



Greenpeace Africa objection to the proposed weakening (doubling) of SO₂ limits in South Africa

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Executive Summary

Greenpeace Africa formally and strongly objects to the proposed weakening of the SO₂ limits in South Africa through the proposed amendment to sub-category 1.1 of the List of Activities - which sets out MES for solid fuel combustion installations - on the following grounds:

- South Africa is already in the midst of an air pollution emergency, with relatively weak Minimum Emission Standards (MES) and the Department of Environment, Forestry and Fisheries should be looking to strengthen our MES, not weaken them. According to expert Ron Sahu, instead of weakening our SO₂ limits to 1000 mg/Nm³, we should be making them stricter in the range of 200 mg/Nm³, the norm in most other jurisdictions around the world, and a level that can readily and cost-effectively be achieved by implementation of flue-gas

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desulphurisation (FGD). This will result in the actual improvement of air pollution in South Africa, including in the various high priority areas.

- There will be significant impacts on human health and on air quality due to the proposed doubling of allowed SO₂ emission limits, which are both unacceptable and avoidable. The proposed doubling of the SO₂ limits is projected to cause 3 300 premature deaths, 1 000 of those in the Gauteng City Region.
- The proposed doubling of the SO₂ limits would also lead to substantially higher toxic mercury emissions, which we believe is also unacceptable.
- The proposed amendment is not accompanied by any kind of assessment from the Department in terms of the impacts of the doubling of SO₂ limits, specifically on air quality, the environment and public health.
- The arguments given by the Department in the press statement accompanying the proposed amendment relating to the feasibility and affordability of controlling SO₂ emissions are essentially meaningless because of the failure to assess the economic and social benefits of reducing SO₂ emissions. The costs and challenges associated with emission control technologies are very well established and widely used elsewhere in the world, and appear to have been inflated in order to support the proposed amendment.
- We do not believe that weakening the SO₂ limits is lawful, and may be subject to legal challenge.

The Department of Environment, Forestry and Fisheries has an important opportunity to play a strong role as an advocate for our constitutional right to a healthy environment by abandoning this proposed amendment, and instead seeking compliance with the existing MES from both Sasol and Eskom, and all other polluters. We believe that this should be followed by the rejection of both Sasol and Eskom's applications to postpone compliance with the MES. We attach two additional papers as annexures to supplement this submission and our input in more detail, please do refer to both of these annexures in addition to this submission itself. Both of these are referred to within the submission itself.

Annexure 1: Air quality and health impacts of doubling the South African standards for SO₂ emissions from power plants by Lauri Myllyvirta, lead analyst, Greenpeace Global Air Pollution Unit

Annexure 2: Comments on the Proposed Increase in the Minimum Emission Standard (MES) for Sulphur Dioxide (SO₂) Applicable to Coal- Fired Power Plant Stacks in South Africa by Dr. Ranajit (Ron) Sahu, Consultant

Introduction

Greenpeace Africa is an independent environmental campaigning organisation with a vision of ‘**an Africa where people live in harmony with nature in a peaceful state of environmental and social justice**’. Our mission is to work with others to foster environmental consciousness where Africa's people can seek social and economic prosperity in ways that protect the environment for the benefit of humans, the planet and the future. In developing our campaign strategies we take great care to reflect our fundamental respect for democratic principles, while seeking out solutions that will promote social and environmental justice.

In South Africa, we campaign for a just transition away from coal and nuclear power, towards renewable energy and energy efficiency. We do not accept any money from government or corporations in order to maintain our independence, which means that we work in the public interest; with environmental and social justice at the core of our work.

As a civil society organisation, and citizens, we work towards the achievement of environmental and social rights, combined with environmental and energy justice in our communities across South Africa. We strive for the realisation of the constitutional environmental right to a healthy environment. The climate crisis acts as a threat multiplier and that urgent action is required to avoid catastrophic climate change.

South Africa's air pollution emergency

Johannesburg's PM_{2.5} air quality has been “unhealthy”, or more than twice as high as the World Health Organization guideline, on 16 out of the past 30 days, with only one “moderate” and no “good” days, according to analysis of government air quality data by Berkeley Earth¹. Greenpeace analysis of satellite data² has highlighted coal-fired power plants and coal-burning industrial plants as major sources of air pollution in South Africa, making it increasingly clear that the country is in the midst of an air pollution emergency. The satellite data corroborates existing data which indicates that Mpumalanga is a deadly global air pollution hotspot, both in terms of NO₂ and SO₂.

Eskom's Highveld plants emit more SO₂ and almost as much NO_x as all the industrial emitters in the largest emitting province in China, Shandong. Shandong's area is twice as large as Mpumalanga's. Eastern China and Shandong have reduced NO_x emissions by 24% and 31% respectively from 2012 to 2017. SO₂ emissions have fallen by more than 80% in China and more than 90% in Shandong from 2012 to 2018.

¹ http://berkeleyearth.lbl.gov/air-quality/local/South_Africa/Gauteng/Johannesburg

² <https://www.greenpeace.org/africa/en/reports/6661/global-air-pollution-map-ranking-the-worlds-worst-so2-and-no2-emission-hotspots/>

There is a clear reason why the Highveld ranks as the world's worst power plant SO₂ and NO₂ emission hotspot – besides having a large concentration of coal-fired power generating and industrial capacity, the emission control performance of the coal-fired boilers is dramatically worse than in other countries. Eskom's coal-fired power plants are allowed to emit more than 20 times as much SO₂ as Chinese and European coal-fired plants. SASOL, one of the largest industrial users of coal in the world, hasn't been required to mitigate its SO₂ emissions in any meaningful way either.

Weakening of the SO₂ limits

Our comments are based on the following:

On 31 October 2018, the Acting Minister of Environmental Affairs made amendments to List of activities and associated minimum emission standards by publishing Government Notice No.1207 in Gazette No. 42013 ("the Notice") under section 21 of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) ("NEMAQA").

Due to the objections against the special arrangement inserted in Part 3, Category 1, Subcategory 1.1 and complaints received in respect of perceived inadequate public consultation on this specific provision, the Minister decided to withdraw the provision (Government Notice No. 687 in Gazette No. 42472) and further consult members of the public.

The intention of the amendment is to provide for existing plants to comply with a sulphur dioxide (SO₂) minimum emission limit of 1000 mg/Nm³ instead of 500 mg/Nm³. This means that existing plants would reduce emissions from the current standard of 3500 mg/Nm³ to 1000 mg/Nm³.

The impacts of SO₂

Emissions of sulphur dioxide (SO₂) are a significant contributor to air pollution. SO₂ is created when burning materials that contain sulphur, which is found in all types of coal across the world in varying proportions. The health impact of SO₂ derives both from direct exposure to SO₂ and because SO₂ forms fine particulate matter³ (PM_{2.5}) through chemical processes in the atmosphere. PM_{2.5} is the air pollutant with the largest public health impact. The largest source of SO₂ in the atmosphere is the burning of fossil fuels in power plants and other industrial facilities.

SO₂ has several adverse effects on human health. SO₂ irritates the respiratory system, causes coughing or wheezing, irritation to the eyes and nose, and a tightness of the chest. In the long run SO₂ exposure contributes to chronic illnesses such as bronchitis, decreased lung function, and premature deaths.⁴ Additionally, SO₂ exposure has been associated with an increase of premature

³ particles with aerodynamic diameter of around 2.5 µm (roughly speaking)

⁴ <https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/sulfur-dioxide.html>

births that can greatly increase risks for newborn babies.⁵ SO₂ is also one of the main contributors to acid rain, which damages environments, waterways, and infrastructure.⁶

South African SO₂ limits compared to other countries

Compared with many other countries South Africa has relatively weak Minimum Emission Standards (MES), that allow existing coal-fired power stations to emit 3500 mg/Nm³ of SO₂, which is up to 100 times more SO₂ than is allowed in China, Japan, or the European Union, and up to 10 times more SO₂ than is allowed in countries like Thailand and Vietnam. Nonetheless, the majority of Eskom’s ancient and highly polluting coal-fired power stations do not comply with these MES.

Table 1: Selected countries SO₂ emission standards for coal-fired power plants⁷

Country	Time period	SO ₂ mg/Nm ³	
		Existing	New
China	hourly	200/50	35
Germany	daily	200	150
India	Continuous	600/200	100
Japan			200
Indonesia		750	750
South Africa	Continuous	3500	500 (proposed 1000)
EU	Continuous	200	150
USA	daily	185	136

It is clear from Table 1, that South Africa’s SO₂ limits (even were they to remain at the 500 mg/Nm³ threshold), are already way higher than those of a number of other countries, including China, India

⁵ <https://www.sciencedirect.com/science/article/pii/S0160412010002254?via%3Dihub>

⁶ https://www3.epa.gov/acidrain/education/site_students/whatcauses.html

⁷ https://cleanairasia.org/wp-content/uploads/2016/09/06_Sanjeev-Paliwal_CPCB.pdf

and the EU. Given the size of South Africa's air pollution crisis, weakening these limits implies irrational decision-making.

In addition, even if the 500 mg/Nm³ MES for SO₂ starting in 2025 remains in place, South African coal-fired power stations will be able to emit:

- 13 times more SO₂ than key regions in China;
- almost 7 times more SO₂ than new build coal-fired power stations in India; and
- 3 times more SO₂ than power stations in the EU.

The proposed weakening of the SO₂ limits

The proposal by the Department of Environment, Forestry and Fisheries to weaken the Minimum Emissions Standard for SO₂ from 500 mg/Nm³ to 1000 mg/Nm³ would double the permitted emissions of SO₂ from coal-fired power plants and other industrial sources of SO₂ emissions, with dire impacts on public health. It would also lead to far higher emissions of mercury as the standard would likely enable plant operators to use emission control methods that, unlike SO₂ scrubbers, don't improve mercury capture or can even impair it.

It is a matter of public record that meetings were held on 17 January 2018 between the Department of Environmental Affairs, Sasol and Eskom to address issues related to compliance with SO₂ limits.⁸ Sasol and Eskom being the most significant SO₂ emitters in the country. This engagement between the Department and Sasol and Eskom was ongoing, and ultimately resulted in the outcome that rather than Sasol and Eskom being compelled to comply with the already relatively weak MES for SO₂ of 500 mg/Nm³, the Department took the unprecedented step of proposing to double the SO₂ limits from 500 mg/Nm³ to 1000 mg/Nm³ in respect of existing plants that are solid-fuel combustion installations (which include all of Eskom's coal-fired power stations, as well as Sasol's coal-fired boilers). In other words, through this amendment, the Department is proposing to make existing standard twice as weak, for the simple reason that the country's major emitters are arguing that they are unable to comply.

Greenpeace Africa believes that this is irrational decision-making by the Department (now the Department of Environment, Forestry and Fisheries) and urges the Department to at a minimum retain the 500 mg/Nm³ limit, while preferably seeking to strengthen the SO₂ limits, rather than

⁸<https://cer.org.za/wp-content/uploads/2018/02/AQM-MESDEA.pptx>

weakening them to ‘allow’ compliance from the major emitters, which is essentially meaningless. We also believe that it is not legally permissible to weaken the SO₂ limits as proposed by the Department.

From 2018, this is the insight that both Sasol and Eskom have given the Department regarding their ‘action plans’ to deal with SO₂ emissions, which was reported to the Portfolio Committee:

Table 2: Sasol and Eskom ‘action plans’ to deal with SO₂ emissions

Sasol’s Action Plan to deal with SO₂ emissions⁹	Eskom’s Action Plan to deal with SO₂ emissions¹⁰
<ul style="list-style-type: none"> •Sasol maintains that an assessment of the commercially available technologies has been done and all proved practically infeasible • Some of the assessed technologies included the following: Catalytic processes; Sorbent injection; Flue Gas Desulphurisation •Sasol concluded that none of the above technologies or any other technology is practically and economically viable for their operations • Reason for unviability, as stated by Sasol, include amongst others, retrofitting challenges due to unavailability of space and the nature of the processes •Sasol recommends changes in the regulatory framework to allow flexibility the MES for SO₂ with special focus on the preparation of Pollution Prevention Plans (declaration of SO₂ as priority pollutant), including rolling postponements, and improvement roadmaps •DEA was of the view that changes in regulatory reform to include MES flexibility just for the purposes of accommodation one or companies is not in the best interest of the country and that this is not a justifiable action •DEA is of the view that Sasol does not show willingness to address these challenge with the 	<ul style="list-style-type: none"> •Eskom acknowledges that there has been no significant reduction in SO₂ emissions from the powers station in the past 30 years •Eskom maintains that ambient air quality monitoring network shows that there is generally compliance with ambient SO₂ •FGD has been proposed or is being undertaken to deal with SO₂ issues in Medupi and Kusile •No further proposed SO₂ abatement technologies for the other remaining power stations •Emphasis is being placed that agreement has been reached that the lifespan for the affected power stations is guaranteed for 50 years, with 8 of the affected power stations facing decommissioning by 2030-thus not worth having FGD as an abatement technology on these •DEA requested an indication in terms of what would be done to those power stations that will not be decommissioned by 2030, which power stations have not been earmarked for FGD

⁹ <https://cer.org.za/wp-content/uploads/2018/02/AQM-MESDEA.pptx>

¹⁰ <https://cer.org.za/wp-content/uploads/2018/02/AQM-MESDEA.pptx>

<p>urgency they deserve and thus the company's proposed changes to regulatory framework is not acceptable as it is not Sasol's work to re-write the law.</p>	
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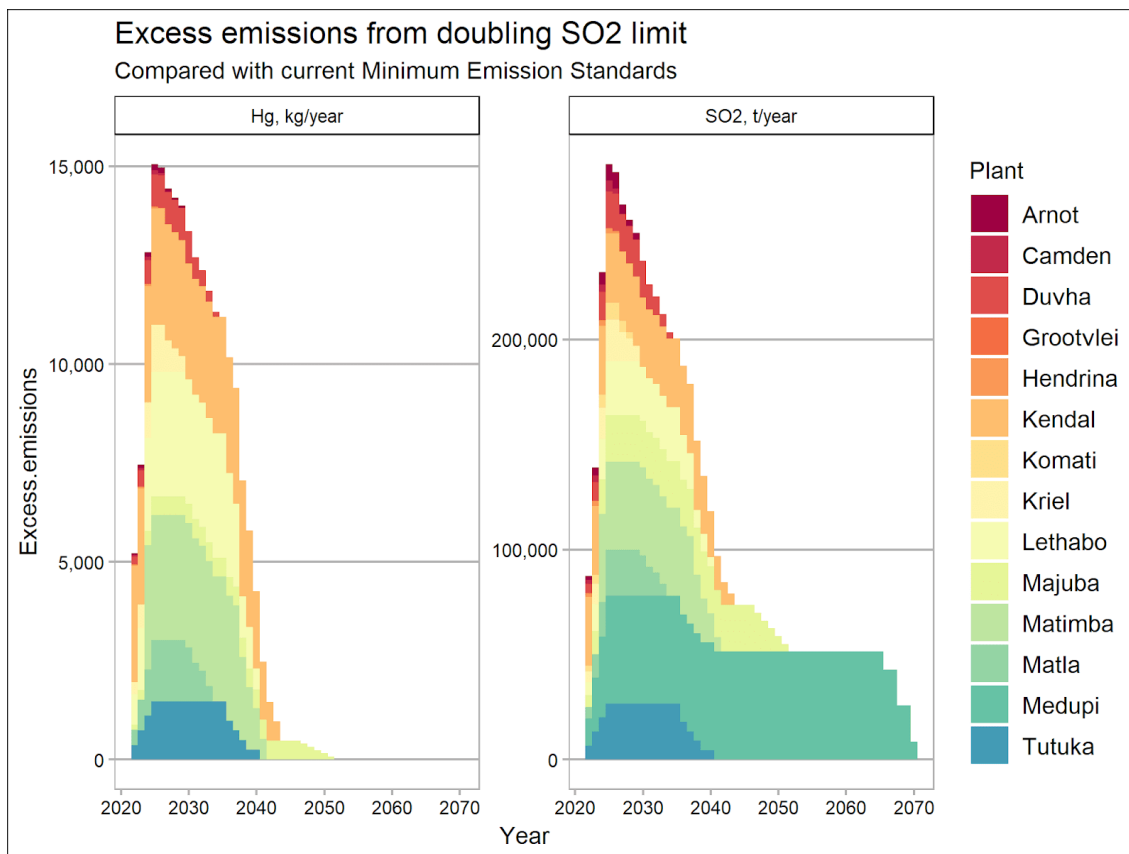
It is clear from the above table that neither Sasol nor Eskom have any intention of complying with the SO₂ MES limits, and have lobbied extensively for the kind of amendment that the Department is now proposing. Indeed, it seems like their lobbying has convinced the Department to 're-write the law' rather than ensure compliance with the existing law/limits. However, in our view the existing SO₂ MES do not meet the standard of "reasonable measures" required by section 24 of the Constitution and should in fact be made substantially more stringent in order to protect human health and the environment.

We are in agreement with the Life After Coal campaign, and do not believe that the Department is empowered to weaken the MES at all. Furthermore, the weakening of already lax standards would be contrary the AQA objects to ensure that South Africa's air quality is not harmful to human health or well-being, and the general duty on all organs of state to enhance air quality. The MES were promulgated for the legitimate government purpose of limiting and reducing toxic atmospheric emissions that have or may have a significant detrimental effect on society. Given the crucial purpose and Constitutional import of the MES, any decision to weaken the SO₂ MES limit cannot be justified in any circumstances and would be unlawful and invalid.

Air quality and health impacts of doubling the South African standards for SO₂ emissions from power plants

Please refer to the attached paper for the full analysis. It is annexure 1 and is called '*Air quality and health impacts of doubling the South African standards for SO₂ emissions from power plants*' and the author is Lauri Myllyvirta, lead analyst, Greenpeace Global Air Pollution Unit.

Compared against a scenario of full compliance with the current MES, the weakened emissions standard would allow Eskom to emit an excess 280,000 tonnes of SO₂ per year, for a total of 5.5 million tonnes over the lifetime of the plants. The failure to install SO₂ scrubbers would increase mercury emissions by an estimated 15,000 kilograms per year or 200,000 kilograms over the remaining operating life. These estimates are based on the assumption that all units retire after 50 years of operation - a longer operating life would mean larger excess emissions.

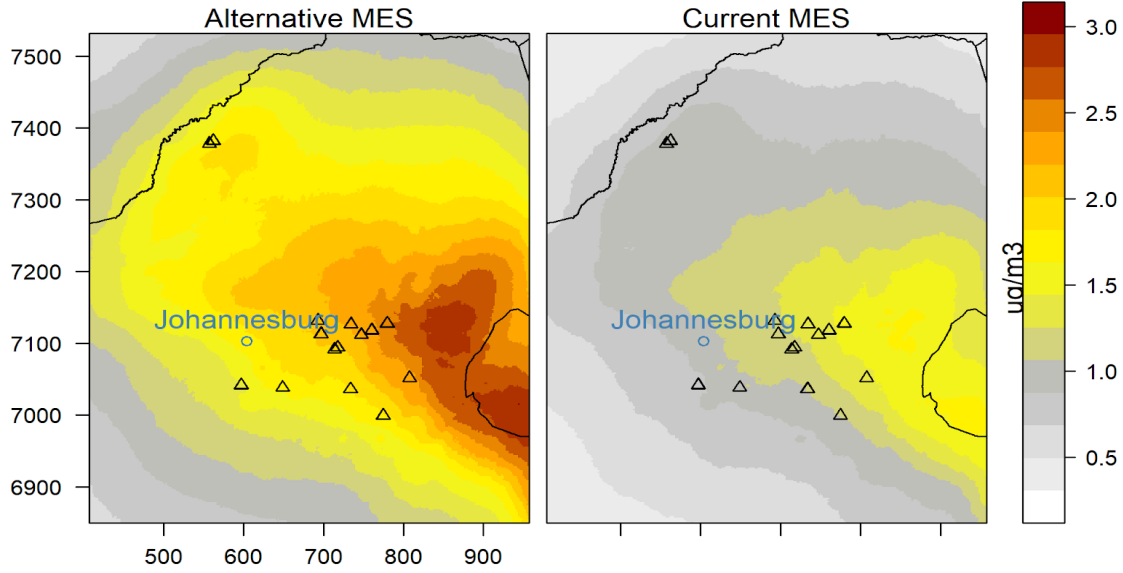


Excess SO₂ peaks at 300,000 tonnes per year, and mercury at 15,000 kilograms.

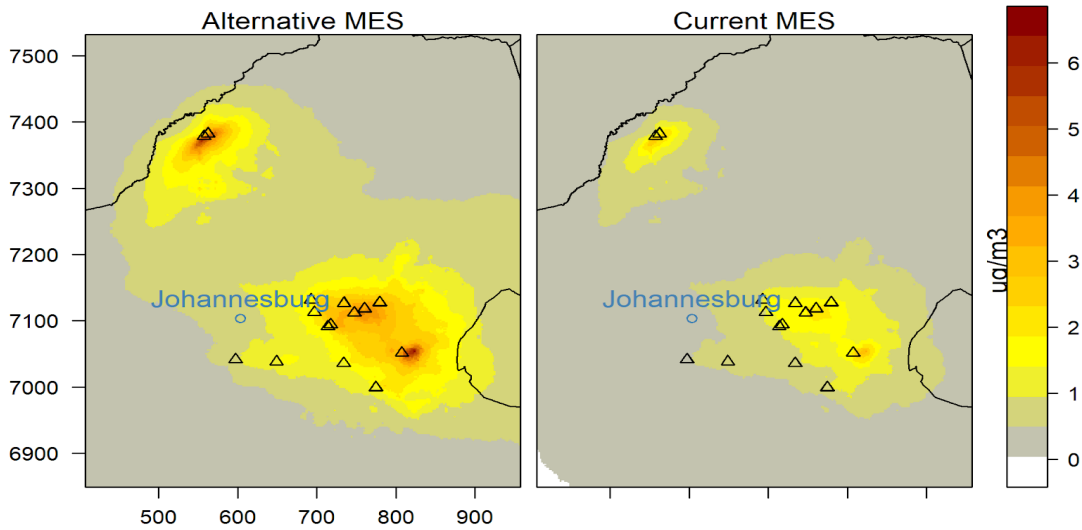
To assess the health impacts of these increases in permitted emissions, the Greenpeace Global Air Pollution Unit carried out CALPUFF dispersion modeling closely following the methodology of the modeling used in Eskom's Cost-Benefit Analysis, with the modeling domain expanded to cover most of South Africa's population. Separate model runs were carried out for each of the 15 Eskom power stations, and contributions of SO₂ to ambient PM_{2.5} levels, through the formation of sulfate particles from the emitted SO₂, were isolated for each station. This allowed us to project the reductions in ambient air pollution levels at each location of the modelling domain over time. The resulting avoided health impacts were projected following the Global Burden of Disease methodology for PM_{2.5} health impacts (Stanaway et al 2018). The projections take into account expected population growth (UN DESA 2017) and epidemiological transition associated with improved health care and an aging population (WHO 2018).

Based on these atmospheric modelling results, **doubling the SO₂ emissions limit would increase population exposure to PM_{2.5} caused by Eskom's coal-fired power plants by 70%, as most of the PM_{2.5} exposure is due to secondary sulphate formation.**

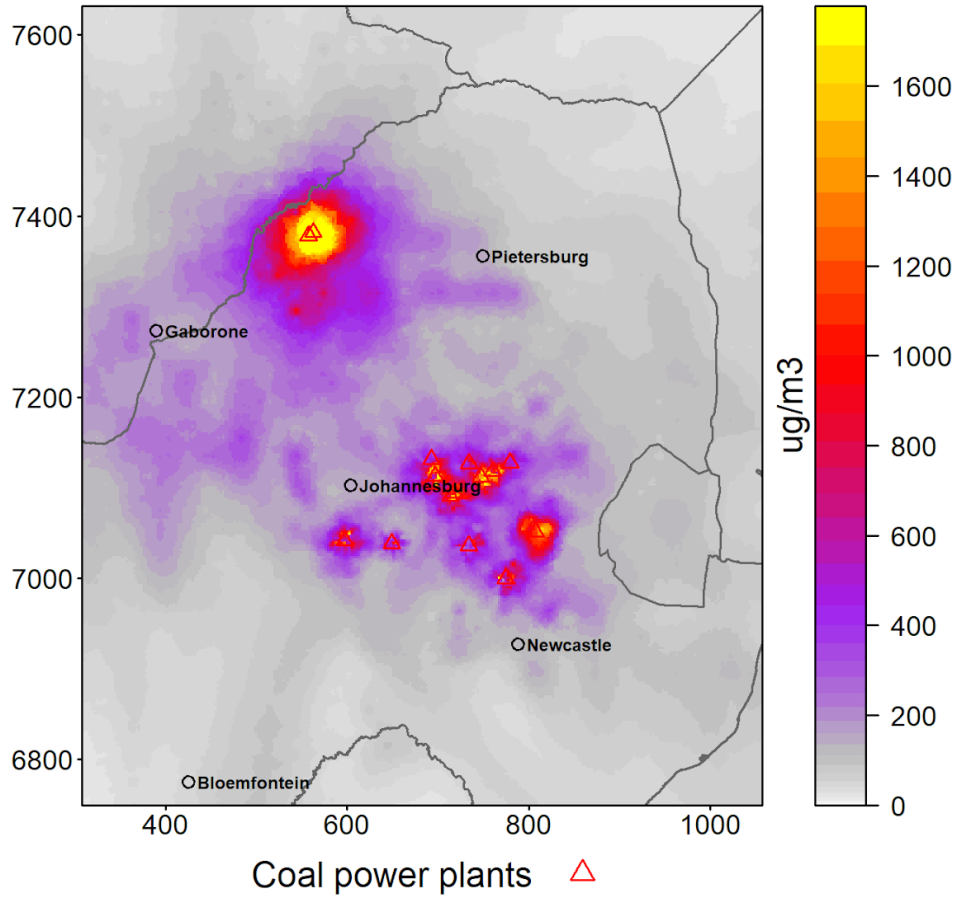
Annual average PM2.5 from Eskom power plants



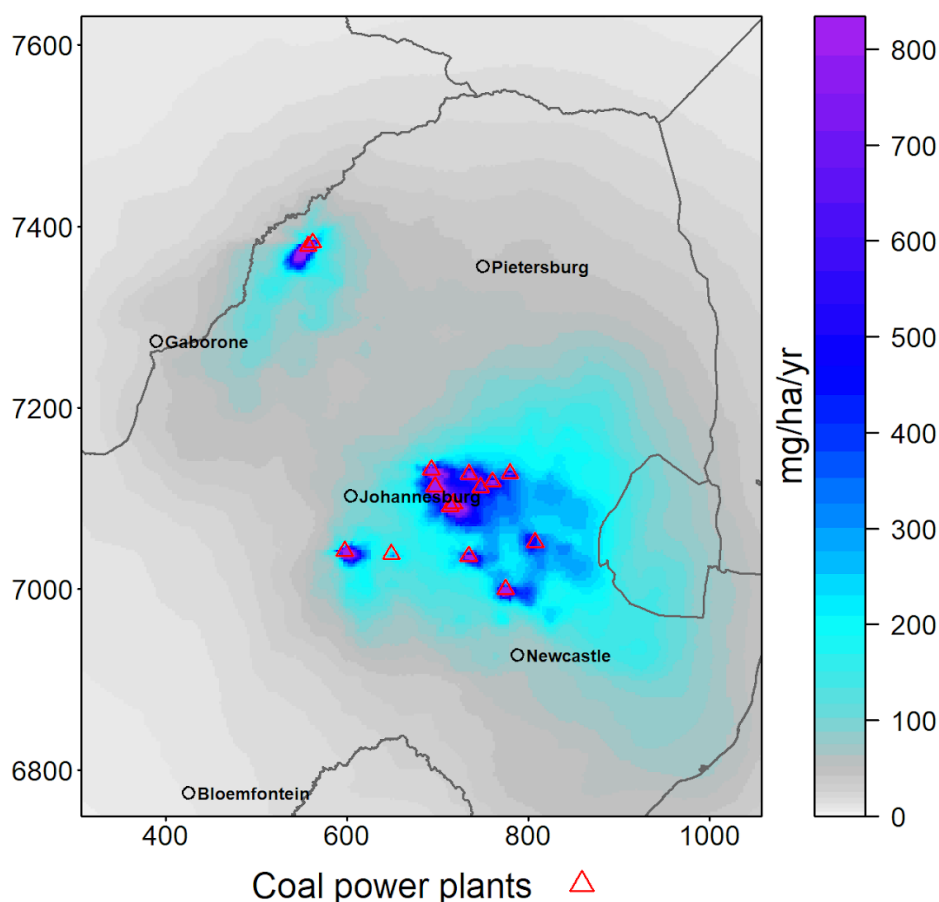
Annual average SO2 from Eskom power plants



Maximum 1-hour SO2 concentration from all Eskom coal plants



Annual total mercury deposition from all Eskom coal plants



The analysis indicates that, over time, the higher SO₂ MES limit of 1000 mg/Nm³ will lead to the following avoidable health impacts, compared with compliance with the current regulation:

- 950 premature deaths due to increased risk of lower respiratory infections, including in young children
- 350 premature deaths due to increased risk of stroke
- 320 premature deaths due to increased risk of death from diabetes
- 560 premature deaths due to increased risk of chronic obstructive pulmonary disease
- 720 premature deaths due to increased risk of ischaemic heart disease, and
- 520 premature deaths due to increased risk of lung cancer associated with chronic PM_{2.5} exposure

The location of Eskom's highly polluting coal-fired power plant fleet in the vicinity of the highly populated region of Gauteng, with many plants located within 100km of the region, is a particular public health concern. Eskom's coal power plant emissions are responsible for approximately 420

premature deaths (95% confidence interval 330 to 500) per year in Gauteng. **Of the 3,300 excess deaths projected from weakening the SO₂ MES limit, approximately 1,000 would take place in Gauteng.**

Most of the health impact is due to emissions from Medupi, followed by Matimba, Kendal and Majuba.

Mercury deposition from the existing and new Eskom coal power plants is projected to exceed levels which can cause health risks, over an area of 89,000km², with 3.4 million inhabitants. The mercury emissions result in an estimated 2,300kg per year of mercury deposited on land and on freshwater bodies within the modelling domain. Cumulatively, the weakening of the SO₂ MES would cause a projected 13,000kg of excess mercury deposition locally in South Africa, compared with the current MES.

The lack of any kind of additional assessment to support the assumptions made around the proposed weakening of the SO₂ limits

The following claims were made by the Department in their statement accompanying the announcement of the public consultation period on the proposed amendment:¹¹

“This is a significant reduction and would still lead to improvements in ambient air quality as total SO₂ emissions would be reduced by at least 50%. Currently, the State of Air Report over the years shows compliances with the SO₂ annual ambient air quality standard but government continues to regulate it because of its contribution to secondary pollution.

Achievement of the new plant standard of 500 mg/Nm³ for SO₂ requires the installation of limestone based wet Flue Gas Desulphurisation (FGD) which is the biggest cost driver in pollution abatement technology. This technology has the SO₂ removal efficiency of over 95 percent. Although FGD is efficient, there are challenges associated with it. The typical capital cost for a 4000MW power plant is R13 billion with an additional R3 billion operating cost per annum. These costs are very high for a slow growing fossil-fuel based economy.

Furthermore, FGD installation requires additional water resources and mining of new limestone as input material. South Africa’s water resources are already constrained and cannot cope with the current and the growing demand from both domestic and industrial users.

Limestone would have to be mined because FGD uses good quality limestone to absorb SO₂ from the flue gas thus forming gypsum. The current market would not be able to absorb the gypsum that would be generated as such it would need to be disposed. The amount and quality of limestone needed is not readily available.

¹¹ <https://www.gov.za/speeches/standards-improve-air-quality-south-africa-23-may-2019-0000>

This means that new mines would be required and mining presents additional environmental problems. In addition, good quality limestone mines are located in the Northern Cape Province which is a considerable distance from the existing major sources of SO₂ and transportation would add to greenhouse gas emissions, amongst others. It should also be noted that the use of FGD technology in a plant generates additional CO₂ emissions, which is a priority pollutant in the Republic.

Revision of the new plant standard for the existing plants from 500 mg/Nm³ to 1000 mg/Nm³ opens up the scope for other technologies to be used in the abatement of SO₂ pollution and would not lead to as much CO₂ emissions. Dry Sorbent Injection (DSI), for example, is another type of FGD that does not require as much water. However, the SO₂ removal efficiency is between 50 and 60%. Although the efficiency is low compared to wet FGD, it has lower capital costs, which are not an impediment to retrofitting existing plants.

The Act does not only aim to protect and enhance the quality of air in the Republic; but also secure ecologically sustainable development while promoting justifiable economic and social development. The process of making regulations is such that all objectives must be upheld. It is therefore in the interest of the Republic of South Africa to consider effecting this change, bearing in mind that the goal is to manage and reduce pollution and not necessarily to create avoidable non-compliances.”

Unfortunately, these statements are not credible, since the proposed amendment is not accompanied by any kind of assessment from the Department in terms of the impacts of the doubling of SO₂ limits, specifically on air quality and public health.

The arguments given by the Department in the press statement accompanying the proposed amendment relating to the feasibility and affordability of controlling SO₂ emissions are essentially meaningless because of the failure to assess the economic and social benefits of reducing SO₂ emissions, neither are there references listed in the statement. The costs and challenges associated with emission control technologies are very well established and widely used elsewhere in the world, and have been inflated in order to support the proposed amendment.

It is also misleading for the Department to claim that ‘improvements’ in air quality would supposedly occur even while the proposal would allow more emissions of SO₂. There is no doubt that the reduction from the 3500 mg/Nm³ limit is critical, and improvements in air quality will happen as a result. What is under debate here is what the impacts will be of changing that reduction from a 500 mg/Nm³ limit to a 1000 mg/Nm³ limit. It should be clear that allowing more than the 500 mg limit of SO₂ will have substantial negative impacts, and we maintain that claiming otherwise is misleading.

An independent assessment of the proposal to weaken the SO₂ limits was commissioned from Dr Ron Sahu¹² by the Centre for Environmental Rights [Annexure 2]. According to Dr Sahu, much of the

¹² Resume is included in Annexure 2.

rationale provided by the Department is not supported and rests on assumptions, which are either incorrect or simplistic. His report addresses more fully the deficiencies, flawed statements or assumptions relating to SO₂ pollution controls (i.e., FGD and dry sorbent injection, DSI) made by the Department, and points out important concerns that the government's statements do not discuss.

The outcomes of this assessment indicate that the SO₂ MES should not be weakened (doubled) to 1000 mg/Nm³, as proposed. Not only will this allow significantly more emissions and adverse harm to exposed populations, the proposal is premised upon assumptions that are false:

- that consumptive water use of the technology required to meet the lower (500 mg/Nm³) standard (flue gas desulfurization - FGD) is significant relative to its benefits;
- that the proposed alternative technology for meeting the relaxed standard of 1000 mg/Nm³ (dry sorbent injection - DSI) is significantly cheaper; and
- that there are no adverse impacts to using DSI in quantities that would be necessary to achieve SO₂ reductions of around 70% as contemplated by the relaxed standard.

The reasons for this opinion are summarised as follows:

- **FGD and water consumption:** There is no justification for doubling the MES to the proposed higher limit based on a broad-brush (i.e., without plant by plant assessment) indictment of FGD technology, simply by presuming that it has high consumptive water needs. Consumptive water needs of FGD are not large compared to other water uses in a power station if the thermal cycle relies on water cooling. And, focusing on just the water use by FGDs while minimising or not weighing the tremendous SO₂ reductions that they can achieve – 99% or more – is misleading and unbalanced. If, in some cases, even the small additional consumptive water needs of wet FGD plants would be problematic, dry-FGD designs can provide the requisite 85% reductions needed to achieve the 500 mg/Nm³ MES. Dry-FGDs, while not as efficient as their wet counterparts, can still easily achieve reductions in the range of 90-95%.
- **Impacts associated with Direct Sorbent Injection (DSI):** DSI was initially developed and is mostly applied in order to remove a range of acid gases such as hydrochloric acid (HCl), hydrofluoric acid (HF). Any SO₂ reductions were an ancillary co-benefit as a result. DSI was not developed to be a primary SO₂ reduction technology as the DEA media release suggests. The DSI process results will cause an increase in Particulate Matter (PM) emissions from electro-static precipitators (ESPs); will adversely affect ESP ash handling systems; cause increases in toxic mercury emissions; and result in adverse impacts from the disposal of ESP sorbent wastes. Mitigating these dramatically raises the costs of implementing DSI.

- **Costs:** capital costs of FGD appear to be significantly inflated. Recent, mass application of FGD, in countries such as India (presently upgrading a large fraction of its coal-fired units with FGD) show that FGD capital costs can be significantly lower, if proper procurement strategies are followed. While capital costs for DSI are indeed lower than FGD, the operating costs (including costs to mine/produce the sorbent, transport it to the coal-plant, properly condition it including reducing its size to fine power by grinding, storing it onsite without exposing it to moisture, etc.) are sizeable, especially to achieve the presumed 70% SO₂ reduction. Based on this, and coupled with mitigating the adverse DSI impacts noted in the previous paragraph, the government's expectation that DSI would be a much cheaper option than FGD is not only not unsupported, but is incorrect.

The April 2015 SO₂ MES applicable to existing coal-fired power plant stacks is 3500 mg/Nm³. **This is an extraordinarily high level of allowable emissions of SO₂**, a known, major air pollutant¹³ and is much higher than comparable allowable levels in other countries. [See Table 1 for reference].

Standards that apply in the US pursuant to application of Best Available Control Technology (BACT) can be very low, on a case-by-case basis, even for existing plants when modified. As demonstrated above in Table 1, developed countries as well as China and India have standards that are 200 mg/Nm³ or less, with China adopting a new plant standard of 35 mg/Nm³.

In Dr Sahu's expert opinion, South Africa's current standard of 3500 mg/Nm³ *"is simply off the charts"*. It is important to note that while the reduction to the original 500 mg/Nm³ is still not nearly as low as levels in the majority of other jurisdictions as seen in Table 1, this would have represented a reduction of approximately 85% from the 3500 mg/Nm³ level. Compliance with the 500 mg/Nm³ level at existing plants was expected via use of flue gas desulfurization (FGD),¹⁴ a widely used group of technologies to reduce SO₂ emissions from existing and new coal-fired power plants. FGDs, depending on design, can reduce stack SO₂ levels by 99% or greater.

Improving air quality is entirely possible: the China example

After public opinion reached a boiling point during disastrous smog episodes in winter 2011-12, later known as China's "Airpocalypse", the government reacted forcefully and published a "National Air Pollution Prevention Action Plan", which set detailed targets for improving air quality, reducing emissions and reducing coal consumption in the country's key regions by 2017. The action plan

¹³ Significant portions of South Africa's population are exposed to very high levels of SO₂, including in so-called High Priority Areas (HPAs), where ambient levels of SO₂ (among other pollutants, including fine particulate matter, PM_{2.5}, which is formed in the atmosphere from SO₂) are known to be greater than health-based protective levels.

¹⁴ FGDs, generically, represent a set of technologies encompassing both wet and semi-wet or dry designs, with many variants depending on actual vendor designs.

period also saw new emissions standards for coal-fired power plants enter into force in 2014, requiring steep reductions in SO₂ and NO_x emissions from the power sector, and a new environmental law become effective at the start of 2015, strengthening the enforcement of emission limits and increasing fines for violators.

Over the five-year period from 2012 to 2017, China achieved dramatic reductions in power plant and industrial emissions and equally dramatic improvements in air quality.

China retrofitted approximately 250 gigawatts of existing coal-fired capacity with Flue Gas Desulphurisation (FGD) between 2005 and 2011, bringing the share of capacity with SO₂ controls from 14.3% to 89.1% in six years. These installations were in response to the national emission standards introduced in 2004. Subsequently China has been retrofitting existing power plants to meet so-called ultralow emission standards, which are 100 times as strict as South Africa's Minimum Emissions Standards for SO₂ (35 mg/Nm³ in China vs. 3500 mg/Nm³ in South Africa).

China remains the world's largest emitter of NO_x (and CO₂) and one of the largest emitters of SO₂, and air pollution levels remain hazardous despite dramatic improvement. However, China's success in reducing emissions and improving air quality rapidly over this decade shows how much can be achieved with a coordinated action plan that requires major polluters to comply.

Conclusion

Greenpeace Africa believes that our submission, and numerous previous submissions made on the Eskom's application for postponements from complying with the MES makes it very clear that we are in the midst of an air pollution emergency in South Africa, with significant negative impacts on people's health. International experience indicates that South Africa has relatively weak Minimum Emission Standards, and the trends internationally are to tighten these standards, certainly not to weaken them.

For coal-fired plants that intend to continue to operate in South Africa, Greenpeace Africa urges the Department to instead consider reducing the stack MES to levels in the range of 200 mg/Nm³, the norm in most other jurisdictions around the world, and a level that can readily and cost-effectively be achieved by implementation of FGD. This will result in the actual improvement of air quality levels in South Africa, including in the various high priority areas.

Weakening the SO₂ limits will clearly have significant impacts on people's health, even causing thousands of premature deaths, and therefore blatantly contravenes our constitutional right to a healthy environment. Greenpeace calls on the Department of Environment, Forestry and Fisheries to compel compliance with the existing limits, and indeed, to seek to strengthen them.

Greenpeace Africa thanks the Department for the opportunity to comment and we look forward to further engagement on this issue, and to being kept updated on this and all air quality-related processes.

Sincerely

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