



# Centre for Environmental Rights

Advancing Environmental Rights in South Africa

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Our ref: CER/33.5/RH/SK  
Date: 24 March 2014

Copy:  
Dr Thuli Mdluli  
National Air Quality Officer  
Department of Environmental Affairs  
By email: [tnmdluli@environment.gov.za](mailto:tnmdluli@environment.gov.za)

Dear Ms Dalhuijsen

## **REPLY TO ESKOM'S ISSUES AND RESPONSE REPORT APPENDIX F TO THE PUBLIC PARTICIPATION PROCESS REPORT DATED FEBRUARY 2014**

1. We act for groundWork, Earthlife Africa Johannesburg (ELA), 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 and Schoongesicht Community Movement. Our clients are interested and affected parties in Eskom's applications for postponement 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 39 of 2004 (AQA).
2. On 12 February 2014, we made submissions on Eskom's applications for postponements from the Minimum Emission Standards (MES) for 16 power stations, as well as comments on its variation applications for 16 power stations.
3. The CER has communicated with Eskom and Iliso and understands that there have been no substantive changes made to the final applications submitted to authorities on 28 February 2014. In the circumstances, we stand by our submissions made on 12 February 2014. The purpose of this correspondence is to address a few responses to comments in the issues and response report (IRR). We have addressed only pertinent concerns and not responded to all of the comments in the IRR.

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## Comments on the IRR

4. In relation to comment at 2.8 on page 8 of the IRR to the effect that

*“This statement ‘that power generation activities to be the primary driver [for hospital admissions] in Mpumalanga, with a 51% contribution’ is not referenced and completely unsubstantiated. It is certainly not made in the HPA AQMP”*

- 4.1. It is not clear why Eskom disputes this statement, which clearly appears on page 72 of the Highveld Priority Area Air Quality Management Plan as follows:

**cases. Power generation activities were estimated to be the primary driver for hospital admissions in Mpumalanga, with a 51% contribution, followed by the Sasol Secunda complex at 17%. Domestic coal burning also made a significant contribution (12%). Similarly,**

5. In relation to comment 2.36 on page 19 of the IRR to the effect that :

*“The basis of the assessment included in the AIRs has been one of determining the effect of the emissions from the power stations on ambient air quality, and most especially on the National Ambient Air Quality Standards (NAAQS)”:*

- 5.1. Our clients dispute this - the basis of the Atmospheric Impact Reports (AIRs) was not reporting on the quantitative effect based on the modeling that was carried out. Instead, the AIRs weave an anecdotal narrative about atmospheric dynamics, and then characterise the effect as “marginal”. “Determining the effect” suggests giving numbers and not anecdotes. Eskom should use the CALPUFF model to quantify the effect of all its power stations on the pollution levels measured at each of the monitoring points and then report on how many exceedances of NAAQS would have been avoided if the power station emissions had been eliminated. This would not replace proper exposure assessment, but at least it would attempt to do what Eskom claims the AIRs were designed to do. If Eskom’s impact is as marginal as claimed, this begs the question why Eskom refuses to quantify it.

6. In relation to comment 2.41 on page 20:

*“the limit values defined in the [NAAQS] aim to reduce harmful effects on human health or the environment (or both)”:*

- 6.1. The NAAQS are not being met. Regardless of how they are viewed, the NAAQS are a formalised expression not of risk-free pollution concentrations, but of acceptable risk.
- 6.2. Our clients dispute that the health impacts and over 20,000 deaths, including deaths of young children, is an acceptable risk.

7. In relation to comment 2.52 on page 23:

*“Eskom recommends that an independent local review of Greenpeace’s health risk assessment be conducted.”*

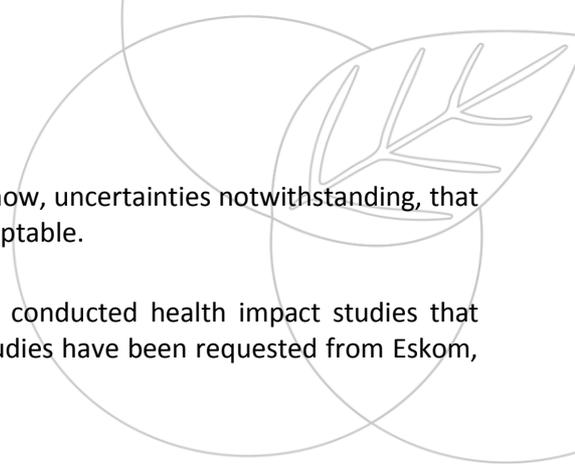
- 7.1. Our clients have continued to call for a detailed health risk assessment of the impacts of Eskom’s applications. They agree that an independent review of the health risk assessment should be conducted by an appropriately competent, independent and experienced person or institution - before these postponement applications are considered. It is submitted that the DEA should take responsibility for this review, and request assistance from, for example, the United State Environmental Protection Agency or the Medical Research Council. The selection of the reviewer and the terms of reference should not be

Eskom's decision – rather, the review process, its terms of reference, and its outcomes should be public. This approach has already been used in south Durban.

8. In relation to comment 2.52 on page 23:

“Greenpeace’s calculation of emissions in excess of those allowed by the MES are greatly exaggerated, as it was probably assumed that Eskom’s power stations operate at the requested emission limits for 100% of the time. In reality, emissions will not increase from what they are at present (the high emission limits are simply requested to allow for normal process variability and corresponding variability in emissions). Emissions will be 30-40% lower than the requested emission limits, power stations generally have load factors of around 70%. The calculated excess SO<sub>2</sub> and NO<sub>x</sub> emissions are equivalent (initially post-2020) to Eskom’s total current annual emissions, so in effect it is the effect of Eskom’s total SO<sub>2</sub> and NO<sub>x</sub> emissions”

- 8.1. It is clearly stated in the health impact study that no increase from the emission levels reported for 2010-2012 by Eskom was assumed for any power plant. Only the emissions from Medupi were added, based on Eskom’s data for Medupi. Eskom gives, in its responses, one-year emissions for the financial year 2012-2013; the data for 2010-2012 given in the Eskom study plan were used for the Greenpeace study. SO<sub>2</sub> and NO<sub>x</sub> emissions data are very similar in both sets of data (1% and 3% higher respectively). PM<sub>10</sub> emissions in 2012-2013 were 21% lower than the data for 2010-2012. The health impact results would have been approximately 3% lower if 2012/13 emission data were used as the base, as the health impacts are dominated by SO<sub>2</sub> and NO<sub>x</sub> emissions.
- 8.2. It is estimated in the health impact study that the installation of FGD in all Eskom power plants would reduce SO<sub>2</sub> emissions by 85% compared to current levels. This is a product of the current achievable stack emission limits calculated from Eskom’s own data (3360 mg/Nm<sup>3</sup>) and the 2020 MES of 500 mg/Nm<sup>3</sup>. In reality, the reduction could be expected to be larger, as most modern FGD units achieve removal rates upwards of 95%. For PM<sub>10</sub> and NO<sub>x</sub>, the estimated reductions are much smaller: 41% and 34%, respectively. Despite criticising and misrepresenting Greenpeace’s calculation of the excess emissions, done in good faith using best available data, Eskom has failed to present its own calculation in its reports and fails to do so again in its responses.
- 8.3. Eskom also presents some technical critiques of the health impact study’s estimates on mercury emissions. The mercury emission estimates were based on a 2011 report by the Department of Environmental Affairs, which included measurements in Eskom’s power plants and was deemed the most appropriate source. It is notable that Eskom failed to present any data on mercury emissions in its applications and reports, which is why Greenpeace had to do these estimates using best available data.
- 8.4. Eskom is correct in stating that the retrofitting of new particulate controls in several power stations would be expected to reduce mercury emissions somewhat. However, the UNEP mercury toolkit, which is the standard approach for estimating mercury emissions in the absence of detailed measurement data, has fixed capture rates for different pollution control technologies, so improvements in particulate removal rates do not influence the estimates. As Eskom’s current particulate removal efficiencies are very low in international comparison, the UNEP toolkit capture rates are presumably more applicable to the power plants after the retrofits. Replacing electrostatic precipitators with baghouses and the installation of a FGD device in Medupi were taken into account in the estimated mercury emissions.
- 8.5. The fundamental issue here, however, is not the details of the health impact study’s calculations. If Eskom were to provide more detailed measurement data on its mercury emissions, this information could and would be incorporated. The fundamental issue is that Eskom’s AIRs fail to address and quantify - in any way - the effect of the requested postponements on mercury emissions, although mercury from power plants is an important health issue and environmental issue. The calculations were done following a standard



methodology in a correct way and it is submitted that the results show, uncertainties notwithstanding, that the issue is serious, and leaving it unaddressed in the AIRs is unacceptable.

8.6. In this regard, our clients understand that Eskom has previously conducted health impact studies that reveal the serious health risks of its operations. Copies of these studies have been requested from Eskom, but have not yet been forthcoming.

9. In relation to comment 2.52 on page 26:

“To quote the Spadaro and Rabl (2008) study on which the mercury cost analysis is based, ‘in most cases, the [mercury] abatement [costs] would far exceed the benefits we have calculated’.”

9.1. The health impact assessment study is not evaluating the costs and benefits of targeted mercury control equipment, but rather estimating the ancillary benefits of mercury removals resulting from air pollution control devices targeting SO<sub>2</sub>. Reduced mercury emissions are a part of the health benefits and cost savings resulting from compliance with South African MES and should be taken into account when comparing costs and benefits.

10. In relation to comment 2.52 on page 26:

“the costs of compliance far outweigh the air quality benefits and actually full compliance with the MES... As has been argued previously the assessment is one of qualified cost-benefit....”

10.1. It is reiterated that Eskom has presented no such assessment. It is unclear how Eskom can allege that the costs exceed the benefits, in circumstances where it has failed to assess the benefits, i.e. the avoided health impacts. Our clients submit that this statement lacks any meaning whatsoever, as Eskom has failed to assess the benefits of compliance in a way comparable to the costs. This assessment was presented in the health impact study attached to our clients’ submissions and the estimated benefits were on par even with Eskom’s very high cost estimates.

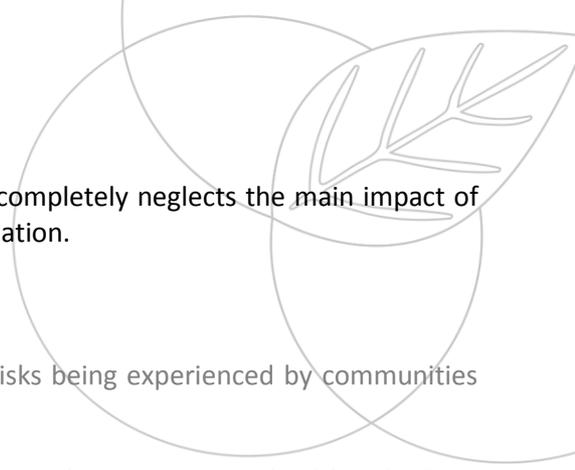
11. In relation to comment at 3.19 on page 34 of the IRR to the effect that:

*“Eskom made many comments about the new standards and the implications that would arise from the new standards. The biggest problem is making existing plants meet the new plant standards. It was never the understanding that the new plant standards would be applicable to existing plants. This is what has made compliance with the MES so especially challenging since retrofitting existing plants that are 30 years old in order to comply with the new standards is particularly difficult”*

11.1. The point distorts the study as no increase from current emission levels was assumed for any power plant as clearly stated. The argumentation on mercury is very unclear – our clients did not suggest adding dedicated mercury controls, just assessing the co-benefits. The refusal to use the CALPUFF model to assess the contribution from their power plants and instead opt for an anecdotal narrative does not make sense to our clients. Our clients note how carefully the IRR states that meeting PM<sub>10</sub> MES would not have a large effect on PM<sub>10</sub> exceedances – but nothing is said about impact of SO<sub>2</sub> and NO<sub>x</sub> MES on secondary PM<sub>2.5</sub>.

12. In relation to comment 3.34 on page 39 of the IRR to the effect that:

“As has been shown in the various AIRs that support the application documents, it is PM that is the ubiquitous problem and the Eskom power stations, without exception were assessed to contribute only very marginally to ambient PM10 concentrations”:



12.1. This has not been demonstrated at all. The short-range modeling completely neglects the main impact of Eskom's power plants on ambient air quality - secondary PM<sub>2.5</sub> formation.

13. In relation to comment 3.53 on page 46 to the effect that:

"Complying with the PM MES would not materially reduce the health risks being experienced by communities exposed to emissions from domestic fuel use":

13.1. This is disputed. Again Eskom is deliberately deflecting discussion on the main issue - health risks from secondary PM, specifically PM<sub>2.5</sub>.

14. In relation to comment 6.29 on page 72:

"The resolution finally decided on was 500 m. TAPM was used to generate the spatially continuous topographical and land-use fields for the modelling domain, but TAPM is limited to 200 x 200 grid points. This gives a maximum domain size of 100 x 100 km with a 500 m resolution. If all the power stations were included, the resolution would have been compromised."

14.1. The fact remains that because of the tiny domain, the modeling carried out excludes, by design, all but a fraction of the total population exposure and health risk resulting from Eskom's emissions, and therefore any claims about costs and benefits are meaningless. This is a fundamental omission and trying to explain it away with technical limitations of a particular piece of software is unacceptable. The assessment of health impacts requires a modeling domain covering at least a 1000km distance from the power plants. There are several modeling solutions, including nested grids, nested domains and use of multiple model runs with different domain sizes that can resolve the alleged trade-off between resolution and coverage.

15. In relation to comment 8.35 on page 102:

"SO<sub>2</sub> emissions from Matimba do not result in non-compliance with ambient air quality standards."

15.1. This is not true. SO<sub>2</sub> emissions from Matimba contribute to exceedances of PM<sub>10</sub> standards at all monitoring sites and these kinds of effects need to be quantified, not denied.

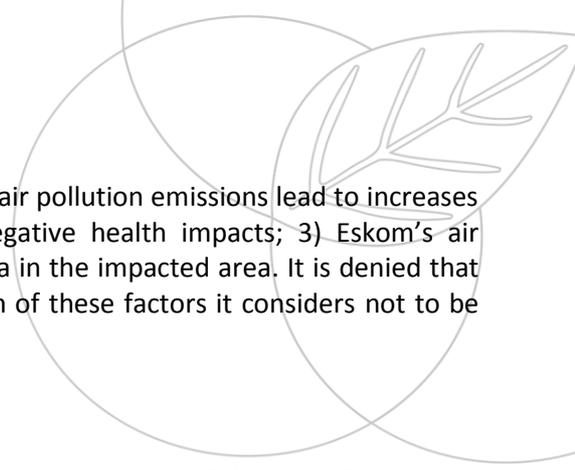
16. In relation to comment 6.34 on page 74:

"Where things get complicated is in modelling the combined power stations all at their maximum possible emissions. The effect of this, as we have described in the AIRs, is to exaggerate the exaggeration. In combining all the power stations the assumption now becomes that all the power stations will be emitting their maximum emissions simultaneously which, while not impossible, is highly unlikely."

16.1. The problem is that no modeling at all of the cumulative impacts of all the power stations across South Africa was carried out using any assumptions, whether maximum possible or annual average emissions. In any case, the precautionary approach and the Regulations prescribing the Format of the Atmospheric Impact Report, 2013 require an estimation of the possible impacts of the maximum emissions scenario. It is submitted that Eskom is again avoiding the real issue on the basis of easily- resolvable technicalities.

17. In relation to comment 9.30 on page 114:

"Greenpeace is scaremongering with their calculations of human health effects that derive from power station emissions all of which are based on factors that may or may not be relevant to South Africa."



17.1. The health impact assessment is based on the following factors: 1) air pollution emissions lead to increases in population exposure to air pollution; 2) air pollution has negative health impacts; 3) Eskom's air emissions; and 4) the latest available South African population data in the impacted area. It is denied that these are not relevant to South Africa. Eskom avoids stating which of these factors it considers not to be relevant to South Africa and why it takes this view.

18. In relation to comment 9.30 on page 113:

"in air quality terms, no greater threat exists to human health than the continued use of domestic fuels in the poorer communities of South Africa."

18.1. The health impact assessment looked at the difference in health impacts from air pollution between Eskom's compliance and non-compliance with the South African MES. To the extent that Eskom alleges that 20,000 premature deaths is a trivial matter that it is cancelled out by "greater threats" and can be simply offset by some other measures, especially as the health impacts of running Eskom's fleet without even rudimentary pollution controls extend decades into the future, this is disputed. There is no question that action should be taken on the health-harming use of domestic fuels, but making this an either-or decision is disingenuous. It is submitted that the socially-optimal decision is to require Eskom to install standard pollution-control devices and for domestic solid fuel use to be addressed.

18.2. Our clients submit that it is highly inappropriate for Eskom to deflect attention away from its own health impacts.

19. In relation to comment 10.4 on page 118:

"The principle of offsets would be to ensure that there were net improvements in air quality in the areas where Eskom operated."

19.1. The word "offsets" implies that there is a quantified health harm that is being offset. As long as Eskom fails to carry out this quantification, "feel-good measures" would be a more appropriate term. Furthermore, Eskom's so-called "emission reduction plan", in many cases, implies non-compliance with the MES up to and beyond 2050 - there are major uncertainties whether there are going to be domestic or other sources that Eskom can meaningfully address that far into the future. Domestic fuel use would be expected to decline and eventually be eliminated as the country develops. A scenario study would be necessary as well. In any case, allowing Eskom to forego installation of standard air pollution controls locks South Africa into higher air pollution levels for decades.

20. In relation to comment 13.3 on page 137:

"Eskom acknowledges that secondary aerosol formation needs to be investigated further, perhaps most appropriately through an aerosol chemistry source apportionment study."

20.1. The CALPUFF model is designed exactly for the purpose of estimating secondary aerosol formation and the long range transport of air pollutants. Our clients point out that a detailed motivation for the inclusion of secondary PM in the modelling was submitted in response to Eskom's proposed Modelling Plan of Study, in August 2013, but Eskom chose to ignore this recommendation. Our clients note that Eskom now acknowledges that secondary aerosol formation requires investigation.

21. In relation to comment 13.20 on page 144:

“It has been argued in the AIR that there is no material increase in PM<sub>10</sub> concentrations when the SO<sub>2</sub> concentrations peak suggesting that there is no additional PM load when the power station plume comes to ground.”

21.1. It is submitted that this is a very disingenuous argument. Transformation of acid gases into secondary particles typically takes around 24 hours. Hence the need to include secondary PM formation in the modelling, and to study the air quality and health impacts at long-range, including in large population centers such as Johannesburg. Instead of conducting a scientifically-rigorous modelling study as suggested in the response to Eskom’s proposed Modelling Plan of Study, Eskom persists with an anecdotal and subjective source apportionment argument.

22. In relation to comment 16.5 on page 164:

“why does the CER make no mention of the 94% and 95% of respiratory hospital admissions and premature deaths respectively, that are NOT attributable to electricity generation?”

22.1. Eskom fails to provide a proper context to this rhetorical question. The FRIDGE Study (Figure 5) summary of source contributions to health risks, the apparent source of the quoted figures, were calculated “across all conurbations”; that is across the Cape Town, Ethekwini, Johannesburg-Ekurhuleni, Tshwane, Vaal Triangle and Mpumalanga conurbations. The inclusion of data pertaining to the Cape Town and Ethekwini conurbations in the present analysis is clearly not relevant, as these are far beyond the region of significant impact of Eskom’s coal-fired power stations. A more immediately relevant quotation from the FRIDGE Study would have been, in relation to the Mpumalanga Highveld (Table 11 of the FRIDGE Study), “*the combined impact of the seven operational coal-fired (Eskom) power stations was estimated to be responsible for 51% of such [all respiratory hospital admissions] cases*” (emphasis added).

22.2. The fact that there are other sources of hospital admissions and premature deaths does not do away with the health impacts of Eskom’s own activities, amounting to an estimated 20,000 premature deaths annually.

22.3. However, given that the FRIDGE study did not take into account the health impacts of secondary particles from Eskom’s power station emissions, which are responsible for the vast majority of Eskom’s health impacts, a 5% share of health impacts attributed to primary PM<sub>10</sub> particles from power stations alone is actually an additional indication that Eskom’s share of the total health impacts of air pollution can be very substantial.

## Conclusion

23. The concluding section of the AIR Summary Report says that “...perhaps it is simply not possible to weigh up the benefits of reduced acid gas emissions (that would occur if there was full compliance with the MES) against the financial and non-financial costs of full MES compliance”.<sup>1</sup> This statement is not supported by other statements in Eskom’s applications.

24. Our clients reiterate that Eskom should not be permitted to rely on its poor forward planning, including lack of due consideration of environmental and other constraints, to avoid compliance with the standards it helped to set. Our clients dispute Eskom’s allegations that there are “negligible benefits” of investing money in emission reductions, and that it has no choice but to apply for postponement of the MES compliance timeframes for most of the fleet of power stations.<sup>2</sup> The significant health impacts have been presented in our 12 February 2014 submissions. Our clients also reiterate that Eskom dispersion and health modelling is neither credible nor accurate.

<sup>1</sup> Eskom’s Summary AIR Document at p30.

<sup>2</sup> Eskom’s Summary Postponement Application at p5.

25. In the circumstances, our clients maintain that Eskom's applications cannot and should not succeed.

26. Please let us know should you require more information regarding any aspect of our submissions.

Yours sincerely

**CENTRE FOR ENVIRONMENTAL RIGHTS**

per:



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