

## **Introduction**

Eskom is currently seeking approval for construction of three new, large-scale coal-fired power stations in South Africa for which Environmental Impact Assessments (EIAs) are in progress. At the same time ambient air quality standards are being developed, in terms of the Air Quality Act passed in 2004, that must inform the choice of pollution control (or abatement) technology required by new and existing power stations. In June a set of standards were published for comment, within three months, noting that “Margins of tolerance, compliance time frames and permissible frequencies by which these standards may be exceeded, will be included in the regulations or in the national framework to be established”. These standards will presumably be debated in parliament.

While escalating greenhouse gasses emissions are of growing concern, with the energy sector accounting for about 80% of South Africa’s contribution to climate change, it is local air pollution that is receiving most immediate attention. From coal burning, this includes particulate matter, nitrogen oxides and sulphur dioxide (SO<sub>2</sub>), as well as heavy metals. Permissible levels of some of these pollutants will be regulated by the proposed new standards, which are most comprehensive with regard to SO<sub>2</sub>, which causes respiratory health problems and acid rain.

## **Proposal for coal-fired plants**

As part of the EIA for the construction of the proposed Matimba B coal-fired power station, near the Lephalale area in the Limpopo Province, consultants Bohlweki Pty Ltd issued an Environmental Impact Report (EIR) in May 2006. The report states that the existing Matimba coal-fired power station, in the same area, does not comply with the requirements of the air quality standards contained in The National Environmental Management Air Quality Act No. 39 of 2004. It is thus evident that no future development that will result in the emission of SO<sub>2</sub> will comply with the standards. If abatement technology is not applied, the addition of the proposed 4800 MW power station, or even the initial stage of 2400 MW, will result in a massive increase in SO<sub>2</sub> emissions.

The EIR acknowledges that development of a new power station close to Matimba could require that sulphur control equipment be fitted to the existing plant, in addition to the new plant. Flue Gas Desulphurisation (FGD) technology comes with various degrees of efficiency, with higher efficiencies having higher costs and greater impact on over-all plant efficiency (thus also increasing the rate of emissions of other pollutants per unit of electricity despatched). Even given a 90% control efficiency, cumulative SO<sub>2</sub> concentration would exceed the South African 10 minute standard in both the maximum impact zone and the Marapong residential area. The report also states: “The increase of stack height from 220m to 250m is not sufficient to negate the need for abatement measures.” (p.286)

The report (p.318) notes that, as a result of the existing power station, “The health threshold applied to respiratory effects (660 microgram per cubic metre as an hourly

threshold for SO<sub>2</sub>) was measured to be exceeded at [three] monitoring sites. This threshold was predicted to be exceeded for a maximum of three to four hours at Marapong.” – there is no monitoring station in Marapong. This concentration is significantly higher than allowed by current and proposed new standards, not only the one-hour maximum of 350 microgram per cubic metre, but even the ten-minute maximum of 500 microgram per cubic metre.

The report concludes by saying, “There are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The issues raised regarding air quality, water use and potential pollution should be considered by the Department of Water Affairs & Forestry (DWAF) and the Department of Environmental Affairs & Tourism (DEAT) in respective applications for licences.” (p.457) However, the EIR does not recommend specific mitigation and management measure, such as a technology for or specific level of FGD efficiency, simply noting that greater than 60% will be required for 2400 MW installed and greater than 80% for 4800 MW, to avoid “substantial changes in the magnitude, frequency or spatial extent of non-compliance”. (p.324) The report also recommends “the impacts associated with the control operations be quantitatively assessed.” (p.458)

DEAT issued a positive Record of Decision (RoD) to Eskom in September 2006, which concludes “the proposed activities may lead to substantial detrimental impact on the environment but the implementation of the mitigation measures and conditions set out in the Record of Decision are considered adequate to minimise detrimental impacts to an acceptable level” (p.3). The relevant conditions are that the facility must comply with relevant standards, including any standards introduced in future.

Earthlife Africa Jhb submitted an administrative appeal to the Minister against the RoD, maintaining that the further studies called for in the EIR, including assessment of cumulative impacts of acidification, should properly be conducted as part of the EIA. The appeal further asserts that there is no basis for drawing a conclusion regarding the adequacy of measures when these are not specified, or the adequacy of conditions that refer to standards that have not been set. A particular concern is that the margins of tolerance that need to be developed for the enforcement of standards have not been established, or even proposed.

While arguing that a decision was premature and should have followed further study, as well as promulgation of standards, Earthlife Africa has acknowledged some important and commendable conditions contained in the RoD including: “Eskom must initiate a programme of support for initiatives aimed at improving air quality in the Marapong residential area. This programme must be included in the construction of the Environmental Management Plan (EMP) and carried through to the operation of the EMP.” & “Eskom shall install, commission and operate any required SO<sub>2</sub> abatement measures in respect of the existing Matimba Power Station as may be necessary to ensure compliance with any applicable emission or ambient air quality standards published in terms of The National Management: Air Quality Act No. 39 of 2004”.

## Proposed air quality standards and coal technologies

As noted in the EIR (p.321) “The SA standards included in the schedule to the Air Quality Act are incomplete when compared to legal limits issued by other countries. Air quality standards typically comprise: thresholds, averaging periods, monitoring protocols, timeframes for achieving compliance and typically also permissible frequencies of exceedance.” The appeal against the ROD also submits that making compliance with air quality standards not yet been promulgated, as well as margins of tolerance not yet proposed, a principle condition for implementation of a project of high strategic importance and clearly established political support, puts at risk the integrity of the process for determining these standards and margins of tolerance.

A further concern, that has been raised in comments on the proposed ambient air quality standards published in June, is the lack of standards for mercury and fine particulate matter, both of which are issues of major regulatory concern for coal-fired plants in other countries. Both the standards and the EIR cover only particulate matter of a diameter of 10 micrograms or more (PM 10), yet it is the finer particulates that are most associated with a range of health impacts. There are also significant gaps in providing values for various averaging periods: standards for both lead and benzene are provided only for the annual average, with no provisions regarding intense emissions over a shorter period, while for PM 10 the shortest averaging period is 24 hours (thus a heavy discharge over a relatively short time, e.g. resulting from a failure of control equipment such as an electrostatic precipitator, may not register as a regulatory concern).

Indoor air pollution, such as from burning coal in an imbawula, a common practice in Limpopo, is the leading cause of health damage from coal use, while respiratory illness the second highest cause of child mortality in South Africa. Reducing the background pollution level would reduce the adverse impacts on local communities of additional pollution from existing and new power stations. This could be achieved by improving the quality of housing (e.g. adding ceilings and other insulation) and/or providing adequate free electricity to cover basic energy needs. However, emissions also have cumulative effects and SO<sub>2</sub> results in acidification of land and water, as well as corrosion (e.g. fences) and damage to crops and trees.

Air pollution such as SO<sub>2</sub> is part of the range of impacts of coal-fired electricity generation. Water use in new plants using dry cooling will be far lower than in most existing plants, but is still significant. Choice of technology is significant not only regarding abatement options but also regarding the boilers and turbines. The rate of emissions of local pollutants and greenhouse gasses could be significantly reduced using state-of-the-art technology such as the Integrated Gasification Combined Cycle (IGCC) process, which can achieve over 50% efficiency and also reduces the costs of other pollution reduction measures. Technology being proposed for all three new plants under consideration offers efficiencies of *up to* 40%; this is reduced for the plant as a whole through measures such as dry cooling and FGD.

Eskom refuses to publicly consider alternative technologies for their proposed new stations, despite EIA regulations requiring the consideration of alternatives. They refer to confidential

feasibility studies that precede EIAs and reject calls for using more advanced technology on the grounds that it has not been sufficiently commercially demonstrated. Such an excuse may hold for a project relying entirely on private finance, which is risk averse, but is not acceptable for a state owned enterprise with assured public money for building new generation capacity. As these plants are expected to run for at least 40 years, poor choices could commit us to dirty and inefficient options for over a generation, or leave us with stranded assets.

## Conclusion

Residents of the Lephalale area, particularly Maropong, are already routinely subject to air quality below both prevailing and proposed standards. While the EIA process is in early stages for the plants proposed for Witbank and the northern Free State, the prevailing conditions for local communities are unlikely to be found to be any better. Unless stringent requirements for all new and many existing power stations ensure the use of emissions control equipment, their situation will deteriorate substantially. Even industries have objected to the plant near Sasolburg, due to the increased pressure they will experience to clean up their act. An unacceptable alternative to such stringent requirements is that we end up with a very weak system for the application of air quality standards, increasing ill health and additional demands on social services such as healthcare.

Given the pressure to fast-track EIA processes and poor appreciation of the value they bring to making sound decisions, there is an urgent need for demands that decisions such as choice of technologies by Eskom are subject to informed public debate and input. Selection of options that minimise short-term costs, by executives with short-term contracts, simply defers the true costs of such decisions into the future. Inadequate consideration of the options for spending the R100 billion or so allocated to new electricity infrastructure will have a profound impact in the medium and long term, reducing standards of living of local communities, the capacity of our ecosystem as a whole and the competitiveness of the national economy.

## Addendum

In January Sir Nicholas Stern, former Chief Economist of the World Bank, will be in South Africa to present the Stern Report on the economic costs of climate change, commissioned by the UK government. The report finds that the costs of avoiding dangerous anthropogenic climate change – i.e. overheating of the global climate system as a result of human activities – is far lower than adapting to the impacts of global warming that would result from anticipated increases in greenhouse gas emissions.

Measures aimed at keeping atmospheric concentrations within 500 parts per million, which will limit but not prevent serious changes in the climate, are estimated to cost about 1% of global GDP. Coping with the impacts of business as usual would cost between 5 to 20% of GDP, depending on factors such as how soon action is initiated, how much more fossil fuel can actually be economically exploited and the impact of feedback mechanisms (e.g. decreased reflection of solar radiation from decreasing ice cover, which accelerates the rate at which the planet warms and thus ice cover melts away).