanding of any environmental impact of the affected plant. At the end of the extension period, a further extension could be granted subject to a repeat of the conditions above-mentioned.

- 9.2. In other words, postponement may only be granted: if AAQS are in compliance and will remain in compliance even if the postponement is granted; and it is demonstrated that the facility's current and proposed air emissions are and will not cause any adverse impacts on the surrounding environment.
- 9.3. Eskom alleges in its variation application that the higher emission limit requested will not result in non-compliance with AAQS. This is not the case.
- 9.4. The WHO Air Quality Guidelines provide ambient air quality guidelines, *inter alia* for PM₁₀ and PM_{2.5}. The WHO Guidelines represent the most widely agreed and up-to-date assessment of air pollution's health effects, recommending air quality targets which significantly reduce these impacts. They were established after a worldwide consultation with more than 80 leading scientists and reviews of thousands of global studies.³⁰
- 9.5. PM affects more people than any other pollutant.³¹ The WHO has determined that there is no safe level of PM exposure.³² This is elaborated upon from 10 below.
- 9.6. SA is a member of the WHO. Its standards for PM₁₀ and PM_{2.5} are far below the WHO Guidelines. SA's PM_{2.5} annual mean standard of 25µg/m³ is at the WHO Guideline IT-2 level and is likely to be associated with significant health impacts from both long-term and daily exposures.³³ SA's 24-hour mean standard of 65µg/m³ is closer to the WHO Guideline IT-1 than IT-2 level. SA's PM₁₀ annual mean standard of 50µg/m³ is the at IT-2 WHO Guideline level. SA's 24-hour mean standard of 120µg/m³ is 20µg/m³ higher than the WHO IT-2 guideline. The WHO recommends urgent action when 24-hour guidelines are not met.³⁴

³⁰ 'WHO challenges world to improve air quality' 5 October 2006, available at <http://www.who.int/mediacentre/news/releases/2006/pr52/en/index.html>

³¹ Ibid.

³² WHO Air Quality Guidelines, 2005 at 7, 9; WHO Guidelines for Air Quality, 2000 at s4, s6.

³³ WHO Guidelines at p.11.

³⁴ Ibid at 12.

- 9.7. The Environment Protection Agency (EPA) in the United States (US) set AAQS in 2006.³⁵ Although the PM₁₀ 24-hour mean of 150µg/m³ is 30µg/m³ higher than SA's equivalent value, in the US, this limit may only be exceeded once a year – in SA, four exceedences are permitted. The EPA's PM_{2.5} 24-hour mean of 35µg/m³ is 30µg/m³ lower than SA's equivalent value. In addition, no exceedences of this value are permitted, whereas SA permits four exceedences. Even from 1 January 2030, when SA's limit value will be 25µg/m³, four exceedences are still permitted. The EPA's annual mean for PM_{2.5} of 15µg/m³ is 10µg/m³ lower than SA's equivalent value. Only in January 2030, will SA's annual mean for PM_{2.5} match the 2006 EPA equivalent.
- 9.8. The latest AAQS in the EU were set in 2008.³⁶ The PM₁₀ 24-hour mean of 50µg/m³ - although with 35 permitted exceedences – is substantially lower than SA's 120µg/m³ (with four exceedences). The EU annual mean for PM₁₀ of 40µg/m³ is 10µg/m³ lower than SA's equivalent standard.
- 9.9. Notwithstanding that SA's AAQS are less strict than the WHO and other jurisdictions, it still fails to meet them, as appears from what has been set out above. Eskom's request to vary its AELs to increase its emissions and to postpone compliance with the MES will exacerbate this situation.
- 9.10. As set out above, Eskom's AEL permits PM emissions of 125 mg/Nm³; its variation application provides that it seeks to emit 350 mg/Nm³ (and 550 mg/Nm³ for 4 days a month) until 1 April 2015, and its exemption/postponement application indicates that it seeks to emit 400 mg/Nm³ until 31 March 2025. Only from 1 April 2025 to 50 mg/Nm³, does Eskom intend to comply with the 2020 MES.
- 9.11. There was much discussion in the 21 November 2013 workshop as to whether or not Eskom is applying to pollute more than it does currently. Eskom insisted that this is not their aim, but the applications reveal otherwise. For example, for Kriel, the AIR reveals in Scenario 1 ("current actual emissions"), that the annual average PM₁₀ emission rate (per stack) is 7 610 tons, corresponding to a concentration is 103mg/Nm³. In Scenario 2a, Eskom is requesting that the stack emission rate be increased to 18 920 tons and that the concentration limit for PM₁₀ be increased to 350mg/Nm³. To give another example, for Matla (less than 10 kilometres away), the AIR reveals in Scenario 1, table 11, that the current actual emissions (for each of the two stacks) for PM₁₀ are 6773 tons corresponding to a concentration of 75mg/Nm³. However, in scenario 2, Eskom requests a concentration limit of 283mg/Nm³, and annual emission rates of 19841 tons for stack 1 and 17628 tons for stack 2. This shows that Eskom is clearly, in fact, requesting the release of more emissions than it is currently releasing. There are several other similar examples in the AIRs.
- 9.12. Eskom's explanation for applying for increased emissions was that it needs to apply for "ceiling limits" to ensure compliance 100% of the time. This is not acceptable to our clients. As we understand their argument, they allege that the actual emissions reflected in the AIRs are actually an under-representation of stations' emissions. If that is so, incorrect emissions have been used to prepare their modelling, and the "results" of such modelling significantly under-estimate the impact of Eskom's non-compliance with the MES (quite apart from the fact that Eskom has failed to include emissions from other power stations). It was also pointed out that certain graphs that Eskom had included in its applications were misleading in that they reflected relative rather than absolute emissions.
- 9.13. In relation to the variation Kriel seeks, this is essentially requesting permission to proceed with non-functional emission control equipment and allow only partially controlled emissions. However, in the Kriel AIR (annexure 5)³⁷ Eskom indicates that its current average emissions for PM at Kriel are 103 µg/m³. There should therefore be no reason why it cannot meet the AEL limit of 125 µg/m³. The value of 103 µg/m³ was also what Eskom used to determine its impact on ambient air quality and to assess compliance with standards.

³⁵ www.epa.gov.

³⁶ www.ec.europa.eu/.

³⁷ p.20.

9.14. Monitored (measured) air quality at the Kriel Village station, which is about 7km from the Kriel power station, show that, for SO₂, about 40% of the daily average values exceed the WHO Guideline; the annual average also exceeds the WHO Guideline. For PM, the WHO daily average value is exceeded 40 to 60% of the time, and the WHO annual average value is exceeded. In summary, the air quality in the vicinity of the Kriel power station does not currently comply with the WHO guidelines.

9.15. To elaborate, in the Kriel AIR, the following appear in relation to PM concentrations at the various monitoring stations:

“Frequency distributions of measured ambient 24-hour PM10 concentrations are shown in Figure 20. The daily NAAQS for PM10 is not complied with in 2010, 2011 and 2012 with the limit value being exceeded for more than 30% of the time in 2010. In addition annual average concentrations of 59, 45 and 59 µg/m³ are seen for 2010, 2011 and 2012 all of which exceed the annual average limit of 40 µg/m³ indicating non-compliance with the NAAQS. PM10 loading is high and sustained throughout the entire year at Kriel Village.”³⁸

*“Frequency distributions of measured ambient 24-hour PM10 concentrations are shown in Figure 9. The daily NAAQS for PM10 is not complied with in 2010 and 2011 with the limit value being exceeded for more than 5% of the time in 2011. There is compliance with the NAAQS in 2012. In addition the annual average concentration of 49 µg/m³ in 2010 is an exceedance of the NAAQS but the annual average values for 25 and 15 µg/m³ for 2011 and 2012 are seen to comply with the annual average limit of 40 µg/m³ and thereby the NAAQS. PM10 loading generally lower at Elandsfontein than the other monitoring stations and this is likely as a result of the lack of proximity of the station to residential areas”.*³⁹

“Frequency distributions of measured ambient 24 hour PM10 concentrations are shown in Figure 25. It can be that the daily limit of 75 µg/m³ effective from 2015 was seriously exceeded as evidenced by the 99th percentile values of 167, 153 and 142 µg/m³ for 2010, 2011 and 2012. In addition the annual average concentrations all exceed the annual average NAAQS of 40 µg/m³ namely annual averages of 83, 62 and 68 µg/m³, 2010, 2011 and 2012 respectively. PM10 loading is high and sustained throughout the entire year.”⁴⁰

9.16. In other words, contrary to Eskom’s argument, PM₁₀ concentrations exceed the South African standards at all of the monitoring stations.

10. The health impacts of non-compliance with the MES

10.1. Air pollution emissions from thermal power plants contribute to ambient air pollution (SO_x, NO_x, PM, and mercury). Particulate matter is considered an important environmental health risk globally.

10.2. The only mention of the word “health” in Eskom’s variation application, is in the context that load-shedding will affect health and emergency services. In its BID, the extraordinary statement is made that “power station emissions do not harm human health”. This claim is disputed by our clients with reference to extensive and conclusive evidence compiled in local and international research. In this regard, a University of Pretoria (UP) Study⁴¹ estimated Kusile’s external public health costs at between R182 million and R213 million. See also, for example: Swanson, H. 2008, "Literature review on atmospheric emissions

³⁸ p.26.

³⁹ p.29.

⁴⁰ p.37.

⁴¹ Business Enterprises University of Pretoria. 29 September 2001, “The external cost of coal-fired power generation: The case of Kusile”, available at:

<http://www.greenpeace.org/africa/Global/africa/publications/coal/FULL%20SCIENTIFIC%20PAPER%20139%20pages.pdf>

and associated environmental effects from conventional thermal electricity generation"⁴² Cropper, M et al. 2012, "The Health Effects of Coal Electricity Generation in India" *Resources for the Future* June 2012;⁴³ and Penney, S et al. 2009, "Estimating the Health Impacts of Coal-Fired Power Plants Receiving International Financing" Environmental Defense Fund.⁴⁴

10.3. As set out above, the HPA AQMP estimates power generation activities to be the primary driver of hospital admissions in Mpumalanga. In relation to mercury in particular, South Africa is estimated to release approximately 30-40 tonnes of mercury emissions from the coal-fired electricity sector.⁴⁵ A conservative estimate of annual health benefits is some \$39–\$47 per gram of atmospheric mercury emissions eliminated.⁴⁶ More recently, a new study in the EU considered lost IQ costs due to mercury exposure.⁴⁷ The IQ benefits from controlling mercury pollution were translated into economic impacts based on the calculated current life-time income benefits from a higher IQ level. The report states that there is little doubt that global benefits substantially exceed \$20 billion.

10.4. The allegation that power station emissions do not harm human health is also not supported by the conclusions of the World Bank Inspection Panel for Medupi or the Air Quality Assessment for the Medupi Environmental Impact Report. We are able to provide more information in this regard, should this be required.

10.5. As it indicated in the BID, and despite our clients' objections, Eskom had not conducted health assessments in the AIRs. It has simply evaluated whether or not its non-compliance with the MES will result in non-compliance with the AAQS. In the case of Kriel, the variation application indicates that there will be no non-compliance with AAQS as a result of the increased emissions requested. As set out above, in reaching its conclusion that AAQS will not be exceeded, Eskom has used flawed modelling, and failed to include the emissions from sources – including its own power stations – in its evaluation of the impact on AAQS. In any event, our clients dispute that the AAQS are adequately protective of human health and the environment. As indicated above, the WHO has determined that there is no safe level of exposure to PM.

10.6. Below we provide an estimate of the health impact and estimated economic costs from excess emissions in the event of Kriel being granted a variation of their AEL and application to be exempt from PM MES until April 2025.

10.7. As set out above, Eskom, in this variation application, seeks to vary their AEL such that the maximum release rate for PM until 1 April 2015 be changed from 125 mg/Nm³ to 350 mg/Nm³. This represents an excess maximum emission of 225 mg/Nm³.

Table 1. Current emissions for Kriel from Kriel AIR

Emission source				Emissions, t/a			Concentrations, mg/Nm ³ @10%O ₂		
Power station	Stack	Lat	Lon	NOx	SO ₂	PM10	NOx	SO ₂	PM10
Kriel	Stack 1	26.25	29.18	50272	56167	7610	681	761	103
Kriel	Stack 2	26.25	29.18	50272	56167	7610	681	761	103

⁴² http://www.hme.ca/reports/Coal-fired_electricity_emissions_literature_review.pdf

⁴³ <http://www.hks.harvard.edu/m-rcbg/rpp/RFF-DP-12-25.pdf>

⁴⁴ http://www.edf.org/sites/default/files/9553_coal-plants-health-impacts.pdf

⁴⁵ Pirrone, N et al. 2010, "Global mercury emissions to the atmosphere from anthropogenic and natural sources". *Atmos. Chem. Phys.*, 10, 5951–5964, 2010

⁴⁶ Pacyna, J et al. 2010, "An assessment of costs and benefits associated with mercury emission reductions from major anthropogenic sources". *J Air Waste Manag Assoc* 60 (3): 302-315.

⁴⁷ Bellanger, M et al. 2013, "Economic benefits of methylmercury exposure control in Europe: Monetary value of neurotoxicity prevention" *Environ Health*. 2013; 12:3. available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3599906/>

10.8. The annual emissions resulting from full compliance with the emission standards were calculated by scaling the current annual emissions, reported by Eskom, down by the ratio of the emission standard to the current emission limit that the plant is able to comply with. The excess emissions are the difference between the current emissions and the emissions under full compliance. So for example, if a power plant is currently emitting 1,000 tonnes of PM₁₀ per year, and can comply with an emission limit value of 100 mg/Nm³, compliance with an emission standard of 50 mg/Nm³ would result in annual emissions of 500 tonnes of PM₁₀. E.g. 1000t/a multiplied by 50mg/Nm³ divided by 100 mg/Nm³ equals annual emissions of 500 tonnes of PM₁₀. An equivalent argument can be made if the plant operates at an annual average of, say, 70% of the limit value. $1000 \times 50 \times 0.7 / (100 \times 0.7) = 500$ tonnes.

10.9. Calculating excess emissions of mercury is also valid as the MES requirements would have significant mercury control co-benefits, and hence the exemptions requested by Eskom would lead to higher mercury emissions than in the case of full compliance. Current mercury emissions and removal rates (share of mercury contained in the burned coal that is not emitted through the stack) of Eskom fleet were estimated by Scott.⁴⁸ The same methodology was used to estimate emissions for Kriel.

Table 2. Current mercury emissions

	Hg emissions in 2009/10, kg1	Current removal rate
Kriel	2218.5	10%

10.10. Due to the unreasonably short period for interested and affected parties to make comments on the Kriel application, our experts have not yet completed their evaluation of the health impacts of Kriel's application in isolation from the impacts of surrounding power stations. It is, however, safe to say that Kriel makes a significant contribution toward these impacts. We will, however, provide this information once it is available.

11. Eskom's exaggeration of the costs of compliance and the length of time to retrofit

11.1. It is submitted that Eskom is significantly overstating both the cost of retrofitting electrostatic precipitators (ESP) to a fabric filter and how long it takes to complete the retrofit. In its request for a variation of the AEL for the Kriel power station, Eskom states:

"The (nominal) cost of the fabric filter plant retrofit and dust handling plant upgrade for all six units (including financing costs and interest during construction) is estimated to be R9.1 billion. The fabric filter plant retrofit cannot be executed before 2018 because of the detailed project planning and long project lead times required for a project of this nature. The relevant timetable would be as follows:

- Basic design and review and approval: 12 months
- Public Finance Management Act (PFMA) approval: 4 months
- Contract award: 11 months
- Lead time from placement of contract to commencement of construction: 18 months."

11.2. However, these stated costs and timeframes are not consistent with similar retrofits that Eskom has accomplished, particularly a retrofit at its Hendrina Power Station that was completed in 2004, and a retrofit at its Camden Power Station that was completed in 2005.

⁴⁸ Scott 2011: *Reducing Mercury Emissions from Coal Combustion in the Energy Sector in South Africa. Final Project Report*. South African Department of Environmental Affairs, available at: <http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/coal/Report%20FINAL31%20jan%202012.pdf>

11.3. With respect to the cost of retrofitting ESP to a fabric filter, and how long it takes to complete the retrofit, a 2006 paper states:

“Electrostatic precipitators (ESP) built in the 20th century were suitable for the emission requirements of the time, but as environmental legislation and awareness increased, the performance of these precipitators were sometimes no longer compliant with increasingly stringent legislative requirements. Often these precipitators were two or three-field devices and it is difficult to improve the performance of such small-footprint plants to current requirements. A viable option for improving the efficiency of these emission control devices is to retrofit pulse jet fabric filters into the old and small ESP casings. Such a project has recently been completed at Hendrina power station, South Africa. The plant was originally equipped with ESP’s for gas cleaning, but these were recently replaced with fabric filter plants (FFP), retrofitted into the two and three field ESP casings. The project was executed in three phases, starting in 1994. It was completed in 2004.”⁴⁹

“Hendrina power station is situated 45 km from Middelburg in Mpumalanga Province, South Africa. The power station is a 10x200MW coal fired plant and burns coal from the adjacent Optimum colliery.”⁵⁰

“Hendrina could not meet the 100mg/Nm³ emission limit set by the Chief Air Pollution Control Officer (CAPCO) for particulate emissions. In fact, prior to 1994, Hendrina was one of the biggest emitters in the Eskom fleet. There was no means of limiting the emissions to the level required by CAPCO, other than rebuilding or upgrading the ESP’s, or replacing them with FFP’s.”⁵¹

“The project was executed in three phases and the total cost was R240.1 M (approximately USD38 M).

Phase 1

“The worst performing ESP’s were the two-field precipitators on Units 6-10. They were selected to receive attention first. The contract started in 1995 and was completed in 1997. The specification called for a limit of 50mg/Nm³. The Enquiry Document invited bids for both an ESP upgrade or fabric filters. The capital cost for an ESP that could meet the required emissions was high due to the need for costly casing extensions. Differential expansion involved with attaching and sealing a steel extension onto the existing concrete casings presented some serious challenges. The life cycle cost for FFP’s were high relative to that of an ESP, but the total cost was lower for the best FFP offer followed by an ESP upgrade. The contract was subsequently awarded for a pulse jet FFP. “The cost of the project was R78.3 M (USD12.43 M).”⁵²

Phase 2

“This project was for three units, units 1, 3 and 5. Unit 1 being of a different design, was the least efficient ESP of the remaining five ESP’s. Units 3 and 5 were chosen because of their poor mechanical condition and non-sustainable performance. The project started in 2001 and was completed in 2003. The specification again called for 50mg/Nm³. Both ESP and fabric filters would be considered. The lowest price was for an ESP but calculations done during the tender evaluation indicated that the required emission level would not be met. The contract was subsequently awarded for a Pulse jet FFP. The cost for this phase of the project was R87.7 M (USD29.23 M).”⁵³

⁴⁹ Grobbelaar H (2006) "Retrofitting Fabric Filter Plants Into Small Electrostatic Precipitator Casings available at <http://www.isesp.org/ICESP%20X%20PAPERS/PDFS/Paper%209C2.pdf> at p 1.

⁵⁰ Ibid at p.2.

⁵¹ Ibid at p.3.

⁵² Ibid at p.4.

⁵³ Ibid.

Phase 3

*"The final phase was for two units, units 2 and 4. The project started in 2003 and was completed in 2004. The contract for units 1, 3 and 5 had an extension clause that stipulated that the contract could be extended to units 2 and 4. This clause was used for the last two units to ensure similar plant. The cost for this portion of the project was R74.1 M (USD 11.76M)."*⁵⁴

11.4. Accounting for inflation from the date of completion of each phase of the Hendrina retrofit to the present, the complete retrofit of the 2000MW capacity Hendrina power station - with fabric filters guaranteed to meet a PM₁₀ standard of 50mg/Nm³ - cost about R500million. Using these historical costs, the complete retrofit of the 3000MW capacity Kriel power station to the same performance specification would cost about R750million. Eskom's figure of R9.1billion appears to be a gross exaggeration of costs.

11.5. With respect to how long it takes to complete the retrofit, a paper by Steyn F., et al (2007) states:

*"Camden Power Station was built in the 1960's and the units were fitted with three field ESP's at the time except for units 3 and 4, which had two field ESP's with mechanical collectors (cyclones) upstream. The Station was placed in a state of preservation (mothballed) in the late 80's to early 90's. Eskom decided to return these units to service in order to meet the increasing demand for Power in South Africa. In October 2004, Bateman Howden SA was awarded a contract by Eskom, South Africa's state owned power utility, to retrofit six ESPs at their Camden Power Station with PJFFs. Each of the six units has an output of 200 MW."*⁵⁵

*"The first unit at Camden (Unit 7) was completed on schedule during September 2005 and worked flawlessly during hot commissioning. There were no visible emissions from the flue stack. Similar units at Hendrina are into the third set of bags since new and are also still running flawlessly."*⁵⁶

11.6. A fabric filter retrofit (full or polishing) would typically be achievable in 12-24 months from design to completion.⁵⁷ Additional plant outage in the U.S is 19-24 days on average.⁵⁸ It has been found that industry tends to overestimate lead times.⁵⁹

11.7. It is, in the circumstances, submitted that Eskom could have completed a retrofit at Kriel from two ESPs to two pulse-jet Fabric Filters within two years in a way that complies at least with the MES PM limit. There is no proper explanation for this failure to take timeous action or for now indicating they can only retrofit in 2018. This is not acceptable to our clients.

12. Eskom's self-created "emergency"

12.1. Eskom fails to explain why it says the variation is "necessary or desirable to accommodate demands brought about by impacts on socio-economic circumstances, and it is in the public interest to meet those demands". On the contrary, Eskom's explanation for the variation appears largely to relate to the fact that Kriel is an old plant. There is no indication that the PM maximum release rate in the Kriel AEL has impacted

⁵⁴ Ibid.

⁵⁵ Steyn, F., et al (March 2007) "Fabric filter retrofits - an electrostatic precipitator upgrade technology. available at <http://www.isesp.org/ICESP%20X%20PAPERS/PDFS/Paper%209C1.pdf> at p.4

⁵⁶ Ibid at p.8

⁵⁷ "Control Technologies to Reduce Conventional and Hazardous Air Pollutants from Coal-Fired Power Plants", NESCAUM Report, March 31, 2012, available at: <http://www.nescaum.org/documents/coal-control-technology-nescaum-report-20110330.pdf/>

⁵⁸ Celebi at al (2012) Supply Chain and Outage Analysis of MISO Coal Retrofits for MATS, available at: http://www.brattle.com/system/news/pdfs/000/000/126/original/Supply_Chain_and_Outage_Analysis_of_MISO_Coal_Retrifits_for_MATS_Celebi_et_al_May_2012.pdf?1377791288 at pp.15-16.

⁵⁹ Ibid at p.33.

on socio-economic circumstances and created certain “demands”. It is disputed that varying the AEL to emit increased pollution will accommodate socio-economic demands or be in the public interest.

- 12.2. As has been set above, Eskom was involved in the setting of the MES from the inception of the process and had ample opportunity to take the required steps to ensure its timeous compliance. In its variation application, Eskom deals with certain steps it has taken to reduce PM emissions. It then alleges that *“the emission reductions that were anticipated at Kriel as a result of all of the refurbishments were not realised”*, apparently as a result of *“deteriorating coal quality”* and the fact that Kriel is an old plant. It also states that, despite Kriel’s fabric filter plant retrofit being one of the *“highest priority”* such retrofits, they only intend to commence the retrofit in 2018 and that this is *“subject to planning approvals and funding availability”*. The variation application then states that *“the partial shut-down of Kriel will almost certainly result in load shedding, of up to around 1.3 million households...”*.
- 12.3. This explanation is not acceptable to our clients, who also dispute that Kriel is *“on course to meet the milestones required of it, as quickly as it is able to in light of its structure, of the work required on its facilities and of the processes involved”* (as alleged in the variation application). It has simply failed to explain why, despite having been aware of the MES for many years, it has failed to take sufficient steps to ensure that Kriel would be in a position to comply with the MES and its AEL.
- 12.4. There is no reason why South Africans – and particularly those living in proximity to power stations – should have their constitutional right to a healthy environment infringed upon as a result of Eskom’s poor planning. Eskom has known about the standards it had to meet at least since the conclusion of the MES negotiation process in 2009. It was involved extensively in this 5-year process, and in debating the proposals that were finally agreed upon for the emission limits. Despite this, Eskom now seeks to avoid compliance with those same rules relying on the “emergency” it itself has created.
- 12.5. In addition, and despite its appeal largely being refused in May 2013, Eskom waited until 15 November 2013 to make an “urgent” application to vary the AEL conditions, and only advised stakeholders of the application on 26 November 2013, giving only 8 working days for public comment. (As indicated above, 3 extra working days were subsequently provided.) No explanation is provided for this delay.

13. Eskom’s history of non-compliance with environmental legislation

- 13.1. As reported in the 2011-12 latest National Environmental Compliance and Enforcement Report,⁶⁰ Eskom is the organ of state with the highest rate of non-compliance with environmental legislation. It has several administrative enforcement interventions and criminal proceedings against it. Eskom has also submitted a large number of s.24G National Environmental Management Act, 1998 applications for unauthorised activities. As was pointed out in the 2011-12 NECER, the number of these applications is “evident of continued non-compliance and it would appear that the levying of these fines is not resulting in compliance or deterring the company from contravening the law.” For four cases, it has paid in excess of R2 million in fines.⁶¹ Non-compliances at 3 of Eskom’s power stations also feature in the 2012-13 NECER.⁶²
- 13.2. Eskom’s compliance history is therefore extremely poor. It is also apparently not deterred by action that has already been taken against it. Eskom has also not met all of its undertakings made in the Priority Area processes.
- 13.3. These factors should count against Eskom in the consideration of its application to vary its AEL for Kriel.

⁶⁰ 2011-12 p.54.

⁶¹ Ibid.

⁶² Pp.48-49.

14. Conclusion

14.1. In the circumstances, it is submitted that Eskom's application should not be granted. The impacts on human health, should Eskom's application be granted, will be exacerbated by the fact that, although the variation sought is until April 2015, Eskom does not intend to comply with the MES at Kriel until April 2025, and that it seeks postponements (and AEL variations) for all (but one) of its coal-fired power stations; the majority of which, like Kriel, fall within the HPA, where air quality is already very poor.

14.2. Our clients do not dispute the important role that Eskom plays in the economy. However, our clients have also witnessed decades of air pollution by Eskom, and do not want to see the few gains that have been made since the promulgation of AQA and the declaration of the Priority Areas through a poorly-consulted, opportunistic request by Eskom to relax the requirements of its AEL. All our clients require is that Eskom, like all other companies, comply with the law and with the requirements of its AEL.

15. Kindly keep us updated on this variation process and advise us should you require additional information on any aspect thereof.

Yours sincerely

CENTRE FOR ENVIRONMENTAL RIGHTS

per:



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