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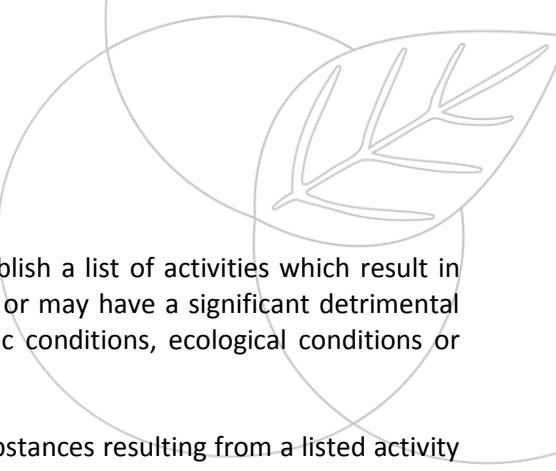
Our ref: CER33.5/RH  
Date: 19 July 2013

Dear Ms Dhembra

**ESKOM'S APPLICATION FOR EXEMPTION FROM MINIMUM EMISSION STANDARDS AND POSTPONEMENT OF THE  
MINIMUM EMISSION STANDARDS TIMEFRAMES FOR ESKOM POWER STATIONS  
COMMENTS ON THE BACKGROUND INFORMATION DOCUMENT**

1. We act for groundWork, Earthlife Africa Johannesburg (ELA) 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; 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. We are instructed to comment on the Background Information Document (BID) dated 12 June 2013, regarding Eskom's applications. Before doing so, we place on record that, on 1 July 2013, we requested various information and documentation in order to allow our clients to participate meaningfully in this process. No response has yet been received to this letter. These comments are therefore made without the benefit of the information requested. At this stage, therefore, these comments can only be provisional, and we reserve our clients' rights to make more comprehensive submissions on receipt of the requested information before a decision is made on Eskom's applications.
3. These comments are organised as follows:
  - A. The Minimum Emission Standards
  - B. Legal provisions for postponement and exemption applications
  - C. Non-compliance with Ambient Air Quality Standards and Priority Areas
  - D. The cost of compliance and the obligation to consider alternatives
  - E. Health impacts
  - F. Medupi Power Plant Inspection
  - G. Conclusion

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## A. Minimum emission standards (MES)

4. Section 21 of AQA obliges the Minister,<sup>1</sup> by notice in the Gazette, to publish a list of activities which result in atmospheric emissions and which the Minister reasonably believes have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage.<sup>2</sup>
5. This notice must establish MES in respect of a substance or mixture of substances resulting from a listed activity and identified in the notice, including—
  - 5.1. the permissible amount, volume, emission rate or concentration of that substance or mixture of substances that may be emitted; and
  - 5.2. the manner in which measurements of such emissions must be carried out.<sup>3</sup>
6. The consequence of listing is that no one may conduct such activity without a provisional atmospheric emission licence (AEL) or an AEL.<sup>4</sup> The provisional AEL or AEL may contain stricter emission standards than the section 21 standards.
7. The section 21 list of activities was published and took effect from 1 April 2010.<sup>5</sup> Eskom's activities fall under Category 1: Combustion Installations<sup>6</sup> and Category 5: Mineral Storage, Processing and Handling.<sup>7</sup> The list specifies the MES for particulate matter (PM), sulphur dioxide (SO<sub>2</sub>), and oxides of nitrogen (NO<sub>x</sub>) for both new and existing plants. New plants are those where the application for authorisation in terms of the National Environmental Management Act, 1998 (NEMA) was made on or after 1 April 2010. Existing plants are those legally authorised to operate before 1 April 2010 or where a NEMA authorisation application was made before 1 April 2010.<sup>8</sup>
8. New plants must comply with the new plant MES immediately. Existing plants must comply with the MES for existing plants by 1 April 2015, and with the MES for new plants by 1 April 2020.<sup>9</sup>
9. Although there is provision in the list of activities to postpone compliance time-frames,<sup>10</sup> the list of activities makes no provision for exemption from compliance.

## B. Legal provisions for postponement and exemption applications

10. In Annexure 2 to the BID, the “specific legal requirements that govern postponement and applications” are set out.
11. We note that the requirements for postponement of MES compliance time-frames, as set out in the Framework for Air Quality Management (Framework) are not included in Annexure 2. These are binding for the reasons set out below.

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<sup>1</sup> MECs are also authorised to do so.

<sup>2</sup> s.21(1)(a).

<sup>3</sup> s.21(3).

<sup>4</sup> s.22.

<sup>5</sup> List of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions, or cultural heritage GN 248 in GG 33064 of 31 March 2010.

<sup>6</sup> In particular, sub-categories 1.1 and 1.2.

<sup>7</sup> In particular, sub-category 5.1.

<sup>8</sup> Part 1.

<sup>9</sup> Part 2(5).

<sup>10</sup> Part 2(6).

12. The Framework is published in terms of section 7 of the AQA for achieving the objects of the AQA. The AQA's definition of "this Act" includes the Framework.<sup>11</sup> The Framework binds all organs of state in all spheres of government;<sup>12</sup> and an organ of state must give effect to the Framework when exercising a power or performing a duty in terms of AQA or any other legislation regulating air quality management.<sup>13</sup> Compliance with the Framework is therefore required in order for the relevant decision-maker to evaluate Eskom's applications.

13. In terms of section 5.4.3.5 of the Framework:

*"provision will be made for specific industries to apply for possible extensions to compliance time frames [in section 21 of the AQA], provided ambient air quality standards in the area are in compliance. The proponent of a Listed Activity will be allowed to apply for a postponement of the compliance date and such an application will be positively considered based on the following conditions being met:*

- *An air pollution impact assessment being completed (in accordance with the format for Atmospheric Impact Reports, as contemplated in Section 30 of the AQA and specified by the National Air Quality Officer) and submitted to the national department at least 1 year before the compliance date; and*
- *Demonstration that the industry's air emissions are not causing any adverse impacts on the surrounding environment.*

*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 granted, a further extension could be made possible subject to a repeat of the impact assessment process." (our underlining)*

14. This makes clear that a postponement application can only be brought in circumstances where ambient air quality standards (AAQS) (in terms of section 9 of the AQA) in the area are in compliance. We have requested evidence that AAQS are in compliance, but this has not yet been forthcoming. On the contrary, as is addressed from in section C below, AAQS are not in compliance in many of the areas affected by Eskom's applications. In the circumstances, it is submitted that the postponement applications could not and should not have been made.

15. The Framework also makes clear that such application can only be granted if it is demonstrated "*that the industry's air emissions are not causing any adverse impacts on the surrounding environment*". In circumstances where "*it is not intended to conduct detailed health or environmental risk assessments in the [Atmospheric Impact Reports], only to ascertain how the AAQS will be affected by the proposed delay in meeting the MES or not meeting the MES at all*", it is submitted that it is unlikely that an adequate investigation will be done regarding the potential adverse impacts of the application.

16. If the postponement applications could have been submitted (which our clients deny because AAQS are not in compliance), it is submitted that detailed health and environmental risk assessments must be undertaken, so that it can be evaluated whether the emissions of each power station cause any adverse impacts. It is submitted that they do.

17. We note that annexure 2 also does not set out the legal requirements that govern exemption. Section 59 of the AQA deals with exemptions.<sup>14</sup>

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<sup>11</sup> s.1.

<sup>12</sup> s.7(3).

<sup>13</sup> s.7(4).

<sup>14</sup> "59. Exemptions.—(1) (a) Any person or organ of state may, in writing, apply for exemption from the application of a provision of this Act to the Minister.

(b) No exemption from a provision of section 9, 22 or 25 may be granted in terms of paragraph (a).

(2) An application in terms of subsection (1) must be accompanied by reasons.

18. It is submitted that if the postponement applications could not have been made, it is clear that the exemption applications could also not have been made. Neither should be approved.

### **C. Non-compliance<sup>15</sup> with ambient air quality standards (AAQS) and priority areas**

19. The AQA provides that the Minister, by notice in the Gazette—

- 19.1. 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
- 19.2. 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.<sup>16</sup>

20. AAQS have been established for PM<sub>10</sub> and PM<sub>2.5</sub>, SO<sub>2</sub>, nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and benzene (C<sub>6</sub>H<sub>6</sub>).<sup>17</sup>

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

- 21.1. 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
- 21.2. the area requires specific air quality management action to rectify the situation.<sup>18</sup>

22. 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.<sup>19</sup>

23. The aim of declaring priority areas is to target limited AQM resources to the areas that require them most.<sup>20</sup> Once an AQMP is implemented, air quality in the area should - within agreed timeframes - be brought into sustainable compliance with AAQS.<sup>21</sup>

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(3) (a) The Minister may require an applicant applying for exemption to take appropriate steps to bring the application to the attention of relevant organs of state, interested persons and the public.

(b) The steps contemplated in paragraph (a) must include the publication of a notice in at least two newspapers circulating nationally—

- (i) giving reasons for the application; and
- (ii) containing such other particulars concerning the application as the Minister may require.

(4) The Minister may—

- (a) from time to time review any exemption granted in terms of this section; and
- (b) on good grounds withdraw any exemption.

(5) The Minister may on such conditions and limitations determined by the Minister delegate any of the powers contained in this section to—

- (a) the MEC responsible for air quality in a province; or
- (b) a metropolitan or district municipality."

<sup>15</sup> While this has not been dealt with in detail in this submission, Eskom has an unfortunate history of non-compliance with environmental and particularly air quality legislation. In Eskom's Group Business Overview published on *Business Day* on 11 July 2013, it conceded 50 "legal contraventions" in 2011/12, and 47 in 2012/13; according to Eskom, 15 of those contraventions involved "particulate emission limits being exceeded at power stations". Also see details of contraventions and enforcement action by authorities described in the National Environmental Compliance and Enforcement Reports for 2010-11 and 2011-2.

<sup>16</sup> s.9(1)(a) and (b).

<sup>17</sup> GN 1210 in GG 32816 of 24 December 2009 and GN 486 in GG 35463 of 29 June 2012.

<sup>18</sup> s.18(1).

<sup>19</sup> s.19(1)-(5), (6)(b).

24. 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.<sup>22</sup>

25. 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. In paragraph 34.1, we address the AQMPs.

26. 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.

27. 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.

28. As set out above, the Framework only permits an application for postponement of section 21 compliance time-frames if AAQS in the area are in compliance. This is not the case.

29. Last year, groundWork requested ambient air quality data from January 2010 until July 2012 through the South African Air Quality Information System (SAAQIS) for the VTAPA and the HPA. These data were then analysed to determine their compliance with the AAQS – with a focus on PM<sub>10</sub> and PM<sub>2.5</sub>.

30. The analysis of such data as is available revealed that, over this period, there have been multiple exceedances of the AAQS - and particularly PM<sub>10</sub> and PM<sub>2.5</sub> - in both the HPA and the VTAPA. A summary of this analysis is available at:  
[https://dl.dropboxusercontent.com/u/41036903/Annexure%201%20Eskom%20MES\\_submissions%20on%20the%20BID.pptx](https://dl.dropboxusercontent.com/u/41036903/Annexure%201%20Eskom%20MES_submissions%20on%20the%20BID.pptx)

31. It is also apparent from our clients’ analysis that 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 PM<sub>10</sub> and PM<sub>2.5</sub> 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 meeting 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.<sup>23</sup>

32. It cannot be disputed that Eskom’s applications, if granted, 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. In this regard, our clients are heartened to note from the BID that, if the Atmospheric Impact Report (AIR)

<sup>20</sup> “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>.

<sup>21</sup> “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>

<sup>22</sup> s.18(5).

<sup>23</sup> In this regard, we refer, for example to the following, all of which are available on the SAAQIS website ([www.saaqis.org.za](http://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.

assessment reveal that the delayed implementation of the MES or non-compliance with the MES results in the AAQS being exceeded, *“that that will have significant implications for decision-making”*.

33. Our clients have also requested more recent data from SAAQIS for these areas, as well as data for the WPA. Once they have been received and analysed, this will also be made available.
34. Below, we consider the AQMPs for the VTAPA and the HPA. As far as we are aware, the AQMP for the Waterberg has not yet been developed. It was declared a priority area on 15 June 2012. As set out above, both Medupi (addressed in section F below) and Matimba power stations are in the WPA.

#### **34.1. Air Quality Management Plans (AQMPs)**

##### *Vaal Triangle Airshed Priority Area (VTAPA)*

- 34.1.1. The highly industrialised Vaal Triangle was declared the first priority area on 21 April 2006. As set out above, Lethabo power station falls within the VTAPA.
- 34.1.2. The AQMP identifies priority areas/“hotspot” zones, based on predicted ambient concentrations from priority pollutants and exposure potential, and ranks these zones on the basis of the impact.<sup>24</sup> This is intended to ensure that the main contributory sources resulting in non-compliance with ambient air quality objectives in the VTAPA - and hence posing the greatest risk to health and the environment - are addressed as a priority.<sup>25</sup> The AQMP provides that, within the VTAPA, the priority areas are identified based on the highest PM<sub>10</sub> concentration zones, and are selected so as to correspond with the impact zones resulting from acute exposures to SO<sub>2</sub> and NO<sub>2</sub>.<sup>26</sup> Power generation is one of the primary emission sources in the area, emitting particulates (PM<sub>10</sub>), SO<sub>2</sub> and NO<sub>2</sub>.<sup>27</sup> Power generation is also one of the sources primarily responsible for NO ground level concentrations.<sup>28</sup>
- 34.1.3. The AQMP points out that the objective with respect to power generation is to reduce emissions to acceptable concentrations, meaning below air quality targets where health impacts are minimised.<sup>29</sup>
- 34.1.4. Lethabo is one of the primary sources contributing to SO<sub>2</sub> ground-level concentrations, which, according to the AQMP, should be reduced by up to 58%. However, the AQMP notes that the control of gaseous emissions like SO<sub>2</sub> is limited by factors such as the resource availability and plant design constraints.<sup>30</sup>
- 34.1.5. Low-grade coal holds a low calorific value and high ash content, meaning that large quantities are burnt with the resultant gaseous and PM emissions. Furthermore, fugitive emissions escape from coal stockpiles and ash disposal dumps.<sup>31</sup> Lethabo is designed to burn low-grade fuel, and is fitted with electrostatic precipitators (ESP) and flue-gas conditioning to reduce fine PM. However, the ESP is overburdened, resulting in higher PM emissions and frequent start-up and shut-down situations which result in uncontrolled emissions.<sup>32</sup>

<sup>24</sup> 55.

<sup>25</sup> 55.

<sup>26</sup> 55.

<sup>27</sup> x.

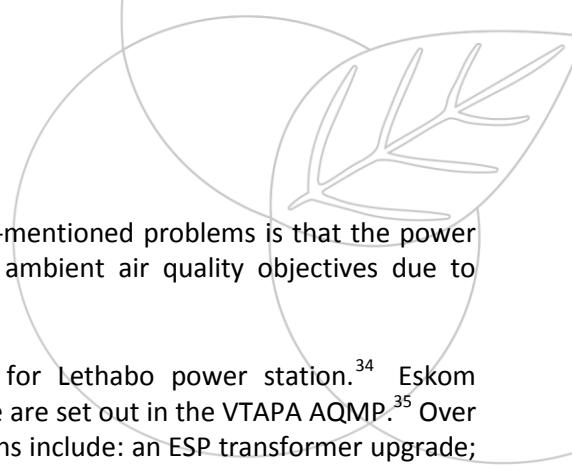
<sup>28</sup> 58.

<sup>29</sup> 58.

<sup>30</sup> 89.

<sup>31</sup> 89.

<sup>32</sup> 89.



34.1.6. The AQMP provides that the resulting effect of the above-mentioned problems is that the power generation industry does not comply with some of the ambient air quality objectives due to excessive PM and gaseous emissions from the source.<sup>33</sup>

34.1.7. The AQMP indicates that Eskom developed an AQMP for Lethabo power station.<sup>34</sup> Eskom committed to a number of interventions for Lethabo. These are set out in the VTAPA AQMP.<sup>35</sup> Over the short term (2008/9), examples of proposed interventions include: an ESP transformer upgrade; the installation of an ESP plant management system, a SO<sub>3</sub> distribution lance upgrade, SO<sub>2</sub> emission reduction and the establishment of a number of monitoring efforts relating to ambient, fugitive and on-line stack emissions. The AQMP also includes additional short-medium term (2012) interventions to be implemented by government for the power generation sector; for example, the DEA is not to allow new power stations in stressed areas until such time as the ambient concentrations are in compliance with the VTAPA AQMP targets.<sup>36</sup>

34.1.8. The AQMP provides that continuous, on-line stack monitoring will be required in areas that are not in compliance with AAQS, especially within declared priority areas. Eskom undertook to install a continuous monitoring system on one unit of Lethabo by March 2009 and all units by 2014.<sup>37</sup>

34.1.9. There are a number of interventions identified for Eskom and set out in its Action Plan (contained in the AQMP). Examples include: switching to low sulphur crude and installation of a high efficiency Sulphur Recovery Unit as part of 2015 upgrade (to be done by 2015 or within 5 years of promulgation of the revised fuel specifications); air quality monitoring - including continuous emission monitoring, ambient air quality monitoring station and a fugitive emission monitoring network (which should have been done by 2009); and SO<sub>2</sub> emission reduction.<sup>38</sup> As set out below, Eskom has failed to comply with all of its commitments made in this AQMP.

34.1.10. As indicated above, the VTAPA AQMP is currently under review. In terms of the draft review report of the medium-term review (June 2013), one of the review purposes is to review progress on interventions implementation, and identify significant gaps and provide recommendations to strengthen intervention implementation.<sup>39</sup>

34.1.11. The draft report states that measured ambient data does not indicate any significant improvement in air quality since the gazetting of the AQMP. Although there have been significant emission reductions in some industrial sectors, these reductions do not manifest as notable reductions in pollutant exposure in residential areas (where the highest densities of human receptors are located). Measured data indicate significant exceedances of the AAQS. Ambient air quality is still a concern in the VTAPA, and the overall objective of an environment that is not harmful to health is yet to be achieved.<sup>40</sup>

34.1.12. According to the draft report, during the day, surface warming induces the break-up of the surface inversion and promotes convection, which enhances the dispersion of the night time pollution build-up. Convection, on the other hand, may bring emissions from taller stacks down to ground level, so-called fumigation, that result in episodes of high ambient pollutant concentrations.

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<sup>33</sup> 90.

<sup>34</sup> 134.

<sup>35</sup> Table 41.

<sup>36</sup> xxii-xxiii; 134-135.

<sup>37</sup> 135.

<sup>38</sup> 183-189.

<sup>39</sup> i.

<sup>40</sup> iii.

Pollutants released in the VTAPA do not only affect the VTAPA. Recirculation on larger spatial scales may transport pollutants emitted in the VTAPA well beyond its boundaries and into neighbouring municipalities and even across international borders.<sup>41</sup>

- 34.1.13. Significant AAQS exceedances are largely centred around the power generation source.<sup>42</sup>
- 34.1.14. The total annual emissions of fine PM<sub>10</sub> on the VTAPA are estimated at 22743 tons per annum, of which approximately 24% is attributed to power generation activities.<sup>43</sup> Elsewhere, the report indicates that the power generation sector is the highest contributor to industrial PM<sub>10</sub> emissions in the area, with 39.2% (they were previously estimated at 32.5%).<sup>44</sup>
- 34.1.15. Power generation is estimated to be responsible for approximately 74% of the total estimated oxides of nitrogen (NO<sub>x</sub>) (which were around 149 748 tons per annum).<sup>45</sup> Elsewhere, the report states that NO<sub>x</sub> emissions as a result of combustion relating to power generation amount to 84.4% (they were previously estimated at 90.1%).<sup>46</sup>
- 34.1.16. Power generation is the biggest source of SO<sub>2</sub> within the VTAPA with an estimated 86% of the total estimated SO<sub>2</sub> emissions (of 266 824 tons per annum).<sup>47</sup>
- 34.1.17. The baseline assessment of VTAPA was revisited and major contributing sources were reviewed to confirm their relevance. Power generation was confirmed to be a significant source.<sup>48</sup>
- 34.1.18. The report includes an audit of the VTAPA AQMP implementation. Less than 50% of interventions in the AQMP have been fully achieved.<sup>49</sup> In relation to power generation, the report notes that various actions committed to have been implemented, but improvements in respect of combustion-related direct emissions are limited.<sup>50</sup> For instance: the ESP transformer upgrade, ash handling management practices, offset projects and various monitoring interventions are ongoing. In relation to SO<sub>2</sub> emission reduction, it is indicated that this was “found to be unfeasible due to water constraints and station set” and that “coal beneficiation was being explored”. The report provides that complaints about emissions from Lethabo are received and addressed by the environmental practitioners at the station.<sup>51</sup> As a result, it is submitted that it is clear that Eskom has failed to take sufficient steps to make the improvements to which it committed.
- 34.1.19. One of the industrial emission reduction goals is that, by 2015, the power generation sector contribution to PM<sub>2.5</sub> and PM<sub>10</sub> through secondary particle formation has been quantified and impact to air quality determined; by 2017, power generation emissions of SO<sub>2</sub> have been reduced by implementation of sulphur abatement and emissions off-setting - to levels determined by the health risk assessment; and by 2020, emissions have been cut and/or offset to the extent that contributions from the sector do not exceed AAQS over settlements.<sup>52</sup> Eskom is certainly not on track to meet these commitments. The granting of its applications will make this goal unattainable.

<sup>41</sup> 18.

<sup>42</sup> 99.

<sup>43</sup> 50.

<sup>44</sup> 59.

<sup>45</sup> 50.

<sup>46</sup> 59.

<sup>47</sup> 50-53.

<sup>48</sup> 115.

<sup>49</sup> 117.

<sup>50</sup> 119.

<sup>51</sup> 186-189.

<sup>52</sup> 121.

## *Highveld Priority Area (HPA)*

34.1.20. 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.

34.1.21. 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.<sup>53</sup> Industries have a number of obligations in order to meet that goal.<sup>54</sup>

34.1.22. According to the AQMP, industrial sources are by far the biggest contributor of emissions in the HPA, accounting for 89% of PM<sub>10</sub>, 90% of NO<sub>x</sub> and 99% of SO<sub>2</sub>. Power generation contributes 12% of PM<sub>10</sub>, 73% of NO<sub>x</sub> and 82% of SO<sub>2</sub> emissions.<sup>55</sup> AAQS for PM<sub>10</sub>, Ozone (O<sub>3</sub>) and SO<sub>2</sub> are exceeded in nine extensive areas in the HPA.<sup>56</sup>

34.1.23. 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.<sup>57</sup> Some of the serious health risks of mercury are addressed in section E below.

34.1.24. 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 SO<sub>2</sub> 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.<sup>58</sup>

34.1.25. The serious health impacts of air pollution are also addressed in the AQMP.<sup>59</sup> Power generation activities were estimated to be the primary driver of hospital admissions in Mpumalanga, with a 51% contribution. SO<sub>2</sub> exposure was also found to be three times greater in Mpumalanga.<sup>60</sup> SO<sub>2</sub> emissions are generally associated with the combustion of coal.<sup>61</sup>

34.1.26. Industrial Intervention Plans are contained in Appendix 6 to the AQMP. In its plan,<sup>62</sup> 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 advise our clients of the extent to which it has met – or is on track to meet – its

<sup>53</sup> xvi, 108.

<sup>54</sup> xxiv-xxviii; 117-121; 172-233.

<sup>55</sup> x-xi; 19-22.

<sup>56</sup> xii-xiv; 43-33; 106.

<sup>57</sup> 47.

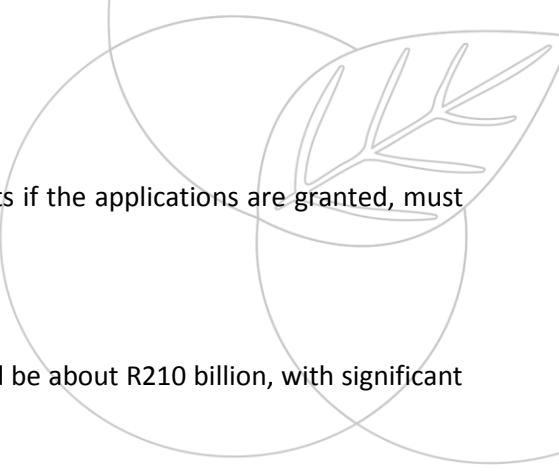
<sup>58</sup> 47-48.

<sup>59</sup> xiv-xv; 142-154.

<sup>60</sup> 72-75.

<sup>61</sup> 97.

<sup>62</sup> 212-224.



obligations in this regard. The impact on these commitments if the applications are granted, must also be disclosed.

#### **D. The cost of compliance and obligation to consider alternatives**

35. According to the BID, capital costs for full compliance with the MES would be about R210 billion, with significant operating cost increases on top of that.
36. In the BID, Eskom also indicates that, in order to retrofit, it will need to 'switch off' units at their power stations, which, if there is inadequate spare capacity in the system, could mean the possible interruption of electricity supply to certain areas and 'load shedding'. According to the BID, in order to meet the MES by 2020, at least 2 units a year (between 2017 and 2019) per power station will need to be retrofitted resulting in approximately 14% of the coal fired fleet being offline.
37. Without evidence to support the allegation as to the cost of compliance (which we have requested, but which we have not yet received), our clients are not in a position to interrogate this figure; it is clear, however, that a more rigorous interrogation of these bald submissions by Eskom is required for the proper consideration of Eskom's applications. In particular, it is imperative that Eskom motivates how it has considered, and why it has rejected, expenditure of some of the estimated R210 billion (which amount our clients do not accept at face value at this stage) on decommissioning the worst-performing power stations, upgrading the quality of coal used in the remaining power stations and boosting the generation of energy through renewables. All these options would immediately reduce the pollution emitted by the power stations, and the costs of compliance. The BID does not deal with these options at all.
38. As much as R60.6 billion a year was determined - by a University of Pretoria (UP) Study<sup>63</sup> - to be the full externality cost of Kusile. The study then assessed what quantity of renewables could be purchased if it were possible to shift the external costs of investing in Kusile to renewables instead. Using the capital costs associated with various renewable options, as listed in the Integrated Resource Plan 2010-2030 (IRP), the amount of renewable power generation that could be purchased was calculated. At its worst:

*"it would be possible to develop no less than 500% of Kusile's proposed power generation capacity, assuming that renewable electricity generation capacity was funded from only 30% of Kusile's external costs"*

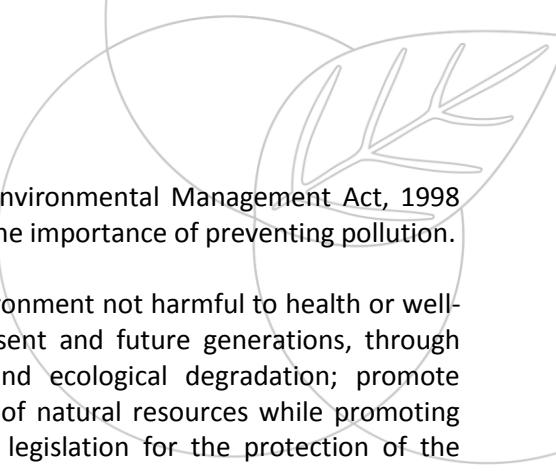
39. The analysis also evaluated how long it would take to equal Kusile's output using renewables with the money from the calculated true (damage) cost of the plant. Two estimates of the impacts of the opportunity cost of Kusile were calculated, a full estimate, based on the full external costs and an extremely conservative estimate, based on 30% of external costs. If investments were shifted to renewable energy, they would likely be recouped from the damage cost of Kusile within three and a half years, but at worst within 10 years if costs from water impacts were excluded. The report states:

*"(i)n other words, over its lifespan, the opportunity cost of Kusile is, at its most conservative, an installed capacity of 24 000 MW (4 800 x 5v), but could be as high as 68 600 MW (4 800 x 14.28)".*

40. It is submitted that there is strong evidence of the need for Eskom to invest in alternative (renewable) energy sources.
41. Our clients will make additional submissions in this regard upon receipt of the requested information.

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<sup>63</sup> 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>



42. The Constitution of the Republic of South Africa 1996, the National Environmental Management Act, 1998 (NEMA), the AQA, and various other environmental legislation highlights the importance of preventing pollution.

43. Section 24 of the Constitution guarantees everyone the rights: to an environment not harmful to health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. NEMA is the framework legislation for the protection of the environment. The AQA aims: to protect and enhance of the quality of air in the Republic; to prevent air pollution and ecological degradation; to secure ecologically sustainable development while promoting justifiable economic and social development; and 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.<sup>64</sup>

44. The National Environmental Management (NEM) Principles contained in NEMA serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of NEMA or other laws concerning the protection of the environment.<sup>65</sup> Sustainable development requires the consideration of all relevant factors; including:

- 44.1. that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- 44.2. that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- 44.3. that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- 44.4. that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- 44.5. that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.<sup>66</sup>

45. Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.<sup>67</sup> "Best practicable environmental option" is defined in NEMA as "the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term".<sup>68</sup>

46. Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.<sup>69</sup>

47. The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.<sup>70</sup>

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<sup>64</sup> s.2.

<sup>65</sup> s.2(1)(c).

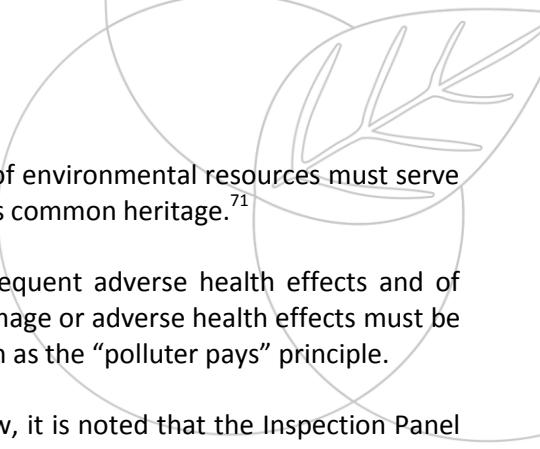
<sup>66</sup> s.2(4)(a).

<sup>67</sup> s.2(4)(b).

<sup>68</sup> s.1

<sup>69</sup> s.2(4)(e).

<sup>70</sup> s.2(4)(i).



48. The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.<sup>71</sup>
49. The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.<sup>72</sup> This is known as the "polluter pays" principle.
50. In the discussion of the Medupi Power Plant Inspection at section F below, it is noted that the Inspection Panel found that the NEM Principles were not adequately considered.
51. One of the general objectives of integrated environmental management is to identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the NEM Principles.<sup>73</sup>
52. The availability of reasonable, feasible alternatives to Eskom's applications is a relevant factor that should be considered in evaluating Eskom's applications. This includes the potential consequences or impacts of alternatives on the environment and human health. Alternatives that minimise harm to the environment and/or human health must be given preference over the granting of Eskom's applications.
53. The failure to consider feasible alternatives in relation to Medupi is also addressed at section F below.
54. Coal-fired power stations are particularly polluting. They are not the best practicable environmental option: Our clients submit that coal-fired power stations do not, as is required by NEMA, provide the most benefit or cause the least damage to the environment as a whole, at a cost acceptable to society, in the long term and/or the short term. As mentioned briefly above, there are reasonable and feasible alternatives in the form of expenditure of some of the estimated cost of compliance on decommissioning the worst-performing power stations, upgrading the quality of coal used in the remaining power stations and boosting the generation of energy through renewables.
55. In addition to saving costs and being a much more practicable environmental option, renewable energy sources could potentially meet any electricity shortfall whilst certain power station units undergo retro-fitting in order to comply with the MES.
56. As argued above, environmental legislation requires investigation and evaluation of these alternative options before Eskom's applications can even be considered.

## **E. Health impacts**

57. The BID claims that power station emissions do not harm human health. This claim is disputed with reference to extensive and conclusive evidence compiled in local and international research. In this regard, the UP report referred to above 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 and associated environmental effects from conventional thermal electricity generation"<sup>74</sup> Cropper, M et al. 2012, "The Health Effects of Coal Electricity Generation in India" *Resources for the Future* June 2012;<sup>75</sup> and Penney, S et al. 2009,

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<sup>71</sup> s.2(4)(o).

<sup>72</sup> s.2(4)(p).

<sup>73</sup> s.23(2)(b).

<sup>74</sup> [http://www.hme.ca/reports/Coal-fired electricity emissions literature review.pdf](http://www.hme.ca/reports/Coal-fired_electricity_emissions_literature_review.pdf)

<sup>75</sup> <http://www.hks.harvard.edu/m-rcbg/rpp/RFF-DP-12-25.pdf>

58. 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 (EIR) – addressed at section F below.
59. We have requested evidence in support of this allegation in the BID, but it has not yet been provided. This aspect will be addressed in more detail in later rounds of public participation, and once we have received the requested information.
60. It is noted that the issue of human health will be re-assessed in the AIRs. However, as mentioned above, the BID also indicates that "*it is not intended to conduct detailed health.... assessments in the AIR*". We reiterate that, without such detailed assessments, decisions will be made on the basis of inadequate information.
61. As set out above, the HPA AQMP estimates power generation activities to be the primary driver of hospital admissions in Mpumalanga. One of the VTAPA AQMP's objectives is to reduce emissions to acceptable concentrations that minimise human health impacts.
62. The HPA AQMP also states that, during the day and especially in summer, convection can bring the plumes to ground level when high concentrations may occur. This is also noted in the VTAPA AQMP.
63. 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.<sup>77</sup> A conservative estimate of annual health benefits is some \$39–\$47 per gram of atmospheric mercury emissions eliminated.<sup>78</sup>
64. More recently, a new study in the EU considered lost IQ costs due to mercury exposure.<sup>79</sup> 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.
65. Recognising its serious risks to health and the environment, in January 2013, more than 140 countries agreed to limit the use and emission of mercury in terms of the Minamata Convention on Mercury. The Convention will be signed in October 2013, and takes effect once it has been ratified by 50 countries.
66. Our clients point out that, in terms of the NEM Principles that the "polluter pays" and is responsible for the environmental health and safety consequences of a project exist throughout its life cycle, Eskom should be held responsible for these health costs (as well as the environmental costs).
67. We note that a key assumption underpinning the preparation of the AIRs is that the AAQS are adequately protective of human health and the environment. Our clients do not agree with this statement. In several respects, the AAQS are well below the AAQS of the World Health Organisation (WHO). The WHO Guidelines represent the most widely agreed and up-to-date assessment of air pollution's health effects, recommending air

<sup>76</sup> [http://www.edf.org/sites/default/files/9553\\_coal-plants-health-impacts.pdf](http://www.edf.org/sites/default/files/9553_coal-plants-health-impacts.pdf)

<sup>77</sup> Pirrone, N et al. 2010, "Global mercury emissions to the atmosphere from anthropogenic and natural sources". *Atmos. Chem. Phys.*, 10, 5951–5964, 2010

<sup>78</sup> 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.

<sup>79</sup> 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/>

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.<sup>80</sup>

68. By way of example, the WHO has determined that there is no safe level of PM exposure.<sup>81</sup> Despite this, SA's AAQS for PM are substantially lower than the WHO's recommendation.
69. Nevertheless, there is in any event widespread non-compliance with the AAQS, particularly in the areas impacted by Eskom's plants which are the subject of their postponement and exemption applications.
70. Even if it were so that power station emissions do not harm human health (which is denied), section 21 of the AQA also lists activities which have or may have a significant detrimental impact on social conditions, economic conditions, ecological conditions or cultural heritage. It is therefore not appropriate only for the health impacts of the postponements and/or exemptions to be addressed in the consideration of Eskom's applications.
71. Below, we deal with the World Bank inspection of Medupi Power Plant. The majority of these submissions apply equally to Eskom's other coal-fired power stations.

#### **F. Medupi Power Plant Inspection**

72. In April 2010, a World Bank loan of US\$ 3.75 billion was approved for Medupi Power Plant ("the Project").
73. A Request for Inspection was submitted by representatives of community members living in the vicinity of Medupi through ELA and groundWork ("Requesters"). The Requesters claimed, *inter alia*, that the power plant might cause harm related to increased health problems, decreased water availability, exacerbation of the effects of climate change, and cultural and livelihood changes. It was claimed that this harm might arise from emission of PM and greenhouse gases (GHGs), water uses, expanded mining operations, land development and influx of labour, as well as strains on the national economy. The Request also claimed that the application of the World Bank's policy on Borrower/Country Systems was not warranted in the context of the Project, and that there had been inadequate attention to key issues of cumulative impacts and Project alternatives.
74. The Inspection Panel produced an Investigation Report in November 2011.<sup>82</sup> The Panel confirmed that Medupi "represents four major challenges with respect to potential project-induced harm: significant water consumption raising issues of both scarcity and pollution in the local area; emission of gases and particulates causing increased health problems in the local area; added burden on the limited institutional and financial capacity of local authorities that have to cope with rapid industrialization of the area, especially as related to public and social infrastructure and environmental management; and emissions of [GHGs] by the Medupi Power Plant."<sup>83</sup>
75. The Panel held that the process in developing the Medupi EIR reflected certain important shortcomings, which were not adequately identified by Bank Management. These related to the scoping process, the sequencing of steps in the EIA process, aspects of stakeholder engagement, and the use of the Project Environmental Management Plan (EMP) to address certain types of issues.<sup>84</sup>
76. Amongst other things, the Panel found that World Bank management failed to give due consideration to the NEM Principles in reviewing the EIR and EMP. "This is significant as these core principles have a direct bearing on the potential harm and likely significance of issues within the South African context, and thus on the scope of appropriate studies and the extent of mitigation needed... these principles provide the main benchmark for

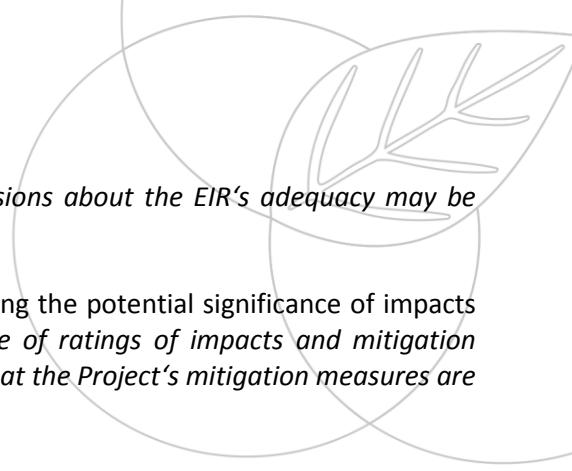
<sup>80</sup> 'WHO challenges world to improve air quality' 5 October 2006, available at <http://www.who.int/mediacentre/news/releases/2006/pr52/en/index.html>.

<sup>81</sup> WHO Air Quality Guidelines, 2005 at 7, 9; WHO Guidelines for Air Quality, 2000 at s4, s6.

<sup>82</sup> South Africa: Eskom Investment Support Project (IBRD Loan No. 78620-ZA), 21 November 2011, Report No. 64977-ZA.

<sup>83</sup> viii.

<sup>84</sup> 64-65, Annexure A.



reviewing EIAs in South Africa; without their due consideration, conclusions about the EIR's adequacy may be flawed."

77. The EIR essentially made no reference to the NEM Principles in evaluating the potential significance of impacts or in determining appropriate mitigation. As a result, "*the significance of ratings of impacts and mitigation measures are questionable.*"<sup>85</sup> "*The lack of specificity in the EIR means that the Project's mitigation measures are not likely to be adequate*"<sup>86</sup>
78. The Bank's Safeguards Diagnostic Review (SDR) was held not to adequately address certain gaps in the legal framework pertaining to analysis of cumulative impacts and environmental management planning. Also, the SDR failed adequately to address the lack of legislative provision to use an Independent Advisory Panel for the EIA for this type of project, and did not provide an adequate analysis of equivalence in respect of relevant laws related to water use and mining activities. The Panel was concerned about the Bank's reliance on the Medupi EIA as an input for its SDR analysis.<sup>87</sup>
79. The Panel also found that there was an inadequate assessment of the capacity and implementation practices – especially of provincial and local level government institutions responsible for regulatory oversight and monitoring and enforcing environmental and social standards. Adequate capacity to identify and address impacts is crucial for the Project's health, environmental and development outcomes.<sup>88</sup>
80. In relation to **water availability and quality**, the Requesters claimed, amongst other things, that Medupi and its sulphur scrubbers for pollution abatement would put additional strain on existing water sources in an area already suffering from water scarcity, and the directly-related expansion of coal mining at the Grootegeluk Mine would have negative environmental impacts, especially with respect to acid mine drainage.<sup>89</sup> The Management response was that Medupi's water needs, as well as those of an expanded Grootegeluk Mine, would be met by the Department of Water Affairs (DWA) through the implementation of the first two phases of the Mokolo-Crocodile (West) Water Augmentation Project (MCWAP). The MCWAP was "*designed to meet the 25-year planning horizon that anticipates high and growing demand for water for public supply, irrigation, and industrial use in the Steenbokpan-Lephalale corridor in which Medupi is located.*" MCWAP Phase 1 involves laying a new pipeline by 2013 along the right-of-way of an existing pipeline. This Phase also includes extending to Medupi this water transmission main, which is owned by Exxaro and brings water from the Mokolo Dam to the Matimba Power Plant, the Grootegeluk Mine, and the Lephalale Municipality. Phase 2 will transfer water through a new pipeline from the Crocodile River to the Steenbokpan-Lephalale Corridor by 2015.<sup>90</sup>
81. The Panel found that the focus of management in relation to water resources was on ensuring that Medupi had a reliable source of water supply. Insufficient attention was given to the potential impacts that the use of water might have on other users, and to the evaluation of the potential significance of Project impacts on quantity and quality of surface and groundwater resources. The Panel held that the full spectrum of likely impacts on water resources was not reliably identified or assessed. There was inadequate consideration of the Project's direct, indirect and cumulative impacts on availability and quality of surface and ground water resources. This was contrary to the risk-averse approach required and likely weakened the ability of the Project to take effective steps to minimise or avoid these risks, and provide measures to compensate for harms that cannot be avoided. The Panel noted that the expansion of the Grootegeluk Mine to supply coal to Medupi will result in cumulative impacts of potential significance linked to increased water use on river systems, and on surface water and groundwater quality. These cumulative aspects were not properly assessed.<sup>91</sup>

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<sup>85</sup> 61.

<sup>86</sup> 63.

<sup>87</sup> xi.

<sup>88</sup> xi – xii.

<sup>89</sup> xii.

<sup>90</sup> 66.

<sup>91</sup> xiii.

82. In other words, and in relation to “water availability” issues addressed in the BID, our clients already warned that there were serious water risks, including related to its scarcity. Eskom does not explain why the MCWAP will no longer meet its water needs. The BID does not explain why Eskom cannot use other technologies, including semi-dry FGD and activated carbon technology. Our clients have requested information regarding the claims in the BID as to the amount of water required by flue gas desulphurisation (FGD) and will respond to these claims in more detail in due course.

83. In relation to **air quality and health problems**, the Requesters claimed that Medupi’s emissions would cause health impacts, and that local communities were seriously concerned about the potential impacts from emissions of SO<sub>2</sub>, NO<sub>x</sub>, heavy metals and PM. Medupi would add to the background levels of these pollutants already emitted by the nearby Matimba coal-fired power plant, the Grootegeluk Coal Mine, and other polluting activities such as brickworks in the Lephalale area and other planned industrial development in the vicinity.<sup>92</sup> The Management response was that there would be no significant incremental impact of air emissions from Medupi on human health from PM, mercury and other heavy metal emissions, and SO<sub>2</sub>, and that the human health risks of not immediately installing abatement technology were acceptable. The expected low level of impact, according to Management, is mainly because Medupi’s emissions will be reduced by the sequential installation of FGD pollution abatement technology in the smokestacks and because the most populated areas in the project vicinity -Marapong and Onverwacht - are located normally upwind of the power plant.<sup>93</sup>

84. Management stated that, under the section 21 emission standards, Medupi will be allowed to operate for five years as an existing plant with respect to emissions and ambient air quality, but then must install within the following three years pollution control equipment that brings it into line with the more stringent emissions limits for new power plants.<sup>94</sup>

85. The Panel pointed out that although AAQS consider public health risks, actual health impacts depend on the actual concentration of pollutants, the numbers of people impacted, their susceptibility to adverse impacts, and the effects of exposure. *“The potential harm to public health arises from the emissions of [SO<sub>2</sub>], [NO<sub>x</sub>], heavy metals (e.g. mercury) and particulates that Medupi, once operational, will add to the background levels of these pollutants already emitted by the Matimba Plant, the Grootegeluk Coal Mine, and other activities (e.g. brickworks) in the Lephalale area -and to those likely to be emitted by planned industrial establishments in the Lephalale area and vicinity.”*<sup>95</sup>

86. *“People living downwind of the Matimba and Medupi Power Plants in the expected maximum impact zone to the southwest of the Matimba plant are likely to be exposed to emissions, although population density in that zone is low (about five persons per km<sup>2</sup>). The residents of Marapong (17,000 people, 75 people per km<sup>2</sup>) and Onverwacht/Lephalale (3,000 people, 180 people per km<sup>2</sup>) would also be exposed to the cumulative emissions from Medupi and Matimba (EIR: pp. 283-286). The Panel’s expert has further noted that because the wind does not continuously blow from the northeast, people in all directions will be affected by plant emissions - even if not in the “maximum impact zone”.*

87. *If Medupi operates without SO<sub>2</sub> abatement measures, South Africa’s [AAQS] for SO<sub>2</sub> will be violated (Medupi EIR: Appendix Q) and hence there are likely to be adverse impacts on the health of those individuals exposed to elevated concentrations of emissions (particularly SO<sub>2</sub> and potentially also fine [PM]). According to the Air Quality Assessment prepared as part of the EIA for Medupi, the health risk associated with the operation of six units at Medupi without SO<sub>2</sub> abatement is defined as ‘high’ for residents of Marapong and ‘moderate to high’ for the residents of Onverwacht. With at least 90% control efficiency in SO<sub>2</sub> abatement, risks would be reduced to ‘moderate’.*

<sup>92</sup> xiii.

<sup>93</sup> 85-86.

<sup>94</sup> 86-87.

<sup>95</sup> 87-88.

88. The EIR Air Quality Impact Assessment (AQIA) provided that significant effects may be noticed by sensitive individuals and chronic respiratory ailments in adults may be aggravated. It provided that action to avoid or reduce these effects may be needed.<sup>96</sup> The Report notes that coal-fired power plants have been found to increase health risks for certain medical conditions and to reduce the productivity of people affected.<sup>97</sup>

89. The health risk potential in the expected maximum impact zone to the southwest of the Matimba Power Plant is deemed by the EIR to be low mainly because the area is sparsely populated. The Panel held that this characterisation fails to capture the large risk present for those individuals who do live in the area. The risk to each individual's health remains high, based on maximum predicted impacts. It was held that Medupi's effects on ambient air quality and health are likely to be significant, particularly without SO<sub>2</sub> abatement.<sup>98</sup>

90. The Panel held *"that the risks to health will be high in the maximum impact zone and in the towns of Marapong and Lephalale, and exacerbated given the (at minimum) three-year gap between the start of operation of six units of the power station and the installation and operation of SO<sub>2</sub> abatement..... Without FGD, according to the EIR ..., health risks would be 'high' to 'medium high' in this area. The FGD technology chosen for Medupi requires water to operate. Should there be a delay in supply of the necessary water to the power plant..., the operation of FGD would similarly be delayed, with protracted harm to health."*

91. *Second, the accuracy of predictions with regard to air quality in relation to Medupi's cumulative emissions, effects on ambient air quality and on human health is not certain. The Panel's expert believes that the CALPUFF model, used in the Medupi EIR, was not optimal for estimation of air quality impacts in the context of the area of potential impact immediately surrounding the Medupi Power Plant site.... Meteorological, baseline air and emissions data also require further validation with respect to appropriateness, and thus outputs of the model are questionable and need to be refined. As a result, all claims with respect to air quality impacts are based on what may well be serious underestimates of air quality impacts within 1 to perhaps 15 kilometers from the proposed plant.*

92. *Third, while the EIA acknowledges health risks exist for project area residents, no specific health risk assessment was undertaken, and the significance of variables influencing the potential for negative impacts on the local community was not addressed. Actual effects on health will depend on the levels of exposure and susceptibility of affected persons to airborne pollutants. In the [AQIA] for Medupi, risks of exposure were categorized as high in Marapong and Onverwacht/Lephalale. Lephalale has a relatively high level of HIV/AIDS infection compared to other parts of South Africa (Lephalale Municipality, 2009/2010); this infection level could increase vulnerability to respiratory tract ailments and thus the severity of health impacts and the strain on local - already under-capacitated - clinics and public health services. About one in three residents of Marapong are unemployed (EIR: Section 5.7.5, p. 60) and thus considered to be vulnerable to negative health effects.*

93. *Fourth, the unplanned settlements in the area constitute another factor bearing on the potential health impacts of the power plant. Despite the 'sudden, rapid poorly planned expansion of the urban area of Lephalale' and the encroachment of informal settlement around Marapong to the foot of the Matimba Power Station, the EIR for Medupi assumes that no residential settlements would be developed within the main impact areas of the power station(s) during their operational phase. It states that 'should this not be the case the exposure potential, and hence the health risk potential, would need to be reassessed' (EIR: Air Quality Impact Assessment [AQIA], Section 9.1.4). The AQIA notes that the use of FGD will reduce plume rise and result in potential increases in localized, ground-level concentrations of pollutants not removed by SO<sub>2</sub> abatement (EIR: AQIA Section 9.7.3); potential impacts on local communities could thus be exacerbated.*

94. *Fifth, there are also concerns relating to potential downwind impacts on air quality. The wind direction in the affected area of Limpopo Province and neighboring Botswana is predominantly northeasterly. In addition, there*

<sup>96</sup> 88.

<sup>97</sup> 116.

<sup>98</sup> 88-89.

are infrequent easterly and westerly winds that could serve to combine emissions from different coal-based energy facilities. Cross-border transport of harmful emissions from the Matimba and Medupi Power Plants is thus highly likely, although its significance has not been assessed.

....

95. The Panel's expert determined that people downwind of the Grootegeluk Mine and the two power stations, and in Lephalale town and Marapong, are particularly vulnerable to cumulative health impacts from air pollutants. Residents of the town of Lephalale and Marapong are likely to be affected by an influx of job seekers and [labourers] associated with both Grootegeluk Mine and Medupi, and may suffer should the local municipality be unable to provide infrastructure and health services in accordance with the growing population.

96. The AQIA undertaken as part of the Medupi EIA assessed the combined emissions of Matimba and Medupi, but not other known cumulative impacts (e.g. of the expansion of Grootegeluk Mine). No measures are proposed in the EIR to offset the increase in air pollution levels in the airshed due to the Medupi Power Plant, taking into account the reasonably foreseeable development of additional polluting activities in that airshed in future.

...

97. ... (T)he Medupi Power Plant did not take cognizance of 'reasonably foreseeable' future developments at the time the EIA was undertaken that would negatively affect air quality in the Lephalale area (e.g. additional coal-fired power stations plus coal mines, at least). Consideration of such developments would probably enable additional impacts to be taken into consideration in finalizing the project design and determining the appropriate level of mitigation measures. The Panel notes that DEA wants to manage the area so that additional developments can be authorized in future.”<sup>99</sup> (our underlining)

98. The Investigation Report also addressed the risks related to delays in water supplies to Medupi. It noted that Medupi relies on FGD pollution abatement technology to meet AAQS and to mitigate adverse health impacts. Obtaining the water for wet FGD depends on the timely delivery of Phase 2 of the MCWAP. “The EIR for the MCWAP Phase 1 (p. 15) states that — ‘... it is clear that the FGD technology at Medupi Power Station cannot be fully implemented without the MCWAP Phase 2 in place or without the full return flow and groundwater resources in place. The recommended engineering approach is that the FGD implementation should commence when Phase 2 is committed to and the implementation thereof already initiated.’

99. The Panel noted that water supply to Medupi had not been assured. It held that the scope and timing of Phases I and II of the MCWAP, and thus plans for water supply to Medupi, appeared unreliable and subject to change. “According to the Panel's expert, the incremental water requirements from a growing Lephalale population, an expanding coal mine and the Medupi Power Plant have not been considered in water allocations. Consequently the stop-gap measures to supply water to Medupi in the event of a delay in the MCWAP Phase 2 do not assure a reliable and adequate supply of water for Medupi and the operation of wet FGD”.<sup>100</sup>

100. The Panel noted that the Project Appraisal Document provided that: “(a)bsent FGD, measures to mitigate sulfur-dioxide emissions from the power plants represent a “substantial risk”. The Bank's requirements provide that – by mid-2013 – Eskom must ‘develop, adopt, and thereafter implement a program, satisfactory to the Bank, to install FGD equipment ... taking into account technical, environmental, and financial criteria in accordance with terms of reference to be discussed with the Bank.’ “The Panel also notes that such a program may include an independent feasibility analysis of alternative control technologies (SDR: p.74, para. 226). Management has informed the Panel that it will not plan any action on this front until it has reviewed the status report from Eskom regarding water supply, which it expects to receive by the end of June 2013. According to the SDR, the Bank has ‘proposed’ for Eskom to ‘provide the Bank with a plan for FGD installation and include consideration of

<sup>99</sup> 89-92.

<sup>100</sup> 92-94.

alternative, less water-intensive dry FGD, in the event that sufficient water is not available or allocated to support wet-FGD technology (SDR: p. 64, para. 190).’

101. *The Panel takes cognizance of the fact that Management discussed with Eskom the potential for reducing the timeline for installing FGD by considering other technologies, including semi-dry FGD and activated carbon technology (ReACT), both of which would require considerably less water than wet FGD. Management stated in the SDR (p. 64, footnote 158) that —Eskom remains committed to this option should FGD installation become necessary and has made irreversible plant design decisions and material commitments based on the future use of wet FGD. The Loan Agreement provides for the installation of six FGD units to commence by March 31, 2018 and to be operational by December 31, 2021.*
102. *The Panel notes, however, that the Loan Agreement allows for the postponement of these dates at the discretion of the Bank following consultations with the Borrower (Loan Agreement, Schedule 2, paras. 10-11). The Panel observes that, according to the Management Response, Medupi was expected to come into operation beginning in 2012 (MR: Annex 1, § 20) and to be fully operational by 2017. In this context, delays in the implementation of FGD technology would compound the negative effects of air pollution from the facility.*
103. *The Panel notes that alternative approaches to pollution abatement are not systematically assessed in the Medupi EIR accepted by Management. A comparative evaluation of these alternatives should normally inform the design of the Project, including the optimal generating unit size. Instead, the EIR defers to the findings of Eskom studies and criteria, which are limited to technical and financial/economic criteria and exclude environmental and social considerations.*
104. *The Panel notes that no systematic comparative analyses of emission abatement options and associated impacts, including infrastructure or services required to provide the required materials and manage and dispose of wastes, were undertaken to inform the choice of wet FGD...*
105. ... As noted in the previous section, technology to reduce SO<sub>2</sub> emissions is only to be installed three to four years after all six units are operating against background levels of SO<sub>2</sub> that exceed [AAQS] and pose health risks. In addition, there is uncertainty about an assured supply of water to enable installation of emission reduction technology that could exacerbate air quality and associated health risks. The time lag between full operation of Medupi, the lack of emission reduction technology, and the uncertainty about timing of that technology all have a bearing on air quality and consequent health effects and point to the need for timely mitigation measures.”<sup>101</sup>
106. In short, the Panel found significant shortcomings in management’s due diligence assessment of air quality issues and the development of responsive mitigation measures to address risks of serious harm. Due consideration was not given to probable future projects in the area (e.g. additional coal mines and coal-fired power stations) in determining the appropriate level of mitigation measures for the Project. The Panel considered that these shortcomings in policy compliance have important implications for residents in the vicinity of Medupi and in the region, and likely reduced the ability of management to assess and respond to the significant potential negative air quality impacts of Medupi in an integrated and effective manner. The Panel noted the important role of management in ensuring the installation of technology to remove emission of SO<sub>2</sub> (i.e. [FGD]), though the planned installment of FGD is three years after start of the plant and may be further delayed in light of, *inter alia*, risks posed by water scarcity.<sup>102</sup>
107. Again, our clients raised the air quality and health issues. The Management response was that FGD technology would be installed. However, despite this undertaking, Eskom now wishes to postpone the installation of this equipment and, in some cases, not to install it at all.

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<sup>101</sup> 94-95.

<sup>102</sup> xiii-xiv.

108. The Project Appraisal Document provides that, without FGD, there is a “substantial risk” from SO<sub>2</sub> emissions.

109. As set out above, although postponements are possible in the Bank’s discretion, the Loan Agreement provides for the installation of six FGD units to commence by March 31, 2018 and to be operational by December 31, 2021. Eskom was required by the Bank – by mid-2013 – to implement a programme to install FGD. The Bank proposed that Eskom’s plan for FGD installation include consideration of alternative, less water-intensive dry FGD, in the event that sufficient water is not available or allocated to support wet-FGD technology. It is not clear whether Eskom provided the required status report. Our clients also request a copy of this report.

110. As set out above, the Panel pointed out that the EIR failed to assess alternative pollution abatement options and impacts adequately.

111. The Panel notes that Medupi was expected to come into operation beginning in 2012 and to be fully operational by 2017. It held that delays in the implementation of FGD technology would compound the negative effects of air pollution from the facility. This is exacerbated by the background levels of SO<sub>2</sub> “that exceed [AAQS] and pose health risks”.

112. It is clear from what is set out above, that the health impacts of power station emissions cannot be disputed. The AQIA for Medupi determined the health risks to be “high” without SO<sub>2</sub> abatement, and “moderate” with at least 90% control efficiency in SO<sub>2</sub> abatement. Because Eskom wishes to postpone or do away with the installation of this equipment, the risks to human health are high. Even with such abatement control, it was held that Medupi’s impacts on ambient air quality and health were likely to be significant.

113. It was also held that any delay in the supply of water necessary for FGD would cause “protracted harm to health”.

114. The AQIS also held that, if FGD were used, it would reduce plume rise and result in potential increases in localised, ground-level concentrations of pollutants not removed by SO<sub>2</sub> abatement – potential exacerbating impacts on local communities.

115. As set out above, the Panel questioned the accuracy of predictions with regard to air quality in relation to Medupi’s cumulative emissions, effects on ambient air quality and on human health. It indicated that the CALPUFF model was inappropriate and that there were serious underestimates of air quality impacts. This should be borne in mind in this process.

116. The Panel also held that it was inappropriate that no specific health risk assessment was undertaken, and that the significance of variables influencing the potential for negative impacts on the local community was not addressed. This finding should also be considered in the current process where Eskom seeks postponements and/or exemptions of MES compliance time-frames.

117. It is also essential that the cumulative air quality impacts of Eskom’s applications are considered, including future developments.

118. The Requesters raised concerns about the potential impacts of the Project on **GHG emissions** and thus on **global climate change**. The management response stated that Medupi plant would be fitted with advanced combustion technology to reduce carbon, nitrous oxide, and sulphur emissions during operation. According to management, Medupi uses the best available and reliable technology which reduces emission levels of conventional pollutants to comply with international good practice and minimises CO<sub>2</sub> emissions to levels below what would result from the use of conventional pulverized coal combustion (i.e. sub-critical) technology. Medupi will be equipped with highly efficient fabric filters to reduce PM emissions, low NO<sub>x</sub> burners to control NO<sub>2</sub> and, eventually, wet FGD technology to reduce SO<sub>2</sub> emissions.<sup>103</sup>

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<sup>103</sup> xiv, 99.

119. The Panel noted that the magnitude of emissions from Medupi far outweighs emissions avoided through Project mitigation measures, and found that the description of the net results of mitigation efforts under the Project failed to adequately demonstrate that the Project is directly addressing its own externalities. The Panel found that management's statement that "*the present project, as well as the longer-term partnership envisaged between the government of South Africa and the World Bank will enable the country to achieve a low carbon trajectory*" was "overly optimistic", given that Medupi will emit significant levels of GHG emissions.<sup>104</sup>

120. In other words, to mitigate the claim about the GHG emissions, there is reliance on "advanced combustion technology"; fabric filters; low NO<sub>x</sub> burners and FGD technology. However, the current applications aim to defer or scrap the promised technologies. As a result, the stations will be emitting GHGs and potentially impacting on climate change.

121. The Panel also found that Medupi's serious impacts on the local municipality and public services were not adequately addressed. Nor were impacts on local livelihoods and poverty.<sup>105</sup>

122. The Panel also found that there the economic analysis prepared by the Bank did not adequately address the environmental and health-related externalities of Medupi. Insufficient attention was paid to issues like the economic estimates of the costs of potential harm from air quality degradation in the Medupi area and of the anticipated increase in water scarcity in an already stressed water system incorporating the additional water requirements for expansion of the operations of the Grootegeluk mine. The Project economic analysis should have explicitly addressed and estimated the costs of potential damages to human health and to animal habitat from increased SO<sub>2</sub> emissions in periods without FGD in place.

123. In relation to Requesters' concerns that the **Bank did not adequately consider alternatives to coal**, the Panel noted that the requirement to ensure that a complete and balanced review of design alternatives – a cornerstone of good EIA practice – was considerably more difficult given that Eskom had already begun construction of Medupi before the Bank agreed to provide financial assistance. Although, the Bank could influence alternative designs of certain project features - such as those to ameliorate air pollution, for most types of design alternatives the decisions had already been made and could not be reversed. Although the Bank analysed viable alternatives to the Project to reduce GHG emissions, this analysis focused only on electricity production cost and the externality of GHG emissions, whereas Bank policy, and corresponding provisions of South African law, requires a broader focus on whether there are other feasible alternatives available that could meet project objectives and reduce or avoid significant externalities and impacts. Management did not ensure that Project documentation adequately included a complete and balanced review of design alternatives to promote informed Board decision-making. The Panel further found that, since the economic analysis did not adequately consider all relevant externalities (in particular to relation to water and air) there was an inadequate consideration of risks in the analysis of alternatives. The estimated costs of CO<sub>2</sub>, may have been underestimated - a concern that becomes greater when emissions are looked at in a cumulative context and in light of the long-term nature of the relevant investments.<sup>106</sup> The Panel held that, "*to inform the best practicable environmental option, it would have been appropriate to evaluate a range of alternative scales of coal-fired plants developed in parallel with longer-term and more environmentally friendly options, ensuring that the evaluation took into account the full range of potential externalities across the life of the proposed plant.*"<sup>107</sup>

124. We reiterate that Eskom should consider alternatives to the present applications; including the decommissioning of the most polluting power plants, and investment in renewable energy. Eskom fails to explain why it cannot use higher-grade coal.

<sup>104</sup> xiv.

<sup>105</sup> xv-xvi.

<sup>106</sup> xvi-xvii.

<sup>107</sup> 134.

125. In response to the panel's findings, management prepared a supplementary note to the management report and recommendation and committed to extended supervision of the project until 2022, as well as further elaboration of the scope of its supervision.

126. Hence, the intended outcomes of the Panel process, in terms of actions moving forward, are the identification and implementation of appropriate actions in terms of redress when harm has been caused, the identification and implementation of actions to improve the project and strengthen implementation to manage risks of potential harm, and/or the identification of actions in response to lessons emerging from the panel's analysis of compliance.

127. Should the risks materialise, Bank policy requires a supervision plan with a clear results framework to enable timely intervention where necessary to resolve problems.<sup>108</sup>

#### **G. Conclusion**

128. In the circumstances, and, as set out above, given that AAQS in the majority of the relevant areas are currently not in compliance, the applications should never have been made. In any event, in the absence of evidence that:

- 128.1. granting Eskom's applications will not result in the AAQS being exceeded; and
- 128.2. there will not be any health, environmental or other risks if the applications are granted,
- 128.3. alternatives have been adequately evaluated and assessed,

it is submitted that the applications should not succeed.

129. As Eskom is one of South Africa's largest industrial concerns and moreover a state-owned entity, there is a serious risk that the granting of its applications will set a negative precedent for other industries.

130. We look forward to receiving the requested information and to further participation in this process.

131. Kindly keep us updated.

Yours sincerely  
**CENTRE FOR ENVIRONMENTAL RIGHTS**

per:



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**Attorney**  
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<sup>108</sup> "Inspection panel findings on impact of Medupi" *Engineering News Online* 17 May 2013, available at <http://www.engineeringnews.co.za/article/inspection-panel-findings-on-community-impact-of-medupi-2013-05-17>