BROKEN PROMISES

The Failure of the Highveld Priority Area

In 2007, government promised to clean up air pollution on the Highveld by declaring it a priority area under the Air Quality Act. A decade later, the environmental injustice remains: toxic air pollution continues to destroy the health and well-being of the people of the Highveld.

A report by the Centre for Environmental Rights
in collaboration with groundWork and the Highveld Environmental Justice Network

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Centre *for* Environmental Rights
Advancing Environmental Rights in South Africa

groundWork

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ABBREVIATIONS

AEL	Atmospheric emission licence
AIR	Atmospheric impact report
APPA	Atmospheric Pollution Prevention Act, 1965
AQA	National Environmental Management: Air Quality Act, 2004
AQM	Air quality management
AQMP	Air Quality Management Plan
AQO	Air Quality Officer
BTEX	Benzene, toluene, ethylbenzene and xylene
CER	Centre for Environmental Rights
CFPS	Coal-fired power station
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
C_6H_6	Benzene
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DOH	Department of Health
ELM	eMalahleni Local Municipality
EMI	Environmental Management Inspectorate
EMPR	Environmental Management Programme
GHGs	Greenhouse gases
HEJN	Highveld Environmental Justice Network
HPA	Highveld Priority Area
IDP	Integrated development plan
ITT	Implementation Task Team
LED	Light-emitting diode
MDARDLEA	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
MDEDET	Mpumalanga Department of Economic Development Environment and Tourism
MES	Minimum Emission Standards
MSRG	Multi-stakeholder Reference Group
MTR	Mid-term review
NAAQS	National Ambient Air Quality Standards
NACA	National Association for Clean Air
NAEIS	National Atmospheric Emissions Inventory System
NAQI	National Air Quality Indicator
NAQO	National Air Quality Officer

NCC	National Coordinating Council
NDC	Nationally-determined Contribution
NDM	Nkangala District Municipality
NEMA	National Environmental Management Act, 1998
NOx	Nitrogen oxides
NO_2	Nitrogen dioxide
N_20	Nitrous oxide
O_3	Ozone
PAIA	Promotion of Access to Information Act, 2000
Pb	Lead
PM	Particulate matter
ppb	Parts per billion
PPCEA	Parliamentary Portfolio Committee on Environmental Affairs
RDP	Reconstruction and Development Plan
SAAQIS	South African Air Quality Information System
SANAS	South African National Accreditation System
SAWS	South African Weather Service
SNAEL	System for National Atmospheric Emission Licensing
SO_2	Sulphur dioxide
VOCs	Volatile organic compounds
VTAPA	Vaal Triangle Airshed Priority Area
WHO	World Health Organisation

EXECUTIVE SUMMARY

The air pollution on the Mpumalanga Highveld has been a feature of the South African landscape since the 1950s. Major towns like eMalahleni, Middelburg, Secunda, Standerton, Edenvale, Boksburg, and Benoni are well-known for their poor air quality. Home to 12 of Eskom's 15 coal-fired power stations; petrochemical plants like Sasol's giant refinery in Secunda; metal smelters; hundreds of mines - primarily coal; brick and stone works; fertiliser and chemical producers; explosives producers; charcoal producers; and other small additional industrial operations, the Highveld is one of South Africa's industrial heartlands.

In November 2007, following demands by civil society for intervention, the then Minister of Environmental Affairs declared 31,000 km^2 of the heavily-polluted Mpumalanga Highveld, then home to about 3.6 million people, a "priority area" in terms of the National Environmental Management: Air Quality Act, 2004. The Highveld Priority Area (HPA) was declared because, as the Department of Environmental Affairs (DEA) said at the time, "people living and working in these areas do not enjoy air quality that is not harmful to their health and well-being", as required by section 24 of the Constitution.

After 2007, it took more than 4 years for an air quality management plan (AQMP) for the HPA to be published in March 2012. The main aim of this AQMP is for ambient air quality in the HPA to comply with all health-based national ambient air quality standards (NAAQS), with seven goals formulated to address different aspects of meeting this overall objective. These are the following:

Goal 1	By 2015, organisational capacity in government is optimised to efficiently and effectively maintain, monitor and enforce compliance with NAAQS
Goal 2	By 2020, industrial emissions are equitably reduced to achieve compliance with NAAQS and dust fallout limit values
Goal 3	By 2020, air quality in all low-income settlements is in full compliance with NAAQS
Goal 4	By 2020, all vehicles comply with the requirements of the National Vehicle Emission Strategy
Goal 5	By 2020, a measurable increase in awareness and knowledge of air quality exists
Goal 6	By 2020, biomass burning and agricultural emissions are 30% less than current
Goal 7	By 2020, emissions from waste management are 40% less than current

The AQMP set specific objectives committing the DEA, the Mpumalanga and Gauteng provinces, and the affected municipalities (in Gauteng: Ekurhuleni Metropolitan Municipality, Sedibeng District Municipality, and Lesedi Local Municipality (in the Sedibeng District); and in Mpumalanga, Gert Sibande District Municipality, Govan Mbeki, Dipaleseng, Lekwa, Msukaligwa, and Pixley ka Seme Local Municipalities (in the Gert Sibande District), Nkangala District Municipality, Victor Khanye, eMalahleni, and Steve Tshwete Local Municipalities (in the Nkangala District)) to start tackling the air quality problems.

The AQMP should be reviewed after five years. The DEA's own review of the AQMP, published for comment in February 2017, makes clear that, despite some ten years since the HPA's declaration, air quality remains poor, with numerous exceedances of the NAAQS (in broad terms, standards set under the Air Quality Act that ambient air must meet in order for people to breathe that air without damaging their health).

The Centre for Environmental Rights (CER), groundWork, and the Highveld Environmental Justice Network (HEJN) have been supportive, active and vocal participants in the various HPA processes for many years, with a particular focus on the Nkangala District Municipality (NDM) (home to towns including eMalahleni, Middelburg, Delmas and Hendrina), which hosts significant industrial, electricity generation, mining, and manufacturing activity. Frustrated with the lack of progress and the ongoing and devastating health impacts related to this failure, the CER has, with support from groundWork and HEJN, conducted its own analysis to determine whether the declaration of the HPA and the promulgation of the AQMP have improved air quality within the HPA to protect health; and if not, why not?

This evaluation focuses on the following issues as the main challenges in reducing high levels of pollution in the HPA:

- capacity and responsibility for air quality;
- dust control measures;
- measures to reduce domestic fuel burning air pollution; and
- steps taken by industry to reduce pollution, and emissions of greenhouse gases (GHGs).

We used information from various sources, including annual reports of the National Air Quality Officer (NAQO); reports presented by government at HPA meetings; expert analysis; the DEA's own review of the AQMP; emission data available to us; submissions made by the DEA in Parliament; and our own participations and observations. Furthermore, given the important responsibilities of local government in regulating air quality under the Constitution, and our experience and perceptions of municipalities' difficulties in fulfilling these, a questionnaire was developed to assess the views of the NDM and the eMalahleni Local Municipality on these main issues - including whether air quality has improved since the declaration of the HPA - and to evaluate the extent to which these two municipalities require assistance in meeting these obligations.

Our conclusions are that **air quality in the HPA remains poor and out of compliance with health-based NAAQS, despite a decade having passed since the HPA was declared**. Not unexpectedly, the DEA's own review published in February 2017 (in spite of severe limitations in the methodology) confirms that aggregate emissions have not decreased significantly – if at all - over this period, and a credible method of monitoring, tracking, and reporting air pollutant emissions in the HPA has not been developed.

Key findings

Key findings of our report are:

1. **Air quality in the HPA has not improved in the past 10 years, despite the declaration of the HPA and the development of the AQMP.** This is clear from government's own reports – including its HPA review - and from expert analysis of data. It is likely that the continued non-compliance with NAAQS is, in large part, due to the failure of key major industrial facilities to reduce their emissions either adequately, or at all.

2. **Without adequately-functioning, accredited monitoring stations, we do not know whether the air quality is actually far worse than it appears**. The HPA ambient air quality monitoring network has deteriorated since its declaration – the 2012 HPA AQMP listed 23 monitoring sites with available data; the DEA's draft review of the AQMP (published in 2017) listed just nine monitoring stations with available data. Only five of the nine stations publish timeous monthly reports, available on the South African Air Quality Information System (SAAQIS) website.

3. **It is difficult to assess directly whether key industries have reduced emissions, given that neither government nor industries make key data and documents publicly available for review**. Some of the information is available in industries' annual emission reports and/or from the National Atmospheric Emissions Inventory System (NAEIS) and SAAQIS, but this information is not complete or updated, nor is it very easily accessible to the public. The accuracy of the available information is unknown. Such information as is available has to be evaluated and interpreted by air quality experts, which is often not practical or affordable for affected people.

4. **Negligible measures have been taken for the past ten years to reduce dust emissions, particularly from mining activities – one of the major contributors to poor air quality in the HPA**. These measures include by-laws, and undertaking some compliance inspections when there are complaints about dust. The existing National Dust Control Regulations, 2013 have proved inadequate. The Department of Mineral Resources, which is responsible for regulating the environmental impacts of mines, including on air quality, is absent from the HPA process.

5. **Limited steps have been taken to reduce air pollution in dense, low-income settlements**. The draft Strategy to address Air Pollution in Dense Low-income Settlements, that was eventually published for public comment in July 2016, does not contain adequate, measurable, and progressive plans to address the complex challenges of indoor air pollution. The draft Strategy also fails to make adequate provision for the participation of community-based and non-governmental organisations in its design, implementation, review, and updating. There has been no indication of when a final Strategy will be adopted and implemented.

6. **Neither NDM nor the local municipalities within the NDM have enough money or dedicated, appropriately-trained and skilled staff to implement the HPA AQMP and to enforce the Air Quality Act**. Municipalities only have a few of the right people to do air quality management work. These officials have too many responsibilities, and are over-stretched to the extent that they are unable to devote adequate time to air quality management compliance and enforcement. NDM has only three officials designated to do compliance monitoring and enforcement, and these municipal officials have undertaken few compliance inspections of polluting facilities. Various HPA municipalities do not have designated Air Quality Officers or Air Quality Management Plans.

7. To our knowledge, the support provided by DEA for local authorities is not only inadequate, but **the NAQO's controversial decision in early 2015 to grant postponements from compliance with the minimum emission standards (MES) under the Air Quality Act to the biggest polluters in the HPA – Eskom and Sasol – has made it significantly more difficult for air pollution in the HPA to be reduced.** At the very least, HPA facilities should comply with the MES, but ideally, local authorities should impose emission limits in atmospheric emission licences (AELs) that are even stricter than the MES.

This report concludes that **the HPA has, to date, dismally failed in its purpose: to improve air quality so that it at least meets the NAAQS. This means that people of the HPA are having their Constitutional rights to an environment not harmful to health and wellbeing violated**. The significant air pollution means that HPA residents are dying prematurely, and suffering from respiratory and cardiac illnesses that inhibit their prosperity and wellbeing.

What needs to change?

People living in the HPA, and organisations that have been active and vocal participants in the HPA structures, are angry and frustrated by government's failure to protect health by reducing air pollution in priority areas. Pollution is not being adequately monitored or reduced, and polluters are not being held accountable.

The following steps must be taken urgently by various authorities to demonstrate that improving air quality in the HPA is, in fact, a priority for government. We regard the below measures as the minimum required in order for the DEA to meet its Constitutional obligations under section 24 (the environmental right) and for all authorities to meet their obligations under the Air Quality Act.

1. **Given the continued non-compliance with NAAQS in the HPA, immediate steps must be taken to reduce emissions of pollutants**:

    - All facilities in the HPA must be required to comply with at least with the MES. Therefore, having heard representations from the facilities and affected communities, the NAQO should use her powers under the Air Quality Act to consider withdrawing the postponements of compliance with minimum emission standards granted to Eskom and Sasol.
    - No further postponements of compliance with MES or other licence variations that permit exceedances of licence emission standards should be allowed.
    - Licensing authorities must suspend the issuing of all new AELs in the HPA, until there is consistent compliance with all NAAQS. Approval and licensing of any expansion plans of existing industries must be contingent on a simultaneous substantial reduction in emissions.
    - When facilities reach their scheduled end-of-life (particularly certain Eskom coal-fired power stations), AELs must be withdrawn, and decommissioning and rehabilitation enforced.
    - The Dust Control Regulations must be amended to ensure adequate monitoring, measurement, and reduction of the significant dust emissions in the HPA, particularly from mining sources.

2. **In recognition of the crucial importance of air quality compliance in the HPA, a comprehensive compliance monitoring and enforcement programme must be put in place** by DEA and local authorities to ensure that violations of AELs are detected, and enforcement action taken against those who violate licence conditions. Such enforcement action must include suspension of licences for facilities until such time as emissions comply with licence conditions.

3. **The institutions charged with ensuring improved air quality in the HPA must be strengthened and appropriately resourced**:

    - The DEA, the Mpumalanga and Gauteng provincial governments, and municipalities must demonstrate accountability for the proper management of priority areas, recognising that they have an ongoing responsibility for implementing and enforcing approved priority area AQMPs.
    - National government, provincial government, and local authorities in the HPA must allocate adequate financial and human resources to fulfill air quality management functions, including the right tools, training, and equipment to enable the reduction of emissions and improvement of the ambient air quality in NDM, eMalahleni and HPA as a whole.
    - To bolster resources for compliance monitoring and enforcement, the DEA must give serious consideration to requiring all existing facilities in priority areas to pay a substantial annual licensing fee, rather than simply a once-off application fee.
    - Municipalities must take urgent steps to ensure the appointment and training of suitable Air Quality Officers, Environmental Management Inspectors, the development of air quality management plans, and the incorporation of those plans into Integrated Development Plans.
    - The Departments of Mineral Resources and Health – and other relevant departments, when appropriate – must participate in the HPA process to ensure that air pollution from mining is reduced, and human health impacts are addressed adequately.

4. To build trust in the integrity of the management of the HPA, and enable meaningful and informed participation by all stakeholders, there must be **far greater transparency about regulation, monitoring, and compliance in the HPA**:

    - AELs for all facilities in the HPA with significant polluting emissions must require real-time emissions monitoring, and that real-time emissions data be publicly available online and on request.
    - The air quality monitoring station network must urgently be improved upon and adequately managed and maintained, so as to produce verified, reliable HPA air quality data that are readily and publicly available.
    - The DEA and all licensing authorities within the HPA must make all AELs and annual emission reports submitted to them publicly available, and all licence-holders must be required to make these documents available on their websites and on request.

INTRODUCTION

Despite the passage of ten years since the declaration of the Highveld Priority Area (HPA) in November 2007, and the publication of an air quality management plan (AQMP) in March 2012, air quality in the area remains very poor, with high levels of pollution and regular exceedances of the health-based national ambient air quality standards (NAAQS).

The right to an environment not harmful to health or wellbeing was first recognised in April 1994 in our Interim Constitution, acknowledging that reducing pollution is essential for protecting people's health. Since February 1997, when the Constitution of the Republic of South Africa, 1996 ("the Constitution") became law, everyone has been guaranteed the right: (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:– (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The National Environmental Management: Air Quality Act, 2004 (AQA) came into force in September 2005,[1] and is one of the "reasonable legislative measures" envisaged by the Constitution to give effect to the constitutional environmental right. AQA recognises; amongst other things, that: "*the quality of ambient air in many areas of [South Africa] is not conducive to a healthy environment for the people living in those areas let alone promoting their social and economic advancement*"; "*the burden of health impacts associated with polluted ambient air falls most heavily on the poor*"; and "*air pollution carries a high social, economic and environmental cost that is seldom borne by the polluter*".[2]

AQA aims to provide reasonable measures to: protect and enhance air quality; prevent air pollution and environmental degradation; and secure *"ecologically sustainable development while promoting justifiable economic and social development".* AQA represents a shift from the source-based air pollution control of the Atmospheric Pollution Prevention Act, 1965 (APPA) (which it repealed) to integrated air quality management (AQM) - which focuses on the adverse impacts of air pollution and sets standards intended to be protective of health, both for pollutant levels in ambient air, and for emitters of pollutants.

An important tool to help achieve the improvement of air quality is the ability of the Minister of Environmental Affairs ("the Minister") to declare areas of high air pollution as "priority areas". The insertion of this power followed environmental justice campaigning in "pollution hotspots" by civil society in south Durban, Sasolburg, Mpumalanga, and Cape Town.

In November 2007, the then Minister declared the Mpumalanga Highveld a priority area for air pollution,[3] on the basis of the area's poor ambient air quality, non-compliance with the NAAQS, and elevated concentrations of so-called criteria pollutants.[4] Numerous statutory and institutional mechanisms – including an AQMP - were put in place with the aim of improving air quality to ensure that it meets acceptable standards. The AQMP sets out seven main goals with timeframes,[5] with the aim of ensuring that

1 Some sections only commenced in April 2010.

2 Preamble.

3 In terms of s.18(1) of AQA.

4 Criteria pollutants are those for which NAAQS (setting allowable concentrations of these substances in ambient air) have been set. Criteria pollutants include carbon monoxide, lead, benzene, nitrogen dioxide, ozone, particulate matter, and sulphur dioxide.

5 Goal 1: by 2015, optimise organisational capacity in government to efficiently and effectively maintain, monitor and enforce compliance with NAAQS;

its main goal – that ambient air quality in the HPA will comply with all NAAQS – is met.[6] It is to be implemented by various relevant stakeholders, including industry, government, affected communities, and civil society organisations. Regular meetings of such stakeholders have also been convened.

Yet, some ten years later, in 2017, air quality remains poor on the Highveld. This is clear from the Department of Environmental Affairs (DEA)'s own reports and data.

The Centre for Environmental Rights (CER), groundWork, and the Highveld Environmental Justice Alliance (HEJN) have been active and vocal participants in the HPA process for years; making numerous demands for improvements in the process; attending meetings of the multi-stakeholder reference group (MSRG) and implementation task team (ITT); attending industry site visits and meetings; making presentations and submissions to government, industry, portfolio committees; drafting and publishing reports; and sending correspondence to various government bodies and industries. Some of the suggestions made to improve the meetings, in particular, include: logistical and administrative arrangements; some proposed standing items for discussion;[7] and that the Department of Health (DOH) and Department of Mineral Resources (DMR)[8] attend these meetings. Although neither the DOH nor DMR yet attends meetings, some of these suggestions regarding logistics and administration have been incorporated in MSRG and ITT meeting processes and have improved the functioning of these meetings.

Since about July 2015, the DEA has been in the process of conducting a mid-term review (MTR) of the 2012 HPA AQMP, ahead of the five year review which was due by March 2017. The draft review was first made available for comment in late February 2017[9] and comments were submitted on 23 March 2017.[10] At the May 2017 MSRG, participants were told to expect the updated review by about 25 June 2017. However, as at the date of finalising this report, the updated MTR has not been received.

The HPA covers a large area. Our assessment focused on Nkangala District Municipality (NDM), which is made up of the following local municipalities: Victor Khanye, eMalahleni, Steve Tshwete, eMakhazeni, Dr J.S. Moroka, and Thembisile Hani; the first three of which fall within the HPA. NDM hosts significant industrial, electricity generation, mining, and manufacturing activity. Polluting industries like Columbus Stainless (Pty) Ltd; Samancor-Middelburg Ferrochrome and Ferrometals Ltd; Samancor Ferrometals eMalahleni; Evraz Highveld Steel and Vanadium Corporation Ltd; Vanchem, Transalloys, Union Carbide, and no fewer than 12 Eskom coal-fired power stations (CFPSs) i.e Arnot, Camden, Duvha, Hendrina, Kendal, Komati, Kriel, Matla, Tutuka, Grootvlei, Lethabo, and Kusile (which is under construction) fall within this area.

Goal 2: by 2020, industries equitably reduce emissions to achieve compliance with NAAQS and dust fallout levels;
Goal 3: by 2020, air quality in all low-income settlements is in full compliance with NAAQS;
Goal 4: by 2020, all vehicles comply with the requirements of the National Vehicle Emission Strategy;
Goal 5: by 2020, a measureable increase in awareness and knowledge of air quality exists;
Goal 6: by 2020, biomass burning and agricultural emissions will be 30% less than current; and
Goal 7: by 2020, emissions from waste management are 40% less than current.

6 pp.108-109.

7 http://cer.org.za/wp-content/uploads/2016/07/CER-Letter-re-Management-of-the-MSRG-and-ITT-meetings-in-Priority-Areas-22-August-2014.pdf; http://cer.org.za/wp-content/uploads/2016/07/CER-letter-to-HPA-ITT-Chairperson-29-October-2014.pdf

8 http://cer.org.za/wp-content/uploads/2016/07/CER-Final-Comments-on-the-ToR-for-the-Implementation-of-the-HPA-MSRG-AQMP-11-Dec-2015.pdf; http://cer.org.za/wp-content/uploads/2016/09/CER-Letter-to-the-DoH-re-attending-HPA-meetings.pdf

9 https://cer.org.za/wp-content/uploads/2016/07/HPA-AQMP-Midterm-review-Draft-Report_February-2016.pdf

10 https://cer.org.za/wp-content/uploads/2016/07/CER-preliminary-comments-on-mid-term-review_23-March-2017_final-1.pdf and https://cer.org.za/wp-content/uploads/2016/07/Annexure-1-to-CER-preliminary-comments-on-mid-term-review.pdf

As a result of the proliferation of polluting industries and their impacts on human health and wellbeing, most of our work and support in the HPA has been in this area.

With this background, and due to the severe frustrations of the CER, HEJN, and groundWork regarding the apparent lack of progress in achieving the aim of the HPA, and the devastating health impacts related to this failure, the CER, with support from groundWork and HEJN, and with expert assistance, conducted our own analysis to determine whether the declaration of the HPA and the promulgation the AQMP have improved air quality within the HPA; and if not, why not?

This assessment focuses on issues of: air quality capacity and responsibility; dust control measures; measures to reduce domestic air pollution; and steps taken by industry to reduce pollution and emissions of greenhouse gases (GHGs). These issues were identified as the main challenges in reducing high levels of pollution in the HPA.

Our experience and perception is that municipalities have significant difficulties in fulfilling their air quality-related obligations. Part of this assessment involved asking questions of two municipalities which have air quality-related obligations in the HPA: NDM and eMalahleni Local Municipality (ELM). As set out in the next section, the Constitution gives municipalities the executive authority and the right to administer air pollution, and AQA indicates that metropolitan and district municipalities are generally required to implement the atmospheric emission licensing system and AQM. This is with oversight from the other two spheres of government. The DEA is required to monitor compliance with HPA AQMP goals.

The questions we asked of NDM and ELM in June 2016 (which were only answered by ELM, and not NDM) focused on the issues identified above. We also asked each of them whether air quality in the HPA had improved since the area's declaration, and identified various indicators to assist in answering these questions.[11] We identified these questions based on what we regard as the most important issues to be resolved in order to achieve the AQMP's aims.

In order to assess these issues, we also used other information from various sources – including: the annual reports of the National Air Quality Officer (NAQO); reports presented by government at HPA meetings; experts' reports; the DEA's MTR; emission data available to us; submissions made in Parliament; and our own participations and observations.

[11] http://cer.org.za/wp-content/uploads/2016/07/CER-HPA-Mini-Shadow-Review-Identified-Indicators-for-Nkangala-District....pdf; http://cer.org.za/wp-content/uploads/2016/07/CER-HPA-Mini-Shadow-Review-Identified-Indicators-for-eMalahleni-Local-Municipality-_15-June-2016.pdf; http://cer.org.za/wp-content/uploads/2016/07/SKM_554e16070608570.pdf
We asked the following questions:

a. Is there clarity and agreement amongst all authorities in the various spheres of government about who is responsible for regulating air quality on the Highveld, including licensing, compliance monitoring, and enforcement?
b. Do the designated institutions have enough resources to do the job? Do they have approved budgets that allocate sufficient funds?
c. Does the municipality have enough of the right people to do the job?
d. Have any measures been put in place since 2007 to reduce dust?
e. Have any measures been put in place since 2007 to improve air quality in dense low income settlements?
f. Have key industrial facilities in NDM/ELM reduced their emissions of key pollutants and GHGs since 2007?
g. Has air quality improved in the HPA since 2007?

AIR QUALITY MANAGEMENT ROLES AND RESPONSIBILITIES

The AQMP envisages, as goal 1, that, "*by 2015, organisational capacity in government is optimised to efficiently and effectively maintain, monitor and enforce compliance with [NAAQS]*". Objective 2 of this goal in the HPA AQMP includes that the air quality function should be assigned to the most appropriate section of municipalities and provinces. The AQMP indicator for this is that the AQM function allocation or delegation must be made for every municipality, and a functional analysis conducted or assignments made.

Who is designated to regulate air quality on the Highveld?

The Constitution provides that municipalities have executive authority and the right to administer air pollution.[12] The DEA and provinces have legislative and executive authority to see to the effective performance by municipalities of their functions, by regulating the exercise of their executive authority.[13]

In terms of AQA, metropolitan and district municipalities are charged with implementing the atmospheric emission licensing system and AQM for the municipality.[14] In order for this to be effected, an air quality officer (AQO) responsible for coordinating matters pertaining to AQM in every municipality must be designated.[15] It is possible for municipalities to delegate their licensing authority functions to a provincial organ of state,[16] and AQA also stipulates the procedure to be followed when a licensing authority fails to take a decision on an application for an atmospheric emission licence (AEL) within the prescribed time period.[17]

In terms of the Local Government: Municipal Systems Act ("the Systems Act"), each municipal council must adopt a single, inclusive and strategic plan for the development of the municipality. Such integrated development plan (IDP) is the principal strategic planning instrument to guide and inform all planning and development, and all decisions with regard to planning, management, and development in the municipality. The IDP must reflect, amongst other things: the council's vision for the long-term development of the municipality - with special emphasis on the municipality's most critical development and internal transformation needs; the council's development priorities and objectives for its elected term, including its local economic development aims and its internal transformation needs; the council's development strategies - which must be aligned with any national or provincial sectoral plans and planning requirements binding on the municipality in terms of legislation; the council's operational strategies; a financial plan, which must include a budget projection for at least the following three years; and key performance indicators and performance targets. It must be reviewed annually and as required by changing circumstances.[18]

To effect AQM in the municipality, AQA requires each municipality to include an AQMP in its IDP.[19] The AQMP must, amongst other things: outline how it proposes to improve air quality; identify how poor air quality impacts on human health and the environment will be reduced; and address the effects of emissions from industrial sources and fossil fuels in residential applications.

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12 s.156, Schedule 4 Part B on the functional areas of Concurrent National and Provincial Legislative Competence.

13 s.155(7) of the Constitution.

14 s.36.

15 s.14.

16 S.238 of the Constitution makes provision for an executive organ of state: to delegate any legislated power or function to any other executive organ of state, provided the delegation is consistent with that legislation; or to exercise any power or perform any function for any other executive organ of state on an agency or delegation basis.

17 s.36.

18 Chapter 5 of the Systems Act.

19 s.15(2).

NDM has prepared an AQMP; this document came into force during 2016, as did NDM's AQM By-law, 2015. Although NDM has its own AQMP for managing air quality issues in the NDM area, the HPA AQMP remains the broader framework document that guides AQM in the area.

The NDM AQMP, 2015 identifies, as one of its objectives, that "*the [a]ir quality function is assigned to the most appropriate section of municipalities and provinces*".[20] The activities in the AQMP require the authorities to: identify the most appropriate sphere for the AQM function on behalf of each municipality; create a database of AQM functional analyses conducted; and conduct a functional analysis or section 77/78 Systems Act analysis to determine the suitable section or department for AQM and assign the function accordingly.

Section 77 of the Systems Act requires that a municipality review and decide on the appropriate mechanism to provide a municipal service when, for example, it prepares or reviews its IDP or a new municipal service is to be provided.

In the Systems Act, a "basic municipal service" is defined to mean a "*municipal service that is necessary [to] ensure an acceptable and reasonable quality of life and, if not provided, would endanger public health or safety or the environment*". AQM qualifies as a basic municipal service, as acceptable air quality is essential to good health.

In terms of Section 78 of the Systems Act, a municipality wishing to provide a new municipal service (or to review an existing one) must, among other things, first assess: the costs and benefits associated with the benefit, including the expected effect on the environment and on human health, well-being and safety; its capacity and potential future capacity to furnish the skills, expertise and resources necessary for the provision of the service; the extent to which the re-organisation of its administration and the development of the human resource capacity within that administration could be utilised to provide a service; the likely impact on development, job creation, and employment patterns in the municipality; and the views of organised labour.

In order for municipalities to implement the AEL system and oversee AQM in the municipality, they must review and decide on the appropriate mechanism to provide the service. It was on the basis of these requirements that local municipalities such as NDM and ELM are tasked with conducting section 77/78 assessments to determine the capacity and personnel requirements for running the AQM function and for the cost of fulfilling the obligations to improve ambient air quality as required by the HPA AQMP.

In responding to this question, ELM indicated that:

> *"There are no written agreements between the various authorities that deal with air quality issues. However, there are standing arrangements between these authorities to communicate issues of air quality via the [Integrated Development Planning/ Local Economic Development] (IDP/LED) working group on the environment, health and social development forums, air quality officers forum (AQOF), Multi-stakeholder reference Group Meetings (MSRG) or Implementation Task Team (ITT) meetings.*
>
> *The municipality has designated the Manager: Environmental Management and Compliance as its local air quality officer. The municipality understands the role of its air quality officer within the context of enforcement of national dust control regulations, its local By-Laws and the National Environmental Management: Air Quality Act (NEMAQA)."*

[20] HPA AQMP p.111.

ELM also indicated that it has always had good "inter-governmental relations" and been able to collaborate in dealing with air quality complaints with NDM, and Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA). MDARDLEA advised, at a presentation made at the 16 May 2017 NDM, that comprehensive joint compliance inspections are conducted quarterly with DEA and municipalities.

ELM said that NDM is the AEL licensing authority, but that it does participate in joint compliance inspections with NDM, and also obtains regular reports on the licensing function through various forums held with affected municipalities.

According to ELM:

> *"The municipality however experiences some challenges in addressing complaints emanating from mining operations, in particular, the licensing of mining operations at close proximity to the residential areas which result in complaints of dust, noise and/or blasting in some areas. The intergovernmental relations between the municipality and Department of Mineral Resources (DMR) needs to be improved in terms of getting the DMR to participate in all the above mentioned relevant forums which aim to deal with air quality issues in the HPA."*

It is clear that NDM takes on the majority of the AQM responsibility also for ELM. Before NDM took it over in 2013, the AQM function was previously performed by the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET). The "environment" function is now with the MDARDLEA. NDM is the licensing authority for all AEL applications in the Middelburg, eMalahleni areas, encompassing Steve Tshwete Local Municipality, ELM, Victor Khanye Local Municipality, Thembisile Hani Local Municipality, JS Moroka Local Municipality, and Emakhazeni Local Municipality. NDM is also in charge of organising and coordinating the HPA NDM ITT meetings, which include Steve Tshwete, eMalahleni, and Victor Khanye local municipalities, as well as other relevant stakeholder meetings or training in the HPA NDM area – usually hosted at the NDM offices in Middelburg.

NDM is also involved in compliance monitoring and enforcement activities, and they have stated at HPA ITT meetings that they regularly accompany the DEA Environmental Management Inspectorate (EMI, also known as "the Green Scorpions", designated as environmental management inspectors in terms of the National Environmental Management Act, 1998 (NEMA)) on investigations within NDM.

NDM states in their AQMP[21] that a section 78 analysis was conducted for NDM, but we have not, despite request, received a copy of this document. This section 78 analysis was, according to the current AQO for NDM, Mr Vusi Mahlangu, superseded by the NDM AQMP. The NDM AQMP outlines NDM AQM functions and obligations in AQA.[22]

It is clear in this case that NDM is the designated authority and is responsible for all AQM matters in the district. NDM works in collaboration with other local municipalities to perform the AQM mandate.

Although the municipalities seem to be aware of the designated authority and the obligations imposed upon each of them in their AQM function, there appears to be limited guidance at the local municipality level to guide the AQM function and relationship. It would probably be beneficial to have a guideline agreement or

[21] p.83.
[22] pp.81-82.

document prepared by the DEA that outlines the AQM relationship between the different local municipalities and the relevant district/metropolitan municipality.

If a section 78 analysis is done, this should be reviewed to evaluate whether it has been effective in providing guidance of the achievement of HPA AQMP goals, and, if not, why not. As addressed below, we are aware from talking to the AQOs and from reports by municipalities (NDM and ELM) that there are significant capacity constraints for municipalities – both financial and human. A review of the section 78 analysis should look at how the capacity concerns can be addressed and this analysis can then be used to motivate for a higher budget to resolve the AQM capacity problem in the municipalities. The resources question is addressed next.

RESOURCES

In relation to adequate and the right resources to do the job, and whether designated institutions have approved budgets and sufficient funds, the HPA AQMP indicators for objective 3 of this goal are: whether the AQO has been appointed, whether AQM responsibilities have been allocated to personnel, whether staff have been appointed to fill in AQM posts in the organogram and whether a scarce skills policy has been developed.

With regard to whether the municipalities have enough of the right people to do the job, this is it linked not only to objective 3 of the 2015 goal, but also to objective 5 in the AQMP ("*personnel are equipped to perform AQM function and use AQM tools effectively*"). Indicators include: whether training guidance has been developed; whether a skills gap analysis has been conducted; whether skills development plans are implemented; whether standard training courses are used; and whether AQM research has been identified and communicated.

Do the designated institutions have enough resources to do the job?

In seeking to answer this question, we wanted to establish whether the responsible authorities have the requisite resources to do the AQM work that they need to do.

The DEA's Annual Report 2015/16 and its Annual Performance Plan 2017-2018 indicate that the purpose of the Climate Change and Air Quality Programme is to improve air and atmospheric quality, lead and support, inform, monitor and report efficient and effective international, national and significant provincial and local responses to climate change.[23] The Programme is made-up of the following seven sub-programmes: (1) Climate Change Management (2) Climate Change Mitigation (3) Climate Change Adaptation (4) Air Quality Management (5) South African Weather Service (6) International Climate Change Relations and Negotiations (7) Climate Change Monitoring and Evaluation.[24]

The Programme expenditure was reflected as follows:

[23] DEA's Annual Performance Plan 2017-2018 p.15.
[24] DEA's Annual Report 2015/16 p.55.

PROGRAMME EXPENDITURE

PROGRAMME NAME	2015/16			2014/15		
	FINAL APPROPRIATION	ACTUAL EXPENDITURE	(OVER)/UNDER EXPENDITURE	FINAL APPROPRIATION	ACTUAL EXPENDITURE	(OVER)/UNDER EXPENDITURE
	R'000	R'000	R'000	R'000	R'000	R'000
Administration	832 487	832 487	-	731 335	731 335	-
Legal, Authorisation and Compliance	131 717	131 417	300	102 123	100 621	1 502
Oceans and Coasts	372 021	368 659	3 362	349 257	349 257	-
Climate Change and Air Quality	246 114	246 114	-	229 292	229 292	-
Biodiversity and Conservation	700 648	699 863	785	643 068	643 068	-
Environmental Programmes	3 580 570	3 579 640	930	3 553 433	3 549 608	3 825
Chemicals and Waste Management	79 740	79 740	-	71 878	71 878	-
TOTAL	**5 943 297**	**5 937 920**	**5 377**	**5 680 386**	**5 675 059**	**5 327**

This table[25] reveals that, in 2014/15, R229 292 000 was appropriated and spent in the Climate Change and Air Quality programme, and, in 2015/16, R246 114 000.

As per the table below, in its latest annual performance plan (2017-2018), it is indicated that, in 2016/17, R289 582 000 was the adjusted appropriation, with the following expenditure estimates in the three years thereafter: R294 872 000 (2017/18); R300 558 000 (2018/19); and 311 876 000 (2019/20).[26]

PROGRAMME	AUDITED OUTCOMES R '000			ADJUSTED APPROPRIATION R '000	MEDIUM TERM EXPENDITURE ESTIMATE R '000		
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
1. Administration	765 026	731 335	832 487	803 226	863 045	923 986	1 004 988
2. Legal, Authorisations and Compliance Enforcement	102 934	100 621	131 417	164 647	179 780	189 324	203 471
3. Oceans and Coasts	326 088	349 257	368 659	475 041	468 455	491 995	508 054
4. Climate Change and Air Quality	229 760	229 292	246 114	289 582	294 872	300 558	311 876
5. Biodiversity and Conservation	565 662	643 068	699 863	718 249	696 518	726 107	761 232
6. Environmental Programmes	3 137 724	3 549 608	3 579 640	3 865 083	3 895 209	3 879 020	4 002 847
7. Chemicals and Waste Management	73 113	71 878	79 740	109 273	450 335	550 236	585 557
TOTAL	**5 200 307**	**5 675 059**	**5 937 920**	**6 425 101**	**6 848 214**	**7 061 226**	**7 378 025**

The following table indicates that the AQM sub-programme appropriated and spent R36 597 000 in 2014/15 and R41 101 000 in 2015/16.[27]

[25] DEA's Annual Report 2015/16 p.8.
[26] DEA's Annual Performance Plan 2017-2018 p.12.
[27] DEA's Annual Report 2015/16 p.82.

PROGRAMME 4: CLIMATE CHANGE AND AIR QUALITY

SUB- PROGRAMME NAME	2015/16			2014/15		
	FINAL APPROPRIATION	ACTUAL EXPENDITURE	(OVER)/UNDER EXPENDITURE	FINAL APPROPRIATION	ACTUAL EXPENDITURE	(OVER)/UNDER EXPENDITURE
	R'000	R'000	R'000	R'000	R'000	R'000
Climate Change Management	6 667	6 667	-	7 642	7 642	-
Climate Change Mitigation	8 769	8 769	-	8 374	8 374	-
Climate Change Adaptation	6 953	6 953	-	6 593	6 593	-
Air Quality Management	41 101	41 101	-	36 597	36 597	-
South African Weather Service	160 423	160 423	-	152 489	152 489	-
International Climate Change Relations and Negotiations	13 046	13 046	-	10 207	10 207	-
Climate Change Monitoring and Evaluation	9 155	9 155	-	7 390	7 390	-
TOTAL	**246 114**	**246 114**	**-**	**229 292**	**229 292**	**-**

According to the 2016 Treasury Budget Estimates on National Expenditure for the DEA (covering the period 2016 - 2019), the budget was allocated as follows:[28]

Budget summary

R million	2016/17 Total	Current payments	Transfers and subsidies	Payments for capital assets	2017/18 Total	2018/19 Total
MTEF allocation						
Administration	808.2	652.0	16.0	140.3	866.5	926.7
Legal, Authorisations and Compliance	164.6	163.7	–	1.0	182.3	191.6
Oceans and Coasts	475.0	460.7	–	14.3	489.1	491.9
Climate Change and Air Quality	289.6	82.0	206.5	1.2	295.0	300.8
Biodiversity and Conservation	718.2	165.3	552.2	0.7	696.6	737.6
Environmental Programmes	3 865.1	643.1	3 218.0	4.0	4 016.9	3 987.6
Chemicals and Waste Management	109.3	101.8	6.8	0.6	114.3	120.7
Total expenditure estimates	**6 430.1**	**2 268.5**	**3 999.5**	**162.1**	**6 660.6**	**6 756.8**
Executive authority	Minister of Environmental Affairs					
Accounting officer	Director General of Environmental Affairs					
Website address	www.environment.gov.za					

The Estimates of National Expenditure e-publications for individual votes are available on www.treasury.gov.za. These publications provide more comprehensive coverage of vote specific information, particularly about goods and services, transfers and subsidies, personnel, entities, donor funding, public private partnerships, conditional grants to provinces and municipalities and expenditure information at the level of service delivery, where appropriate.

This reveals that the amount allocated to Climate Change and Air Quality for 2016/17 is R289.6 million, which is planned to increase to R295 million for 2017/18 and to R300.8 million for 2018/19. This annual increase of about 1.9% is well below the expected inflation rate of 4 to 6%. This means the budget for this item is actually being cut, in real terms, at a time when addressing air pollution and climate change matters are becoming increasingly more important and urgent.

The Climate Change and Air Quality Programme is allocated R885.4 million over the medium-term (2016-2019); which is 4.46% of the DEA's total budget.

[28] Treasury Budget on National Expenditure: Budget vote 27: Environmental Affairs p.1.

According to the 2017 Treasury Budget Estimates on National Expenditure for the DEA (covering the period 2017 - 2020), the budget was allocated as follows:[29]

Budget summary

	2017/18				2018/19	2019/20
R million	Total	Current payments	Transfers and subsidies	Payments for capital assets	Total	Total
MTEF allocation						
Administration	863.0	703.4	16.0	143.7	924.0	1 005.0
Legal, Authorisations and Compliance	179.8	178.2	–	1.6	189.3	203.5
Oceans and Coasts	468.5	453.7	–	14.8	492.0	508.1
Climate Change and Air Quality	294.9	86.6	207.0	1.2	300.6	311.9
Biodiversity and Conservation	696.5	123.7	572.1	0.8	726.1	761.2
Environmental Programmes	3 895.2	483.7	3 408.7	2.9	3 879.0	4 002.8
Chemicals and Waste Management	450.3	164.6	285.1	0.6	550.2	585.6
Total expenditure estimates	**6 848.2**	**2 193.8**	**4 488.9**	**165.5**	**7 061.2**	**7 378.0**
Executive authority	Minister of Environmental Affairs					
Accounting officer	Director General of Environmental Affairs					
Website address	www.environment.gov.za					

The Estimates of National Expenditure e-publications for individual votes are available on www.treasury.gov.za. These publications provide more comprehensive coverage of vote specific information, particularly about goods and services, transfers and subsidies, personnel, entities, donor funding, public private partnerships, conditional grants to provinces and municipalities, and expenditure information at the level of site service delivery, where appropriate.

The Climate Change and Air Quality Programme is allocated R294.9 million in 2017/18, which is planned to increase to R300.6 million for 2018/19 and R311.9 million for 2019/20. The Programme is therefore allocated R907.4 million from 2017-2010 – 4.26% of the DEA's total budget.

This budget allocation should contrasted to the allocation of almost R3,895.2 billion (56.9% of the total) for Environmental Programmes in 2017/18, the purpose of which is the implementation of expanded public works and green economy projects in the environmental sector.[30] We argue that these programmes are peripheral to the core mandate of the DEA, which is to manage, protect, and conserve South Africa's environment and natural resources.

Given the urgent steps required to address climate change and declining air quality, and the centrality of these issues to the fulfillment of the constitutional environmental right, the amounts allocated to the Climate Change and Air Quality Programme are hopelessly too small. More money should be allocated towards Climate Change and Air Quality.

A status quo report conducted by the DEA to assess the capacity of municipalities to fully undertake air quality functions in 2014 revealed that the air quality function is significantly impacted by three factors: human resource constraints, financial constraints, and inadequate technical resources. Others factors include the lack of executive/political support, and air quality functions not being aligned with the IDP planning process budgets and provincial planning processes.[31]

This is supported by ELM's responses to this question: it stated that a new organisational structure for the environmental management and compliance department was approved by the Municipal Council in 2014, but that the budget was insufficient to implement key mandates of the department. According to ELM, since 2014,[32] the following budget allocations were made:

[29] Treasury Budget on National Expenditure: Budget vote 27: Environmental Affairs p.1.

[30] DEA's Annual Report 2015/16 p.67.

[31] Requirements for authorities to fully effect AQM functions; the business case presented at the 9th Air Quality Governance Lekgotla in Kwa-Zulu Natal 6 October 2014 by Ms Elizabeth Masekoameng.

[32] ELM did not use 2007 as the starting point, as requested.

- 2014/2015 – total expenditure of R2 670 518 was inherited from environmental health practitioners who were transferred to NDM during the same year;
- 2015/2016 - total expenditure of R 1 224 376 was incurred - the shortfall is created by the vacancies in the new department; and
- 2016/2017 - a total allocation of R 3 389 309 was approved.

ELM identifies the following key line items for the environmental management and compliance department (it is not clear what period the budget covers as this was not indicated in the response by ELM):

MATERIALS AND PROVISIONS	R 1 153.00
NOISE CONTROL	R2 309.00
PAUPER BURIALS	R46 189.00
PAYMENTS - POND SPCA KRIEL AND WITBANK	R30 202.00
PRINTING AND STATIONERY	R46 205.00
RENTAL - OFFICE MACHINERY	R12 520.00
TELEPHONE SERVICES	R13 856.00
TRAVEL/SUBS. EXP. & DEL. COSTS	R3 671.00
UNIFORMS & PROTECTIVE CLOTHING	R5 767.00
ANALYSIS - COSTS	R11 810.00
PROFESSIONAL SERVICES	R280 000.00
AIR MONITORING STATION	R23 094.00
CLEANING OF COUNCIL STANDS	R28 868.00
FURNITURE & EQUIPMENT	R2 117.00
GROUNDS & TERRAIN	R2 309.00
TOOLS & EQUIPMENT	R2 886.00
TRADE LICENSES	-R27 947.00

ELM advised that the development of AQM policies is done in-house due to budgetary constraints. It did not respond as to whether there are air quality functions that ELM has not been able to spend adequate funds on, due to budget constraints.

Although NDM has not provided us with responses on the indicators, we are aware from speaking to the NDM AQO and from several presentations made at ITT and MSRG meetings that they have budgetary and capacity constraints regarding the AQM function, as does ELM. These constraints prevent the municipalities from fully achieving their AQM obligations in terms of the HPA AQMP.

We can conclude that the designated institutions do not have financial resources to do the air quality work. It is clear that they require substantially-enhanced financial and institutional support to accommodate the AQM function, if there is to be any meaningful improvement in air quality in NDM. In a meeting with the NDM on 6 May 2016, officials advised the CER that they had already made several requests to the municipal council for an increase in the AQM budget, as well as for more people to do the AQM work. They advised that they hoped that their responses to our questionnaire would also show that they are in dire need of financial support for their AQM functions. Unfortunately, such constraints apparently prevented NDM from completing the questionnaire. As a result, we were not in a position to obtain answers to all of the questions we asked.

We recommend that the DEA and Mpumalanga Provincial Department support the district and local municipalities in their AQM functions. Nationally, the Ministry for Environmental Affairs should push for the Treasury to provide more funding support to the district and local municipalities to ensure that the requisite

financial resources necessary for implementing the HPA AQMP are made available to NDM and broader HPA. More funding and support will greatly assist in the achievement of the HPA AQMP goals.

Do the designated Institutions have enough of the right people to do the job?

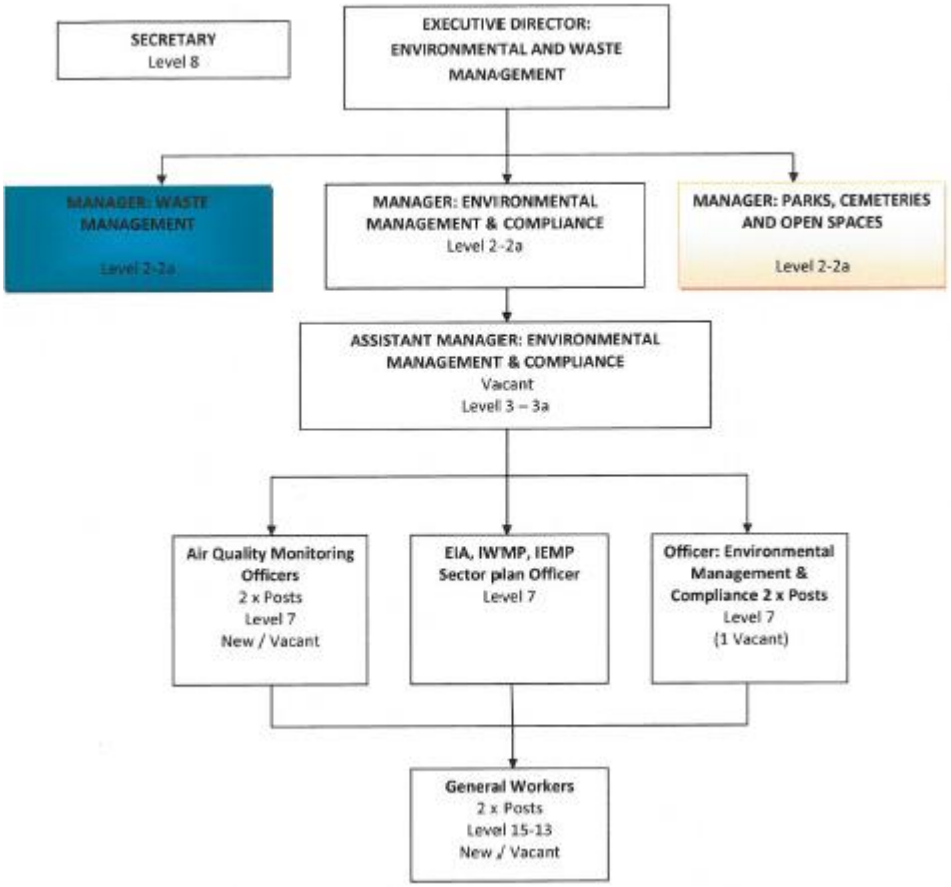
In response to whether they have enough of the right people to do the job, ELM stated that:

> "*The municipality does not have enough of the right people to perform the air quality management functions. This is attributed to the fact that the unit was recently established, therefore, the establishment of relevant systems and protocols to perform functions is currently consuming actual performance of the department in terms of its mandate*."

ELM has an AQO, Mr Erald Nkabinde, and although we asked for the AQO's job description, this was not provided. Generally, the work of an AQO is to oversee and coordinate all AQM matters in their area of designation. We are aware that Mr Nkabinde collaborates regularly with NDM, and ELM also assists with organising the NDM HPA ITT meetings and conducting joint inspections in the area with NDM. It is not clear where the AQO position falls in the organogram submitted by ELM for the Environmental and Waste Management Department. As this organogram contains no names or job descriptions, it is also not clear whether there are other air quality staff employed who fulfil compliance monitoring and enforcement functions for AQM.

The organogram shows that, under the Executive Director: Environmental and Waste Management, there is an Environmental Management and Compliance Manager to whom an Assistant Manager: Environmental Management and Compliance reports. The Assistant Manager position was vacant at the time the organogram was provided, but it appears from a presentation given by ELM in February 2017 that this position may now be filled. Under the Assistant Manager are two Air Quality Monitoring Officer posts (which are vacant) and two positions for Environmental Management and Compliance Officers (one of which is vacant). As indicated above, it is not clear where the AQO position falls.

The organogram provided to us is below:



ELM indicated in their response that they do not have qualified Green Scorpions designated to monitor and enforce compliance with AQA, but two people had been sent for EMI training in Cape Town in mid-2016, and they were waiting for results of their training. On following up with ELM in November 2016, it was confirmed that both people had since passed the exams, but one person had resigned. The ELM AQO indicated that they had written to the MEC about the need to designate the other person as a Green Scorpion and they were waiting for a response. However, as at 25 May 2017, as appears from the table attached below from the NDM ITT presentation (which was also presented at the MSRG on 25 May 2017), four officials have qualified as environmental management inspectors on air quality in NDM, but only three have been designated as inspectors by the MEC.

In relation to the qualification of staff members, ELM states that:

> "*Academic qualifications of the staff ranges from B.Tech Environmental Management/Environmental Health and B.Sc honours. The current AQO has practical experience in air quality monitoring including technical aspects of air quality monitoring, which he did not only gain from previous experience as air pollution control officer in his previous employment but also part of his practical training from various institutions. He also majored in air pollution control at B.Tech level*."

There was a partial response from ELM as to how much training each of the staff members received in atmospheric emission licensing, compliance monitoring and enforcement (EMI training), and dust control regulation. In attempting to answer this question, we have also evaluated data from presentations made at NDM ITT meetings in the past.

In response to how many years each staff member has been doing any kind of air quality regulatory work, including licensing, compliance monitoring and enforcement, ELM states that "*years of experience in air quality management ranges between 2 years for all other staff, up to 15 years for the AQO*."

In relation to NDM, we are aware that they have an AQO, Vusi Mahlangu, who is the AQO and Deputy Manager of Social Services. Other officials are Mpho Nembilwi, the assistant manager of Pollution Control, and Stanford Mofore, the Atmospheric Emission Licensing Officer.

In relation to other staff members, the NDM AQMP provides a summary of human resources allocated and positions vacant in respect of certain mandates. It states that, in 2012, NDM undertook an assessment to determine the resources required in respect of establishing an atmospheric emission licensing function. The assessment concluded that the municipality requires three positions of responsibility to effectively execute atmospheric licensing. Two of the positions on atmospheric emission licensing had been filled, with one vacant.[33]

In relation to staff training, ELM states that current staff attend training on the Dust Control Regulations, but not on AELs.

The NDM AQM By-law provides that NDM must appoint as many authorised persons as it considers necessary for undertaking compliance monitoring and enforcement with the By-law.[34]

From reports and data presented at various forums by NDM and ELM, we have extracted some information on the status of training. It appears that the following training has been received from June 2014 to about June 2016 by between one and seven officials (although it is not clear whether the same officials have received different types training): environmental management inspector's training; National Atmospheric Emission Inventory System (NAEIS) training; System for National Atmospheric Emission Licensing (SNAEL) training; stack monitoring: compliance monitoring inspection training; Dust Regulations training; and air quality training.

As appears from the table below from the MSRG on 25 May 2017, four officials have qualified as environmental management inspectors on air quality in NDM, but only three have been designated as inspectors by the MEC. These are the same figures as in ELM.

[33] p.83.
[34] Chapter 5.

AIR QUALITY MANAGEMENT CAPACITY

Municipality	Air Quality Officer(Sec 13 NEM:AQA)	EMI Qualified	EMI Designated (Sec 31c NEMA)	Environmental Health Officers
Nkangala DM	1	4	3	3
Emalahleni	1	4	3	6 (NDM)
Victor Khanye	0	0	0	3(NDM)
Emakhazeni	0	0	0	2(NDM)
Steve Tshwete	0	1 (Waste)	1(Waste)	2
Thembisile Hani	0	0	0	9
Dr JS Moroka	0	0	0	8

Practically the NDM Air Quality Management Unit is only having two (2) Officials that are 100% dedicated to AQM and the Municipal AQO who divide his attention between AQM and MHS.

Hence the plan to increase AQM capacity as per the recently approved AQMP.

Various presentations given at HPA meetings highlight the lack of AQM capacity at the local government, particularly in the areas of compliance monitoring and enforcement. Although various compliance inspections have been reported, it does not appear that any of these resulted in meaningful emission reductions. We urge that all the inspectors be designated soon so as to speed up the rate of compliance monitoring and enforcement in NDM. This will greatly assist in the improving the air quality in NDM, should it be effectively implemented.

MDARDLEA has nine officials responsible for Pollution and Waste Management for the whole Province.[35]

In conclusion, it is clear that neither NDM nor ELM has enough human capacity to do the AQM job. The NDM AQO has reported at ITT meetings that they have, on numerous occasions, requested additional capacity from the Municipal Council to enable them to deliver better AQM service and support as is required by AQA and HPA AQMP. The serious capacity constraints were also highlighted by various municipal officials who attended the Air Quality Colloquium in the Parliamentary Portfolio Committee on Environmental Affairs (PPCEA) on 13 September 2017.

The MTR identifies the following "challenges" with this HPA AQMP goal: "*Most of the Local municipalities still don't have AQMPs: for those municipalities having AQMP (sic), their AQMPs have been inadequately incorporated in the respective IDPs/EIPs. Additionally, there is a challenge as some of the institutions are yet to develop their AQMPs e.g. [Mpumalanga Department: Agriculture, Rural Development, Land and Environmental Affairs] and [Gert Sibande District Municipality] Budget to give effect to adopted HPA AQMP (engagements with [Department of Cooperative Governance] and [South African Local Government Association]); Lack of retention policies for scarce AQM skills, Not enough awareness session conducted with political head; this is exacerbated by changes in political heads terms of office (i.e. newly voted politicians)*."[36]

[35] Slide 4 MDARDLEA ITT presentation dated 16 May 2017.
[36] p.80.

According to the MTR, "*The devolution of authority requires that provincial and local government undertake to improve capacity in terms of air quality management functions and duties assigned to them in the Act. Although this capacity is lacking at present in other municipalities, the fulfilment of these roles and responsibilities is expected to significantly improve the potential for reaching the primary goals of the HPA AQMP.*"[37]

On 13 June 2017, in the PPCEA, the NAQO indicated that capacity at local government level, and especially in the priority areas, had much improved. The DEA also indicated, at the PPCEA on 13 September 2017, that progress had been made in relation to capacity at municipal level.

The DEA claims, in the MTR, that "*governance in terms of knowledge and organisational capacity has made significant progress in meeting their intervention commitments"* (sic).[38] Although there may have been an increase in organisational capacity since the AQMP came into force, it is clear that capacity is a long way from compliance with the goal to "*efficiently and effectively maintain, monitor and enforce compliance with ambient air quality standards*", despite the fact that this goal should have been met two years ago.

It is recommended that more resources – financial (from the national fiscus) and human - be allocated and made available to assist with the air quality work in the municipalities. This is required for the successful implementation of the HPA AQMP goals to be achieved. Bigger budgets and more dedicated, appropriately-trained and skilled staff are required to implement to implement the HPA AQMP and to enforce AQA. Municipalities only have a few of the right people to do AQM work. These officials have too many responsibilities, and are over-stretched to the extent that they are unable to devote adequate time to AQM compliance and enforcement. NDM has only three officials designated to do compliance monitoring and enforcement, and these municipal officials have not conducted a sufficient number of compliance inspections of polluting facilities, nor ensured that meaningful enforcement action is taken for non-compliance. Various HPA municipalities do not have designated AQOs or AQMPs.

For both municipalities to have the right people to do the AQM work required of them, there must be more support and training on their AQM functions. We recommend that municipalities and/or officials in priority areas who take steps to achieve significant improvements in air quality must be suitably rewarded and incentivised, including potentially through recognition programmes in terms of section 31 of AQA. More compliance and enforcement personnel ought to be trained and designated to ensure that there are regular environmental management inspections. In addition, more air monitoring equipment should be installed and maintained at the municipal level to enable effective monitoring of emissions. Training with regard to monitoring emissions will also be required. The dire shortage of reliable air quality monitoring data is addressed below.

Next, we address three sources of air pollution in the HPA.

SOURCES OF AIR POLLUTION IN THE HPA

As indicated above, the HPA was declared because NAAQS were not being met. AQA requires the Minister to identify pollutants which present a threat to people's health or well-being or to the environment and to establish national standards setting the maximum permissible concentration of each pollutant in the air.[39]

[37] p.83.
[38] p.86.
[39] s.9.

These are health-based standards supposed to represent acceptable exposures to pollution. Despite this, most of the NAAQS exceed the World Health Organization's (WHO's) recommended limits. What this means is that, even if our NAAQS were met – which they are not – South Africans would still not be breathing "safe" levels of pollution.

NAAQS were developed and published in 2009 and 2012 respectively. The 2009 NAAQS[40] relate to sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM) with a diameter of 10 or less micrometres (PM_{10}), Lead (Pb) and benzene (C_6H_6). These are set out in the tables below:

3.1 National Ambient Air Quality Standards for Sulphur Dioxide (SO_2)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
10 minutes	500 µg/m³ (191 ppb)	526	Immediate
1 hour	350 µg/m³ (134 ppb)	88	Immediate
24 hours	125 µg/m³ (48 ppb)	4	Immediate
1 year	50 µg/m³ (19 ppb)	0	Immediate
The reference method for the analysis of sulphur dioxide shall be ISO 6767			

3.2 National Ambient Air Quality Standards for Nitrogen Dioxide (NO_2)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
1 hour	200 µg/m³ (106 ppb)	88	Immediate
1 year	40 µg/m³ (21 ppb)	0	Immediate
The reference method for the analysis of nitrogen dioxide shall be ISO 7996			

3.3 National Ambient Air Quality Standards for Particulate Matter (PM_{10})

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
24 hours	120µg/m³	4	Immediate – 31 December 2014
24 hours	75 µg/m³	4	1 January 2015
1 year	50 µg/m³	0	Immediate – 31 December 2014
1 year	40 µg/m³	0	1 January 2015
The reference method for the determination of the particulate matter fraction of suspended particulate matter shall be EN 12341			

3.4 National Ambient Air Quality Standards for Ozone (O_3)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
8 hours (running)	120 µg/m³ (61 ppb)	11	Immediate
The reference method for the analysis of ozone shall be UV photometric method as described in SANS 13964			

3.5 National Ambient Air Quality Standards for Benzene (C_6H_6)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
1 year	10 µg/m³ (3.2 ppb)	0	Immediate – 31 December 2014
1 year	5 µg/m³ (1.6 ppb)	0	1 January 2015
The reference methods for the sampling and analysis of benzene shall either be EPA compendium method TO-14 A or method TO-17			

[40] GN1210 in GG 32816 of 24 December 2009.

3.6 National Ambient Air Quality Standards for Lead (Pb)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
1 year	0.5 µg/m³	0	Immediate
The reference method for the analysis of lead shall be ISO 9855			

3.7 National Ambient Air Quality Standards for Carbon Monoxide (CO)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
1 hour	30 mg/m³ (26 ppm)	88	Immediate
8 hour (calculated on 1 hourly averages)	10 mg/m³ (8.7 ppm)	11	Immediate
The reference method for analysis of Carbon Monoxide shall be ISO 4224			

Prior to January 2015, weaker NAAQS applied for PM_{10} and benzene. The Minister set increasingly strict NAAQS in order to achieve progressive reduction in atmospheric pollutants.

There are different NAAQS for different averaging periods and a certain number of so-called exceedances of these NAAQS is permitted. Exceedances are allowed one percent of the time. Looking at PM_{10} daily monitoring station results for a year (as an example), there are 24 one hour measurements per day: you add these together and divide by 24 to get the daily average. If there are 4 or fewer daily averages in a calendar year that exceed 75 µg/m³, there is compliance with that standard. To determine annual averages, you use a calendar year's worth of monthly monitoring results and divide by 12. No exceedances of annual averages are permitted, meaning that any annual PM_{10} average over 40 µg/m³ means non-compliance with the NAAQS.

The NAAQS for $PM_{2.5}$ were gazetted on 29 June 2012.[41] These NAAQS are set out in the table below:

3. NATIONAL AMBIENT AIR QUALITY STANDARD FOR PARTICULATE MATTER ($PM_{2.5}$)

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
24 hours	65 µg/m³	4	Immediate - 31 December 2015
24 hours	40 µg/m³	4	1 January 2016 - 31 December 2029
24 hours	25 µg/m³	4	1 January 2030
1 year	25 µg/m³	0	Immediate - 31 December 2015
1 year	20 µg/m³	0	1 January 2016 - 31 December 2029
1 year	15 µg/m³	0	1 January 2030
The reference method for the determination of $PM_{2.5}$ fraction of suspended particulate matter shall be EN 14907			

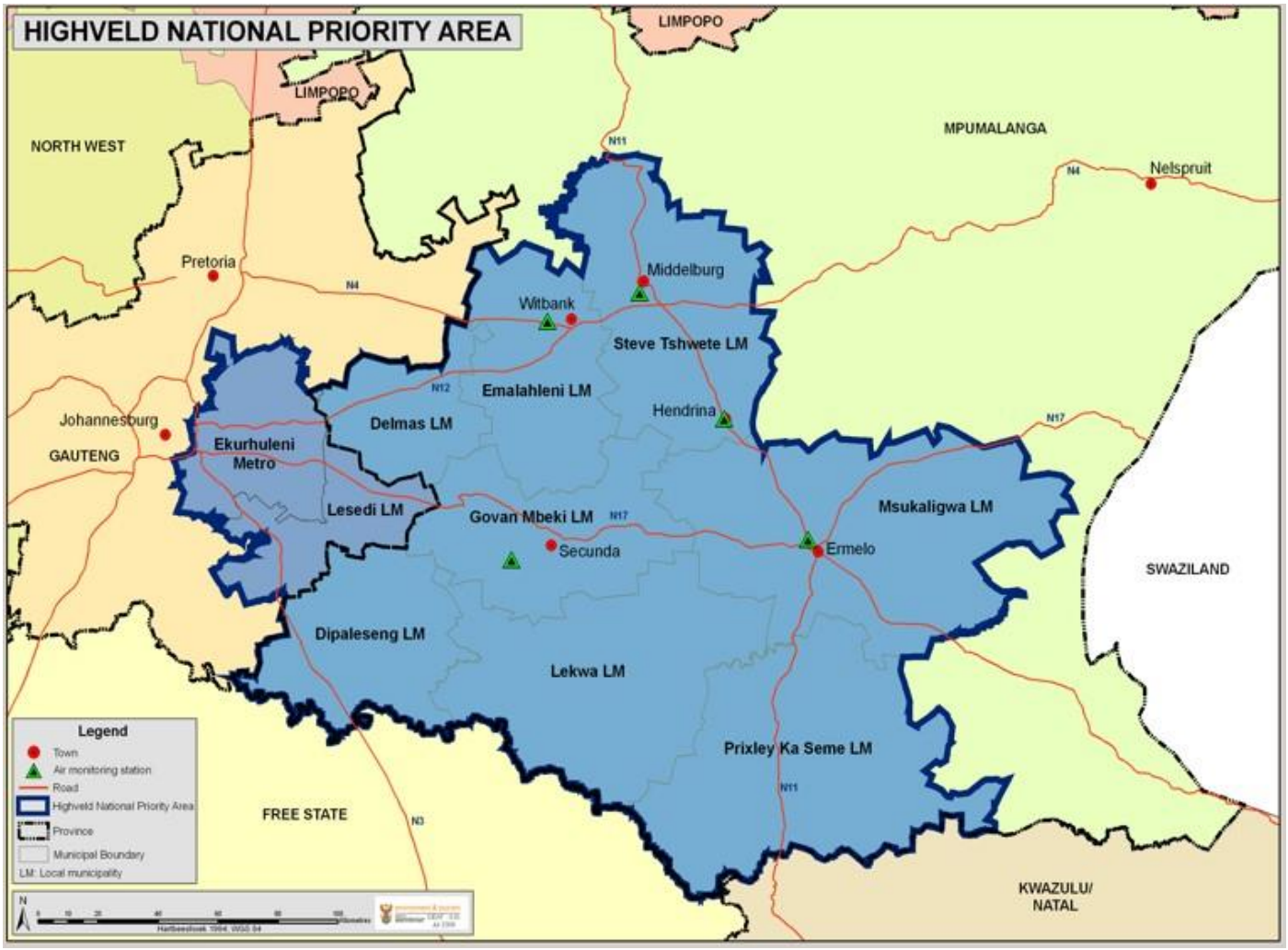
As with PM_{10} and benzene, the $PM_{2.5}$ NAAQS have become stricter over time.

It is important to understand the air quality monitoring background too. The DEA's HPA air quality monitoring started in August 2008 with five monitoring stations located in Witbank/eMalahleni, Middelburg, Hendrina, Ermelo and Secunda. The Middelburg, Hendrina, and Witbank Stations are located in NDM. Ambient monitoring refers to the measurement of chemical and physical pollutant concentrations by determining the quantity and types of certain pollutants in the surrounding and outdoor air.

[41] GN486 in GG 35463 of 29 June 2012.

The monitoring stations currently measure six of the seven pollutants for which there are NAAQS – SO_2, NO_2, PM_{10}, $PM_{2.5}$, O_3, CO (benzene and black carbon are no longer measured at these stations) and were managed by a service provider until August 2013 when they were handed over to the South African Weather Service (SAWS). There were problems with the PM monitoring instruments, and these have now been replaced with newer, better instruments. The SAWS monitoring network is required to follow rigorous quality assurance and reporting procedures.

This map depicts where the DEA's HPA monitoring stations are situated (indicated by green triangles):



Five monitoring stations clearly cannot adequately represent air quality in the HPA as a whole, especially given the multiple sources of significant polluting emissions, including Eskom's CFPSs, the Sasol-Secunda complex, numerous coal mines, and metallurgical plants.

There are many sources of air pollution in the HPA which play a role in exceedances of the NAAQS (although, as the DEA itself points out – and as is set out below - industry is by far the largest source). Table 5 in the HPA AQMP[42] sets out the following as emissions of PM_{10}; nitrogen oxides (NOx) and SO_2 as at about 2009:

[42] p.19.

Table 5: Total emission of PM_{10}, NO_x and SO_2 from the different source types on the HPA (in tons per annum), and the percentage contribution for each source category

	PM10		NO_x		SO_2	
Source category	**t/a**	**%**	**t/a**	**%**	**t/a**	**%**
Ekurhuleni MM Industrial (incl Kelvin)	8 909	3	15 636	2	25,772	2
Mpumalanga Industrial	684	0	590	0	5,941	0
Clay Brick Manufacturing	9 708	3	-		9,963	1
Power Generation	34 373	12	716 719	73	1 337 521	82
Primary Metallurgical	46 805	17	4 416	0	39 582	2
Secondary Metallurgical	3 060	1	229	0	3 223	0
Petrochemical	8 246	3	148 434	15	190 172	12
Mine Haul Roads	135 766	49	-		-	
Motor vehicles	5 402	2	83 607	9	10 059	1
Household Fuel Burning	17 239	6	5 600	1	11 422	1
Biomass Burning	9 438	3	3 550	0	-	
TOTAL HPA	**279 630**	**100**	**978 781**	**100**	**1 633 655**	**101**

NB. SO_2 percentage contributions aggregate is greater than 100 due to rounding of numbers.

Domestic fuel burning was responsible for 6% of PM_{10} and 1% each of NO_X and SO_2. Apart from contributions of 3% from biomass burning to PM_{10}, and motor vehicles contributing 2% to PM_{10} and 9% to NO_X, all other emissions are from industry; including: mine haul roads contributing 49% of PM_{10}; and power generation contributing 73% of NO_X and 82% of $S0_2$.

Below, we consider the steps taken to address air pollution from dust, household fuel burning and industry, respectively.

Dust

Goal 2 of the HPA AQMP is that, by 2020, industrial emissions are equitably reduced to achieve compliance with NAAQS and dust fallout values. The question whether any measures have been put in place since 2007 to reduce dust, relates to objectives 3 and 4 of goal 2 of 2020 in the HPA AQMP: that fugitive emissions are minimised; and that emissions from dust-generating activities are reduced. Indicators for objective 3 include: the development and implementation of fugitive emission plans and the reduction in fugitive emissions. Those for objective 4 are: a dust reduction programme's implementation; fleet maintenance being carried out; and alternative haulage and waste management being investigated.

Have any measures been put in place since 2007 to reduce dust?

Dust is a pervasive problem in several places in NDM and ELM. The main complaints relate to dust from coal trucks transporting coal in the area; dust from untarred roads; and dust from ash dumps or coal discard dumps.

In their response, ELM stated that:

With the exception of dust from the mines, Dust complaints have been investigated, monitored and legal steps taken where necessary in accordance with the Public Health By-laws. Obviously not all complaints could be handled effectively and timeously due to shortage of resources and qualified staff. A majority of the dust complaints received are triggered by mining activities within the area, unfortunately, the municipality always encounters challenges of access into the mining facilities especially because it does not have jurisdiction in terms of the MPRDA.

Dealing with complaints from mining operations requires collaboration from the DMR. Three complaints of dust have been dealt with within the past 12 months, applying the national dust control regulations and municipal By-laws. Two of these cases were handled in collaboration with NDM and DEA officials. One compliance notice was issued to a coal handling facility. Some facilities that were visited have dust fall-out measuring equipments.

The ELM relies mostly on its local Public Health By-laws to enforce air quality matters, until the AQM By-laws are promulgated. The limitation with enforcement of municipal By-laws is that they are not very punitive as compared to the national legislation.

The ELM Public Health By-Laws, 2008, provide for protection from dust on the basis of it being a nuisance. The section on air pollution includes that a public health nuisance is created if, among other things: waste on the premises is burned (except in an approved appliance); ash, grit, soot, or smoke is emitted on the premises so as to have an adverse health impact; or dust is generated on and discharged from the premises into the surrounding atmosphere so as to have an adverse health impact.[43]

Since it is not clear how the impact on health will be determined by ELM, it is likely to be very difficult to enforce this By-law.

NDM's AQM By-law includes a section devoted to "emissions caused by dust, burning and spraying". The section provides for measures to be taken by industries or facilities whose activities result in dust:

> *"Dust emissions*
> *(1) Any person conducting an activity or providing a facility that customarily produces emissions of dust which may be harmful to public health, well-being or cause a nuisance shall implement one or more control measures to effectively prevent dust emissions into the atmosphere.*
> *(2) The control measures contemplated in subsection (1) include - paving; using dust palliatives or dust suppressants; Uniformly applying and maintaining any surface gravel; erecting physical barriers and signs to prohibit access to the disturbed areas; using ground covers; re-vegetating which is similar to adjacent undisturbed native conditions; in the case of an unpaved road, reducing speed limits or restricting access to certain types of vehicles; or any alternative control measure approved in writing by the Municipality*." [44]

In the NDM AQMP, it is recognised that NDM hosts a number of coal mining operations. The operational mines have various activities that result in the entrainment/suspension of PM (or dust); including, but not limited to: the use of vehicles on unpaved and paved roads for transporting ore, personnel, waste rock etc; blasting; overburden stripping; ore and overburden handling; crushing and screening of ore; and wind entrainment from stockpiles.[45]

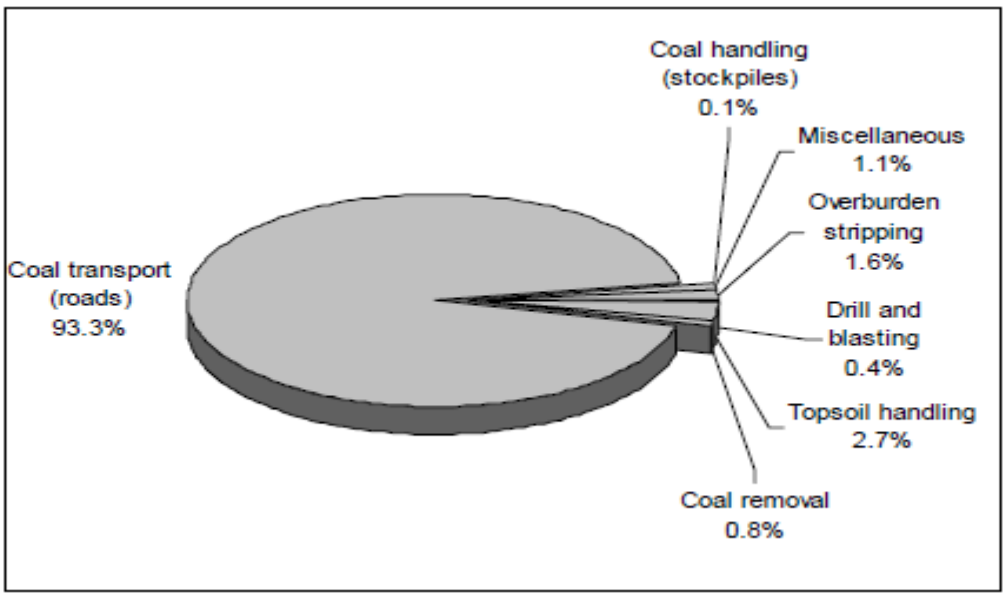
[43] s.5.6.
[44] s.14.
[45] NDM AQMP p.109.

NDM notes that fugitive emissions are often not captured or efforts to capture these emissions are not very effective. Dust entrainment from unpaved roads is, in some cases, reduced by the application of water or approved chemical palliatives.[46] We point out that only approved, environmentally-safe chemical additives should be used.

NDM refers to a 2001 study by Thompson and Visser[47] which evaluated the broader environmental effects of dust from an emission inventory of a South African coal strip mining operation (presumed to be in Mpumalanga).[48] The emission inventory was based on a characterisation of open dust sources over a specific interval of time, to produce a dispersion model to enable predictions to be made concerning ambient pollution levels and the identification of major control areas. The analysis found that 93.3% of the total emissions from the mine were attributable to dust generated from the mine haul road (the next highest attributable emission sources was topsoil handling as illustrated in the figure below). Thompson and Visser state that, *"(d)ust, created through the mechanical disintegration of particulate matter, is a problem common to most surface mining operations*".[49]

Although this publication is dated 2001, it still paints an accurate picture of the situation in large parts of the HPA. NDM refers to the same report in its 2015 AQMP.[50]

The Thompson and Visser study reflects the percentage contributions to total dust emissions from a typical South African strip mine, a large chunk of which can be attributed to coal road transportation, as follows:[51]



Dust emissions from a typical strip mine

As set out above, Table 5 of the HPA AQMP indicates that dust (PM_{10}) emissions from mine haul roads are substantial: 135 766 tonnes per annum, or 49% of dust emissions.[52]

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46 NDM AQMP p.135.

47 R J Thompson and A T Visser available at http://mineravia.com/yahoo_site_admin/assets/docs/Dust_emission_and_exposure__mine_roads.8224449.pdf p.2.

48 NDM AQMP p.109.

49 p.2.

50 p.109.

51 p.3

52 p.19.

Although there are regulations for the management of dust - the National Dust Control Regulations, 2013, published in terms of section 32 of AQA - these are drafted and implemented mainly to control dust as a nuisance. In fact, dust presents dangerous health impacts and the Dust Control Regulations are an inadequate and inappropriate means to address the dust problems in the HPA. As a result, the CER wrote to the Minister of Environmental Affairs on 16 October 2016 about concerns with the Regulations. These comments and the follow up correspondence can be accessed on the CER website.[53]

The 30 day dust monitoring average currently used in the Regulations makes it difficult to quantify dust and fugitive emissions occurring at high concentrations during discrete intervals. CER suggested the use of direct measurements of fugitive dust emissions through opacity measurements: when measured by the level of opacity, the level at which the dust reduces the transmission of light or obscures an observer's view would be determined, meaning that the greater the concentration of fugitive dust, the greater the opacity.

The Regulations also fail to require the geochemical analysis of dust from gold and uranium tailings storage facilities. These tailings often contain radioactive and toxic components and when inhaled or ingested, there will be significant health impacts on those exposed to the dust.

The Regulations should also reiterate (as stipulated in the AQA List of Activities, 2013[54]) that a fugitive emissions management plan should be included in the AEL for listed activities that are likely to generate such emissions.

In February and March 2016, the Minister responded to our correspondence, stating that there were discussions in the air quality fraternity regarding the scientific standard for measurement of dust-fall, and that the DEA would be revising the Regulations in the 2016/17 financial year. A seminar was arranged in August 2016, and, at a meeting with the DEA in February 2017 (in addition to through various correspondence), our numerous concerns with the Regulations were again raised. Attendees at the February 2017 meeting included: the CER, the DEA, Prof Eugene Cairncross, and Mariette Liefferink of the Federation for a Sustainable Environment. The CER, Cairncross, and Liefferink highlighted the serious concerns with the Regulations and the significant health impacts of dust, particularly mining dust. The DEA undertook to reconsider various issues. To date, despite following up, we have not had any feedback from the DEA.

In the MTR, it was stated that: "*The Nkangala and Gert Sibande District Municipalities in the Mpumalanga Province contains a substantial number of coal mining operations extracting this resource through opencast and underground mining methods. Such operational mines have various activities that result in the entrainment/suspension of particulate matter, including but not limited to the use of vehicles on unpaved and paved roads (for transporting ore, personnel, waste rock etc.); blasting; overburden stripping; ore and overburden handling; crushing and screening of ore; and wind entrainment from stockpiles. However, for the purpose of this review, only PM10 emissions were considered*."[55]

Thompson and Visser discuss the following as some options for reducing fugitive dust emissions from a mine haul road: *"providing a tightly bound wearing course material or seal; armouring the surface (placing a thin layer of higher quality wearing course on the existing material or tying this into the top 50mm of material);*

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[53] http://cer.org.za/programmes/pollution-climate-change/submissions-on-draft-regulations-guidelines-and-declarations (see Dust Control Regulations).

[54] Regulation 20 of the 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 893 in GG 37054 of 22 November 2013 ("List of Activities").

[55] p.72.

good maintenance practices; use of various chemical dust suppressants (palliatives); and reducing vehicle speed and/or modifying engine/retarder blower configuration".[56]

Other possible measures include:

- making sure that dust control conditions in a mine's Environmental Management Programme (EMPR) are strengthened, and are a lot clearer and more specific regarding the necessary obligations to reduce mine haul road dust. i.e. mines should be required to either pave the roads to reduce dust, or to continuously ensure that unpaved roads are maintained and are coated with dust suppressants regularly;
- using water-based dust suppression techniques, together with chemical additives to attract more moisture onto the surface of the material, providing a tightly bound wearing-course material or seal, armouring the surface with a higher-quality wearing course by i.e. placing a thin layer of higher quality wearing course on top of 50 mm of the existing material), good maintenance practices, reducing vehicle speed, and/or modifying the engine or retarder blower configuration;
- that dust monitoring and management records are kept by the mining company and that these are made automatically available to affected community residents on request, without having to go through the Promotion of Access to Information Act (PAIA) process;
- that dust complaints from residents of a mining area are recorded and addressed, and that records of how the dust is managed are made automatically available to affected community residents on request without going through the PAIA process; and
- that the mine takes whatever other measures (taking into account current technology) are necessary to reduce dust emissions, doing everything within their power to ensure that community residents are not harmed by dust from their mining activities, including haulage. The DMR should bear the onus of establishing, from records and reports from the mining company, whether the mining company has taken all necessary steps to ensure that dust from mining activities, including haulage, is not harming residents.

The MTR held that "*there has not been a significant decrease in emissions of PM10 in the HPA. Hence, the need to make mining interventions a priority during the implementation process."*[57]

Dust is a substantial problem in NDM due to the number of coal mines and other industries in the area. The HPA is already extremely polluted by sources that include industrial, vehicle, and domestic fuel burning emissions; dust only serves to make matters worse for the residents of the HPA. A failure to address this pervasive problem will lead to continued violation of constitutional rights.

While dust is often considered a 'nuisance' and is therefore regulated as such, stringent measures need to be taken to ensure that dust is adequately managed, in a manner that addresses its serious health impacts. Authorities must take dust management seriously and there should be a concerted effort to strengthen by-laws to address this problem using more cautionary, risk-averse methods - that prevent dust before it happens. We commend NDM for strengthening dust management measures in its AQMP following input on the draft AQMP. We recommend that all other municipalities in the HPA adopt dust control measures that are at least as comprehensive and stringent. More importantly though, compliance and enforcement measures should be adopted and well implemented to make sure that there is effective management of the dust problems that are pervasive in the HPA.

[56] p.4.
[57] p.74.

The Dust Control Regulations must be amended to ensure adequate monitoring, measurement, and reduction of the significant dust emissions in the HPA, particularly from mining sources.

As things stand, without greatly increased regulation, it seems unlikely that the AQMP 2020 goal to achieve compliance dust fallout limit values will be met.

Domestic fuel burning

Goal 3 of the AQMP is that, by 2020, air quality in all low-income settlements is in full compliance with NAAQS. Objective 1 of this goal is the "implementation of the strategy for dense low income settlements". The indicator is that planning of such settlements considers the objectives of this strategy.

Have any measures been put in place since 2007 to improve air quality in dense low income settlements?

A majority of townships across South Africa are affected by indoor pollution from using energy sources such as paraffin, coal, and wood-fired stoves for cooking and heating. Some of these communities are situated in areas that are already extremely polluted by industrial sources - the indoor pollution only serves to further exacerbate the health problems that they experience from air pollution.

A majority of the people affected by domestic coal burning in townships cannot afford services such as electricity and heating. Because their houses are also poorly insulated, they require a lot of energy to keep warm in winter especially. Many coal mines provide communities with free coal, which residents use for heating and cooking. The effects of the domestic coal burning within low-income settlements is known to have significant health impacts, largely linked to respiratory and cardio-vascular illnesses. The severe health impacts and the effects of air pollution result in substantial cost implications for the state in having to cover the resultant health-care expenses of those exposed to poor air quality.

To date, government's response to addressing domestic coal burning has largely been limited to promoting the *Basa Njengo Magogo* approach to lighting fires. Using this method, the kindling is placed on top of the coal so that the fire burns down. This reduces coarse particulate (PM_{10}) emissions visible as smoke from the start up, but does not reduce SO_2 or volatile organic compounds (VOCs) from burning coal. The *Basa* method may also increase CO emissions. CO, SO_2, and VOCs all have serious adverse health impacts.[58] It is not clear to what extent this method has been adopted in the NDM or greater HPA.

The draft Strategy to address Air Pollution in Dense Low Income Settlements has been in the DEA plans for a long time. It had been listed as a deliverable for Year 1 in the Outcome 10 Delivery Agreement in 2010.[59] It was also listed as a quarterly target for cleaner and healthy air in the 2011/2012 performance plan of the DEA's Strategic Plan for 1 April 2011 to 31 March 2016.[60] The draft Strategy was made available by the DEA in 2013 and there was some public consultation, but this process stalled, resulting in a lengthy delay. As a result, the CER wrote to the DEA Director-General on 7 April 2015 and asked for the draft Strategy to be published for comments as soon as possible.[61] The draft Strategy was finally published for comment on 24 June 2016, and comments submitted on 29 August 2016.[62]

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[58] Very little monitoring of CO is done, as a result of which, there is limited, if any, available information on compliance with CO NAAQS.

[59] Outcome 10 Delivery Agreement 23 September 2010 p.70.

[60] DEA Strategic Plan 1 April 2011 to 31 March 2016 p.24.

[61] http://cer.org.za/wp-content/uploads/2016/07/CER-to-DEA-Director-General-Domestic-Coal-Burning-7-April-2015.pdf

[62] The draft Strategy and comments can be accessed here: http://cer.org.za/programmes/pollution-climate-change/submissions-on-draft-regulations-guidelines-and-declarations

These were some of the concerns set out in the comments on the draft Strategy:

- a lack of reliable baseline data to inform the effectiveness of the strategy;
- a lack of current data on the health effects of indoor pollution in densely-populated areas and how much this accounts for the global burden of disease in South Africa;
- a lack of proper monitoring data from monitoring stations that measure the impacts of indoor pollution in the densely-populated areas; and
- the failure to include community-based and non-profit organisations in a coordinating structure called the National Coordinating Committee (NCC).

The comments stated that readily-available intervention measures should be implemented immediately to prevent the prevailing situation from deteriorating further. The importance of stakeholder participation and involvement in identifying the intervention measures suitable for them was also highlighted. Stakeholder participation is also required for the evaluation, monitoring, and reporting process of the Strategy's implementation. CER requested that the draft Strategy be amended to incorporate our suggestions before it was finalised. Workshops have been held in eMalahleni, Zamdela, and Ivory Park, and we have not, despite requests, heard back from the DEA as to the next steps in relation to the draft Strategy.

According to the MTR, a challenge of this AQMP goal was that there has been a lack of buy-in from the Department of Energy in the process of developing the draft Strategy and in projects aimed at improving poor air quality in low-income settlements.[63]

In the response to whether any measures have been put in place to reduce emissions from domestic coal burning, ELM states that:

> **No measures were put in place, except for a major drive to plant trees in those areas along the main roads as well as conducting awareness campaigns to teach residents about the top- bottom approach of making fire using a fuel burning appliance.**
>
> **No measures have been put in place to address domestic coal burning, except that schedule awareness campaign are held once a year in affected communities to raise awareness on the impact of coal burning. Sixteen Youth Jobs in Waste (YJIW) campaigners have been used to conduct the awareness.**
>
> **These minimum achievements are also attributed to the shortage of resources.**

As to whether there have been any measurable improvements in air quality in the places that mainly use coal for household use since 2007, ELM states that:

> **No improvements, instead the pollution levels have increased as a result of an increase in informal settlements which rely on coal burning for heating and cooking.**

In response to whether ELM has any future plans for the reduction of emissions from domestic coal burning, ELM states that its future plans will be informed by the AQMP under development.

In the NDM AQMP, NDM states that:

[63] p.81

> "*Domestic coal burning contributes to particulate (PM2.5 and PM10) emissions. SO2 and CO emissions are also released in high quantities as a result of coal burning, particularly when low-grade, high sulphur coal is burned. Domestic burning of wood (in addition to veldt fire burning) results in the release of fine-scale particulate emissions (PM2.5) as well as NO2, CO and formaldehyde. Domestic coal and wood combustion within informal settlements and rural areas has been identified through various studies to be, potentially, one of the greatest sources of airborne particulates and gaseous emissions to be inhaled in high concentration (i.e. before dispersion and fallout processes can ameliorate impact). In addition, this fuel combustion adds to greenhouse gas emissions*."[64]

NDM further notes that:

> " *the health risk estimates for the Mpumalanga Highveld show that power generation activities were estimated to be the primary driver for hospital admissions in Mpumalanga, with a 51% contribution, followed by the Sasol Secunda complex at 17%. Domestic coal burning also made a significant contribution (12%)… contributions were recorded for mortality outcomes as well and domestic wood burning was the overwhelming contribution to leukaemia cases in the Mpumalanga Highveld*."[65]

The NDM AQMP states that the *Basa Njengo Magogo* fire-lighting method "*results in a significant reduction in particulate emissions (CSIR, 2004), however the assumption was made that it is not widely used during the 2004 to 2006 period evaluated for the baseline assessment*."[66]

NDM has identified the reduction of emissions from domestic coal burning as one of the goals that it intends to achieve.[67] It states that:

11.2.3 DOMESTIC FUEL BURNING EMISSION REDUCTION GOALS

- Household Fuel Combustion Emission Reduction Goal 1: By 2018 fuel usage by households have been quantified, local emission factors determined and impact to air quality assessed; by 2020 emissions from the household sector has been reduced to the extent that contributions from the sector do not cause exceedance of national ambient air quality standards.
- Household Fuel Combustion Emission Reduction Goal 2: By 2018 Health risk assessments have been undertaken in respect of exposure to air pollutants in priority settlements and the cost to the South African economy as a result of exposure to household fuel combustion emissions as well as biomass burning, industrial, transport and power generation emissions are quantified.
- Household Fuel Combustion Emission Reduction Goal 3: By 2018 an evaluation is undertaken of household emission reduction options including but not limited to the rollout of new stoves, retrofit of houses with energy efficiency measures, energy efficient RDP houses, fitment of ceilings, LPG rollout and subsidy and a household emission reduction action plan is developed; by 2018 a household emission reduction plan is rolled out by government and assisted by industry through offsetting; by 2020 emissions have been reduced to the extent that there are no exceedances of national ambient air quality standards.

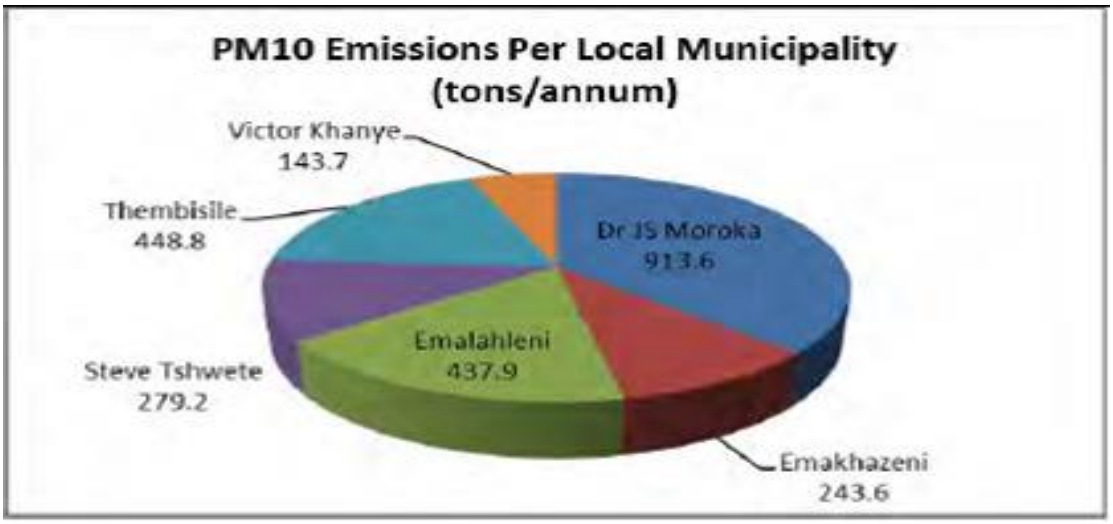
The following graphics are from the NDM AQMP, depicting: the volume of household emissions from local municipalities in NDM in 2011; the emissions from domestic fuel burning per municipality; and the distribution of PM_{10} emissions.

The table below shows the total emissions due to household emissions in NDM in 2011:[68]

[64] p.93.
[65] p.74.
[66] p.95.
[67] NDM AQMP p.60
[68] pp.95-96.

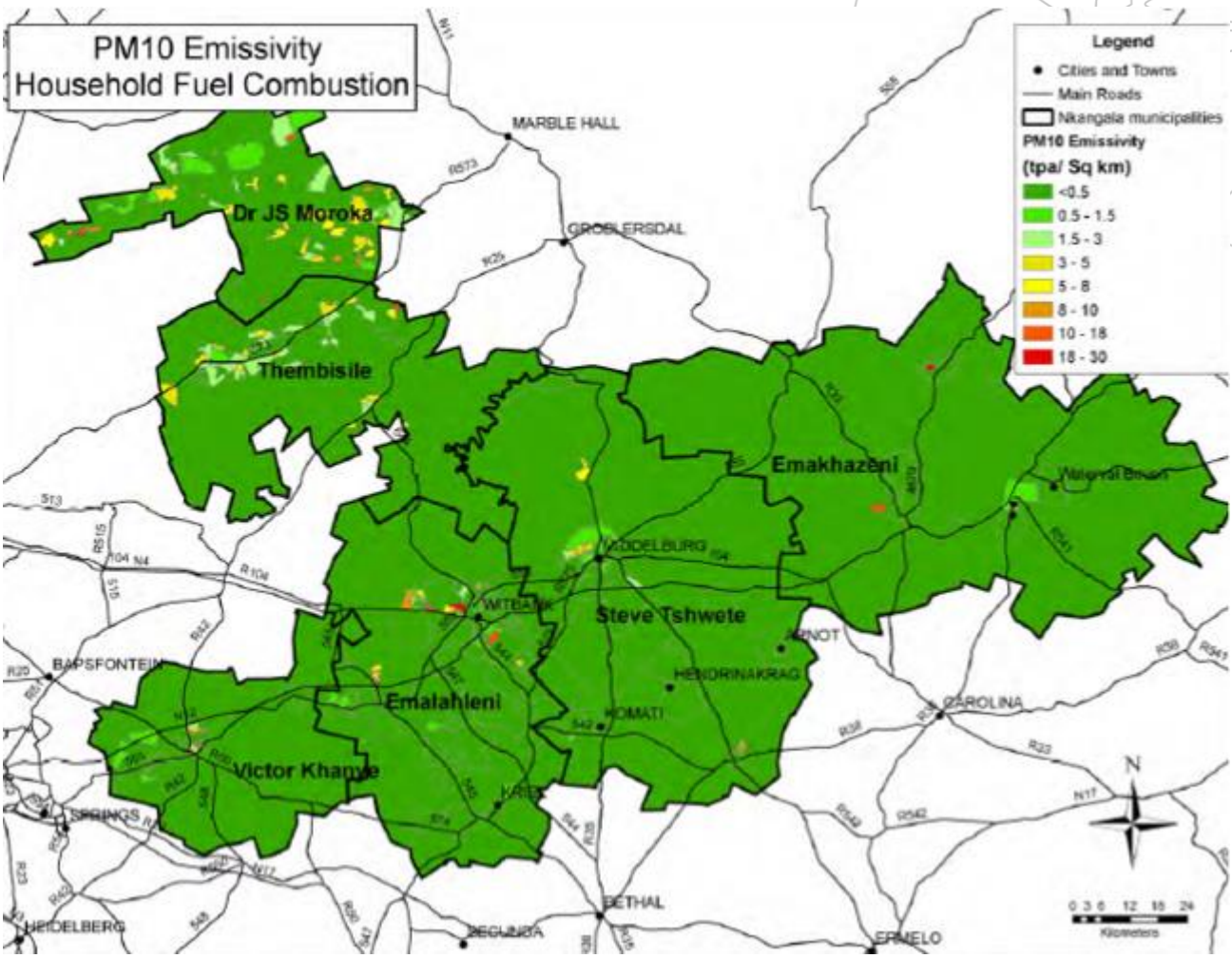
Table 7-5: NDM Census 2011 GIS-based analysis of total annual emissions (in tons) due to household fuel combustion				
Local municipality	**PM_{10}**	**SO_2**	**CO**	**NO_x**
Dr JS Moroka	913.64	69.93	7152.14	292.18
eMakhazeni	243.56	126.78	2806.59	78.95
eMalahleni	437.89	514.43	7388.32	147.09
Steve Tshwete	279.22	307.61	4558.56	92.72
Thembisile	448.76	379.13	6349.18	148.54
Victor Khanye	143.68	214.88	2816.40	48.22
TOTAL of NDM	**2466.75**	**1612.76**	**31071.20**	**807.69**

The chart below depicts the total emissions from domestic fuel burning per municipality in 2011:[69]



This table shows the distribution of PM_{10} emissions from domestic fuel burning through NDM in the relative volumes emitted in 2011:[70]

[69] p.96.
[70] p.98.



From this somewhat outdated data from 2011, we can establish that CO emissions are the highest at 31 071 tons, followed by PM at 2466 tons. CO emissions are highest in ELM at 7388 tons and PM emissions are the highest in JS Moroka at 913.64 tons. SO_2 emissions are the highest in ELM at 514 tons.

The MTR uses a similar methodology for estimating the emissions from domestic or household use of polluting fuels (coal, wood, and paraffin) as used in the AQMP. The AQMP stated that domestic fuel burning contributed 6% or 17239 tons per annum of total PM_{10} emissions (and negligible SO_2 and NO_x emissions).[71] These figures are essentially repeated in the MTR. It uses the same emission factors and, apparently (this it is not explicitly stated), the same household fuel use consumption rates as the baseline study, but uses more recent - Census 2011 - population distribution data, rather than the HPA 2007 mini-census data[72] used in the baseline study. Therefore, the total MTR domestic fuel burning emissions should be proportional to the change in the number of households estimated to be using these fuels, unless the proportion of households using these fuels has decreased. The MTR[73] presents the estimated changes in total annual emissions from this source category as follows:

[71] p.xi.
[72] p.30.
[73] p.59.

Table 5-4: Changes over years in total annual emissions due to domestic fuel burning (tons/annum)						
Total domestic fuel burning emissions in HPA	PM_{10}		SO_2		NO_x	
	2010	2015	2010	2015	2010	2015
	17 239	7 876	-	4921	5 600	2 397
-means data was not available						

It appears that '2010' in the table above refers to estimated 2007 emissions and '2015' to 2011 emissions - the respective dates of the census campaigns. It seems that there was a more-than-50% reduction in the aggregate use of coal, wood and paraffin between 2007 and 2011. The MTR does not, however, present data to indicate if this reduction in the use of these fuels has continued to the present.

This leads the MTR to conclude that domestic fuel burning emissions are improving more than any other sector,[74] and that NDM "*is the lowest contributor of SO2, NOx and PM10 from domestic fuel burning in the HPA*".[75]

However, not only does the MTR not state the basis of its estimates, but it also raises certain concerns as to the accuracy of the data; referring to "*inconsistencies in the information pertaining to fuel types combusted, emission factors to be used, volumes of fuel used, diurnal and seasonal patterns of fuel usage, the combustion equipment used as well as the manner in which fuel is used within combustion equipment. This lack of information constrains the capability for accurate predictive quantification. Therefore, it is recommended that the DEA standardize the emission factors, volumes and averaging period of the fuels used. Another limitation within this methodology is that the reliance on census data. The way in which the census data questionnaire was structured residents could only say one fuel they used for heating, lighting etc. This can be misleading as some households may use more than one fuel, for instances houses that use predominantly coal for heating may use wood to start before adding the coal. This information is lost within the current structure of the census questionnaire.*"[76]

Surprisingly, the MTR does not refer to the Statistics South Africa General Household Survey, 2016,[77] which contains a baseline of the use of wood and coal – at least on the provincial level – from 2002. It sets out the percentage distribution of the main sources of energy used for cooking between 2002 and 2016, as well as the distribution, per province, in 2016.[78]

This report demonstrates that there has been a marked decline, nationally, in the use of highly-polluting fuels – coal, wood and paraffin - over the last 10 years. Between 2007 and 2016, the percentage of households using coal, wood and paraffin for cooking declined, respectively, from 2.2% to 0.5%, from 13.8%

[74] p.85.
[75] p.61.
[76] p.58.
[77] http://www.statssa.gov.za/publications/P0318/P03182016.pdf
[78] pp.32-34.

to 9.1%, and from 14.2% to 4.7% - a 40% decline in wood and coal use. According to the report, in Mpumalanga in 2016, only 15% of households used wood for cooking, 3.4% used coal, and 4% used paraffin.

This national declining trend appears to be occurring irrespective of the draft Strategy or the so-called air quality offsets, discussed below. These programmes address indoor air pollution that affects perhaps 15% (wood, 15%, and coal 3%) of the population, but ignore or try to divert attention from the ambient air pollution that affects a far greater percentage, if not all of the population. An emission reduction strategy that focuses on household fuel emissions will never result in NAAQS compliance.

The HPA AQMP used dispersion modelling to identify nine 'hotspots' - areas of exceedance of ambient 24 hour SO_2 and/or PM_{10} standards. Source apportionment was done within each of the hotspots to determine the relative contribution of each modelled sector to the total ambient pollutant concentration.[79] Source apportionment was done at seven of the hotspots - Emalahleni, Kriel, Steve Tshwete, Ermelo, Secunda, Ekurhuleni, and Delmas. At these hotspots, household fuel burning contributed 2 to 12% of total ambient PM_{10}, with industries contributing 87 to 98% of total ambient PM_{10} at these locations. It is not clear if these hotspots coincide with the definition of 'low-income settlements' as used in the statement of Goal 3. However, the baseline modelling and source apportionment study showed that in the 'hotspots' – areas of highest concentrations – household fuel burning constituted a relatively small fraction, less than 12%, of total ambient PM_{10}, implying that the attainment of compliance with PM_{10} standards requires the simultaneous reduction of emissions from industrial emissions.

The MTR did not include a similar dispersion modelling and source apportionment study, nor did it conduct targeted measurement campaigns in identified 'low-income settlements' to evaluate time trends in air quality. In comments on the draft MTR, CER recommended that $PM_{2.5}$ and NO_2 monitoring stations be established in selected 'low-income' settlements using wood, coal and paraffin for household energy, together with annual surveys of household fuel use, so that air quality in these areas can be properly monitored.[80]

It was also recommended that the MTR include a comparable dispersion modelling exercise to that used in the baseline study, but with the addition of focused attention on the Ekurhuleni Metropolitan Municipality, given that air quality is known to be poor in this area, and because it is the most dense in terms of population and industry scale and complexity. In addition, photochemical modelling of O_3 formation is required to identify the main precursors of O_3 formation and to take appropriate steps to manage and reduce emissions of these precursors, with the objective of achieving the O_3 NAAQS.

The combined efforts by the municipalities (including NDM and ELM), the DEA, industries, and affected communities are essential to result in a reduction of emissions from domestic fuel burning as soon as possible in order to alleviate the health risks and constitutional rights violations that the people of the HPA have already had to endure for a long time.

If the resources currently being directed at treating the health effects of coal burning were redirected to renewable energy, the domestic fuel problem could be greatly reduced, if not eliminated. Green and renewable energy solutions such as the use of solar geysers and other solar heating solutions should be used to alleviate the domestic fuel burning problem in the HPA.

[79] p.42.

[80] http://cer.org.za/wp-content/uploads/2016/07/CER-preliminary-comments-on-mid-term-review_23-March-2017_final-1.pdf

The extreme energy-inefficiency of low-cost housing is a major problem too. New houses, particularly the Reconstruction and Development Plan (RDP) houses, should be designed and oriented for thermal efficiency and built properly. The houses should include, at a minimum, a gypsum or plasterboard ceiling to improve the general thermal properties, and heavy curtains to minimise heat loss. There should also be a programme for retrofitting existing houses, in consultation with communities living there.

Electrification would be another solution to reducing air pollution from domestic fuel burning, and for the electricity to be affordable, the consumption can be substantially reduced with the use of light-emitting diode (LED) lights, efficient fridges, solar water heaters etc. Cooking alternatives are more challenging, but the simplest addition is a hot-box or wonder-bag - which are easily made at home. The houses should all be built with a zero-waste approach, and initiatives like biogas for the homes and community-managed recycling centres could be adopted. Again, no measures should be implemented without community buy-in – the aforementioned are simply some possibilities for discussion.

All the above-mentioned measures can also be used to upgrade the shacks in the affected areas, relocating the people if necessary. For these initiatives and measures to be effective, they must be done with the full participation of the community, including in such issues as design and, most particularly, of relocation.

In early 2015, when the NAQO granted postponements of compliance with the minimum emission standards (MES), [81] she indicated that Eskom and Sasol should implement "air quality offsets" as a condition of those postponements.[82] They each had to implement an offset programme to reduce pollution in their receiving environments (PM pollution in the case of Eskom, and PM and SO_2 pollution in the case of Sasol). This requirement was subsequently incorporated into the AELs for Sasol's operations, as well as for all of Eskom's CFPSs, except for Medupi and Matimba (in the Waterberg-Bojanala Priority Area) and Kusile (which was the only of Eskom's CFPSs for which MES postponement was not sought). Sasol and Eskom have both piloted some measures to limit the health impacts of domestic fuels burning as air quality "offsets". The "offsets" under consideration include, for example: enhancing municipal capacity to prevent veld fires and for the collection and removal of non-recyclable waste; a vehicle emissions testing facility; engaging with waste-pickers regarding waste recycling; and installing new insulation ceilings in people's homes.

We strongly dispute that air quality can be offset. We also do not agree, in principle, with the use of offsets as a management tool to avoid compliance with legislation – in this case, meeting the MES on time. We have made submissions highlighting many concerns with the draft Air Quality Offset Policy,[83] as well as on the draft Air Quality Offsets Guideline.[84] However, the Guideline was finalised, largely without addressing our concerns.[85]

Ultimately, the responsibility for tackling the problems of domestic air pollution would best be placed at the local authority and/or community health level, supported by national policy and assistance, to ensure that rollout of interventions aimed at improving such non-industrial pollution sources would be equitable rather than selective, as offsets are likely to be.

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81 https://cer.org.za/wp-content/uploads/2015/02/airqualitymanagement_postponementapplications1.pdf.

82 See for example, the decision for Kendal CFPS: https://cer.org.za/wp-content/uploads/2015/02/Kendal-Letter.pdf

83 https://cer.org.za/wp-content/uploads/2016/08/CER-submissions-on-Draft-AQ-Offset-Policy_21-Feb-2014_final.pdf

84 https://cer.org.za/wp-content/uploads/2016/08/Offsets-AQ-Gdlne-CER-27-July-2015_final.pdf

85 https://cer.org.za/wp-content/uploads/2010/03/National-Environmental-Management-Act-107-1998-Air-quality-offsets-guideline-20160318-GGN-39833-00333.pdf

The health costs of air pollution are already a significant burden on the state. The DEA, and departments like the DoH, the DMR, and the Department of Human Settlements must collaborate closely with the municipalities, industries, and communities to find alternatives to domestic fuel burning.

The draft Strategy does not contain adequate, measurable, and progressive plans to address the complex challenges of indoor air pollution. It also fails to make adequate provision for the participation of community-based and non-governmental organisations in its design, implementation, review, and updating. There has been no indication of when a final Strategy will be adopted and implemented.

Unless these issues are urgently addressed, there may not be compliance with the AQMP goal to ensure that air quality in all low-income settlements is in full compliance with NAAQS by 2020.

Industrial emissions

As set out above, goal 2 of the HPA AQMP is that, by 2020, industrial emissions are equitably reduced to achieve compliance with NAAQS and dust fall-out values. The questions as to whether key industrial facilities in NDM and ELM have reduced their emissions of key pollutants and GHGs since 2007, relates to several objectives of goal 2; including that: gaseous and PM emissions are reduced (with indicators that include AELs being issued with emission reductions, emission reduction measures and maintenance plans implemented by industries); GHG emissions are reduced (with indicators that site GHG emission inventories should be compiled and energy-efficient plans implemented); abatement technology is appropriate and operational (with indicators that include that air pollution abatement technology is installed, equipment is optimally operated, and technology benchmarks are completed); clean technologies and processes are implemented (with indicators that AELs include clean technology and clean technology options are investigated and implemented); adequate resources are available for AQM in industry (with indicators that AQM personnel are designated and abatement and measurement financial planning is completed); and NAAQS and dust fall-out limit value exceedances from industrial emissions are assessed (with indicators that monitoring is carried out, with results reported to and available on the South Africa Air Quality System (SAAQIS)[86] and atmospheric impact reports (AIRs) are updated to include monitoring results); and that a line of communication exists between industries and communities (with the indicator that there are quarterly meetings between industry and communities).

Have key industrial facilities in NDM and ELM reduced their emissions of key pollutants and GHGs since 2007?

As stated above, the main facilities in the NDM and ELM areas include 12 of Eskom's CFPSs (with Kusile under construction), hundreds of mines; several metallurgical operations, minerals processing, and handling and storage operations - amongst others.

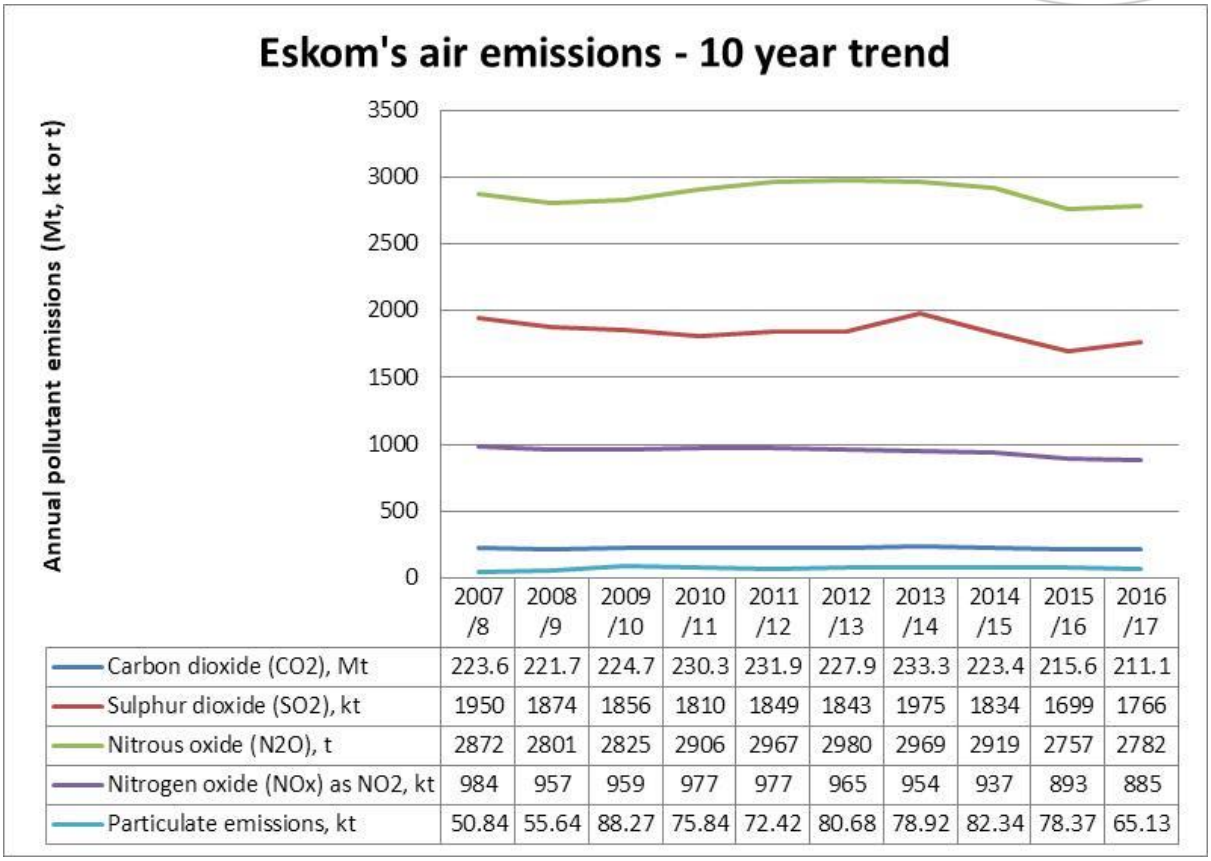
The main pollutants from CFPSs for which emission standards have been prescribed – in the AQA List of Activities - are SO_2, PM_{10}, and NO_X.[87] These CFPSs also produce pollutants like CO and VOCs.[88] The metallurgical and minerals processing industries emit CO and VOCs, in addition to SO_2, PM and NOx.[89]

These various industries all contribute to GHGs, with Eskom being by far the biggest contributor to carbon dioxide (CO_2) emissions in the HPA. In addition, Secunda (where Sasol's coal-to-liquids plant is based) is the

[86] www.saaqis.org.za.
[87] List of Activities Subcategory 1.1: Solid Fuel Combustion Installations p.12.
[88] NDM AQMP pp.89-91.
[89] List of Activities Category 4 at pp.26-37.

largest point source of CO_2 in the world.[90] Increasing concentrations of the GHGs - including CO_2, methane (CH_4), nitrous oxide (N_2O) and O_3 - in the atmosphere causes global warming and climate change.

Eskom is the biggest polluter in the HPA. The graph below was compiled using data extracted from Eskom's Integrated Report 2016/17.[91] It shows Eskom's annual emissions of various pollutants over the period 2007/8-2016/17.



	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Carbon dioxide (CO2), Mt	223.6	221.7	224.7	230.3	231.9	227.9	233.3	223.4	215.6	211.1
Sulphur dioxide (SO2), kt	1950	1874	1856	1810	1849	1843	1975	1834	1699	1766
Nitrous oxide (N2O), t	2872	2801	2825	2906	2967	2980	2969	2919	2757	2782
Nitrogen oxide (NOx) as NO2, kt	984	957	959	977	977	965	954	937	893	885
Particulate emissions, kt	50.84	55.64	88.27	75.84	72.42	80.68	78.92	82.34	78.37	65.13

Current PM emissions from Eskom are worse now than they were in 2007/8. In the tables below, based on Eskom's Integrated Report 2016/17, the following are compared in 2007/8 and 2016/17: its annual electricity generated and pollutant emissions; and its annual emissions intensities. In 2007/8, Eskom's relative PM emissions average over all plants, was 0.23 kg/MWh sent out; in 2016/17 its PM emissions performance was worse, at 0.32 kg/MWh sent out for the year.

Annual electricity generated and pollutant emissions from Eskom's coal power stations, 2007/8 and 2016/17

	GWhSO	CO2, Mt	SO2, kt	NOx, kt	PM, kt
2007/8	222908	223.6	1950	984	50.84
2016/17	200893	211.1	1766	885	65.13

[90] https://www.theigc.org/blog/the-cost-of-air-pollution-in-south-africa/

[91] http://www.eskom.co.za/IR2017/Documents/Eskom_integrated_report_2017.pdf pp104-106.

Eskom: Annual emissions intensities, 2007/8 and 2016/17

	CO2, t/ GWhSO	SO2, t/ GWhSO	NOx, t/ GWhSO	PM, kg/MWh SO
2007/8	1003	8.7	4.4	0.23
2016/17	1051	8.8	4.4	0.32

Comparing 2007/8 and 2016/17, CO_2 emissions intensity has deteriorated, NO_x emissions intensity are the same, SO_2 emission intensity has slightly deteriorated, and PM_{10} emissions intensity has deteriorated quite substantially. In other words, Eskom is more emissions-intensive now that it was ten years ago.

A 2017 report by Professor Eugene Cairncross reveals that numerous of Eskom's CFPSs are in regular non-compliance with its AEL emission limits.[92] This is despite the fact that these AELs contain more lenient limits than the MES, following the NAQO's February 2015 decision to grant Eskom (and Sasol) the bulk of the postponements sought from MES compliance. It is clear that when the largest emitter of air pollution does not meet the licensed limits – despite these being more lenient than the MES – and indicates an intention to continue to seek postponements of compliance, this significantly reduces any prospects of achieving an improvement in air quality.

At the PPCEA meeting on 13 September 2017, the DEA indicated in its presentation that compliance inspections from late 2015 to February 2017 revealed that five Eskom stations were in non-compliance with their AEL limits: Tutuka, Kendal, Lethabo, Medupi, and Medupi. In addition, Professor's Cairncross's report on Eskom's non-compliance with its relaxed emission limits was brought to the attention of the DEA and various other environmental authorities.[93] However, in a meeting held with them in July 2017, no evidence was provided of meaningful enforcement action that had been – or would be - taken against Eskom for its non-compliance. In addition, no reassurance was provided that future MES postponement applications would be refused.

On the contrary, in the July 2017 meeting, the DEA indicated that it would not be "reasonable" to expect Eskom to spend vast sums of money to retrofit their CFPSs to ensure compliance with MES when some CFPSs are scheduled to be decommissioned in about eight years. In fact, Eskom has plans to extend the lives of some of its CFPSs. Eskom has also made clear that it intends to apply for "rolling postponements" of MES compliance – in some cases, until stations are decommissioned; and Sasol, the other largest polluter, has made already made various applications to postpone MES compliance.

In the PPCEA on 13 June 2017, the NAQO indicated that there had been some reduction in industrial emissions, that industries had been in the HPA for many years, and the DEA was giving them some time to comply with MES. However, she indicated that there was a "clear industrial signature" of the emissions. This lenient, facilitative approach of government to non-compliance is a significant contributor to the high air pollution levels in the HPA. In the PPCEA on 13 September 2017, the DEA indicated that, although it did not envisage a situation of continuous postponements, there is no specific limitation in the legislation as to the number of postponements that could be granted. We point out that "rolling postponements" of MES granted until a facility's decommissioning would amount to exemption from the MES, which is not legally permissible. Also in the PPCEA on 13 September 2017, Eskom indicated that its plan was only to be 57% compliant with the MES, and only by 2025.

[92] https://cer.org.za/wp-content/uploads/2016/07/AEL-Compliance-Assessment-of-Eskom-CFPSs-final-19-May-2017_final.pdf
[93] https://cer.org.za/wp-content/uploads/2016/07/CER-letter-to-DEA-re-Eskom-non-compliance_31-May-2017.pdf

There is not much data publicly available on the reduction of emissions by industries, and the accuracy of the information is unknown. In response to the question whether industries had reduced their emissions, ELM deferred to NDM, indicating that NDM has "*air monitoring stations and are in a position to determine reduction in emission levels and other compliance matters*". NDM is the AEL licensing authority as well as the responsible authority for air quality compliance monitoring and enforcement. SAWS conducts the ambient air quality monitoring and reports on the state of air in NDM.

As set out below and in the CER's comments on the MTR, there are various concerns with the emissions-estimation methodologies used in the MTR. The MTR does not list the facilities included in its estimate of industrial emissions, which means that it is not possible to ascertain which facilities have been added to or removed from the baseline list. It admits that it cannot account for or explain the considerable differences in the number of facilities or the spatial distribution of facilities.[94] The result is that a credible statement as to the changes in total industrial emissions cannot be made on the basis of the data presented in the MTR. The MTR's claim that "*the methodology used in the current emission inventory is believed to be more robust than the previous one*"[95]is therefore strongly disputed.

The MTR itself identifies various concerns with the accuracy of the data; such as: "*some of the smaller AQA Section 21 listed activities have not reported emissions to the NAEIS. Only 75% of the listed activities in the HPA reported emissions to the NAEIS. However, the inventory/emissions quantification presented in this report provide a good baseline for future assessments because the 75% that reported are significant emitters in the region. Additionally, Section 23 (S23) emission inventory was not compiled due to data unavailability."*[96]

The "challenges" the MTR identifies for goal 2 are the following: "*Not all sources are accounted for in the industry site emission inventories; 30 % of industries not reporting to NAEIS; Not all facilities are conducting dust monitoring; There are number of unclear and ambiguous interventions and others are not relevant in addressing AQ*."[97]

According to the MTR, *"industrial sources in total are by far the largest contributor of SO2 and NOx in the HPA, accounting for approximately, 99.57% of SO2 and 95.97% of NOx, while mining is the largest contributor of PM10 emissions*";[98] and "*there has not been a significant decrease in emissions of industrial and mining sources… Nonetheless, industrial sources are still the largest contributors of SO2 and NOx in the HPA with mining being the main contributor of PM10*."[99]

In addition, those at the September 2016 MTR review stakeholder workshop were reported to take the view that only 29% of industrial emissions interventions had been achieved, and 39% were a "work in progress".[100] This is contradicted by a statement earlier in the draft review, to the effect that those at the workshop took the view that "*industrial interventions are largely implemented, however stakeholders argued that the interventions were not adequate enough to enable the achievement of the AQMP goals*".[101]

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94 p.54.
95 p.53.
96 p.53.
97 pp.80-81.
98 p.ii.
99 p.85.
100 p.78.
101 p.1 – this should be p.viii.

No explanation is provided for these different conclusions, but industrial interventions have clearly been inadequate, given that these are the biggest source of air pollution and the HPA remains in widespread non-compliance with NAAQS. As set out above, the reported decline in domestic fuel burning reveals that air pollution from this source does not make a significant contribution to this NAAQS non-compliance.

Goal 2 of the HPA AQMP incorporated 12 Objectives and a number of specific activities per objective, with timeframes, responsibilities and indicators. Objective 1 - "*emissions are quantified from all sources*", requires that site emissions inventories are completed and that emissions reports are available on an ongoing basis. The baseline HPA AQMP estimated emissions of PM_{10}, NO_X and SO_2 from 11 source types (including eight industrial categories):[102] Ekurhuleni Metropolitan Municipality industrial, Mpumalanga industrial, clay brick manufacturing, power generation, primary metallurgical, secondary metallurgical, petrochemical, mine haul roads, motor vehicles, household fuel burning, and biomass burning. The MTR, in contrast, estimates emissions from only five source categories: industrial sources, domestic fuel burning, biomass burning, vehicles and mining operations.[103]

In order to further facilitate comparison of industrial emissions, we recommend that the 2015 (or better, more recent) emissions estimate be grouped into the same sub-categories. Any comparison between the MTR estimates of emissions and those of the baseline HPA AQMP should carefully account for differences in the categorisation of emission sources, as well as possible differences in emissions-estimation methodologies and gaps in the data. The MTR does not provide sufficiently-detailed information to enable such an analysis. For example, the baseline HPA AQMP included a total of 346 APPA-registered operations,[104] grouped per HPA municipality, and listed emission sources by name in Appendix 6,[105] but the MTR fails to present a comparable level of detail.

The MTR[106] compares the number of industries considered in the current (2015 review) emission inventory and the previous (2010 baseline) emission inventory as per the table below (note the very significant, unexplained, differences in the numbers of facilities in each municipality):

Table 5-1: Number of industries considered in the current (2015 review) emission inventory and the previous (2010 baseline) emission inventory

Municipality	Total number of facilities considered in the current (2015) emission inventory	Total number of facilities considered in the 2010 baseline emission inventory
Ekurhuleni Metropolitan Municipality	172	244
Nkangala District Municipality	94	29
Gert Sibande District Municipality	47	25

[102] p.19.
[103] p.iv.
[104] p.21.
[105] p.172.
[106] p.54.

The following comment in the MTR accompanies Table 5-1:

> It is assumed that the decrease in the number of industrial facilities could be attributed to:
> - Some of the facilities closing down and no longer operational.
> - Some facilities no longer listed in terms of section 21. The amendment of the AQA Section 21 listed activities led to some of the Atmospheric Pollution Prevention Act (APPA) scheduled activities being delisted.
>
> Even with this updating of emission inventories, it should be noted that there are still industries that are not registered in any of the databases utilised. These facilities could be operating illegally. It should also be noted that the inventory did not take into account smaller industrial activities that are not listed in terms of AQA Section 21. Consequently, there is a need for further investigation particularly on those facilities that are not reporting their emissions to the NAEIS.

It is therefore clear that there is great uncertainty regarding these numbers.

The MTR claims that "*there has been a gradual decrease in emissions of all the pollutants in HPA, but the decrease is not significant*".[107] Table 5-2[108] presents changes in total annual emissions:

Table 5-2: Changes over years in total annual emissions due to industrial sources (tons/annum)

Total industrial emissions in HPA	PM_{10}		SO_2		NO_X	
	2010	2015	2010	2015	2010	2015
	111 782	92 575	1 612 174	1 460 701	886 024	885 990

The following comment accompanies Table 5-2:

> The decrease in emissions presented in **Table 5-2** above is not entirely attributable to improvements in emission from specific sources. The changes in emissions qualities can be attributable to the following factors:
> - **The source of information:** Previous industrial emissions inventories used APPA registration certificates. With the changes in legislation that came after the first baseline emissions inventories, the listed activities have AELs and are required to report emissions annually to the NAEIS. The latter was used in the current emission inventory update.
> - **Closing down of some industries:** Some industries in the HPA were confirmed to have closed down since the previous inventory was done.

[107] p.55.
[108] p.56.

The comments accompanying Tables 5-1 and 5-2 clearly indicate that there is considerable uncertainty in the 2015 estimate, and that the sources of uncertainty have not been identified. The MTR does not list the facilities included in its estimate of industrial emissions, making it impossible to ascertain which facilities have been added to or removed from the baseline list. The result is that a credible statement as to the changes in total industrial emissions cannot be made on the basis of the data presented in the MTR.

A number of companies submitted emission reduction plans and targets which were incorporated into the baseline HPA AQMP, including plans to reduce fugitive dust emissions and to improve air quality monitoring. The MTR does not assess the progress made with respect to these emission reduction plans. This is a significant omission.

As set out above, there is a declining trend in the use of domestic fuels, which only make a small contribution to total PM_{10} emissions – a reduction of some 40% between 2007 and 2016. There is no such reduction in industrial PM_{10} emissions; and no discernable reduction in ambient PM.

We agree with the view in the MTR that such industrial interventions as may have been made are not adequate to enable the achievement of AQMP goals.[109] The statement about progress with industrial interventions is contradicted within the MTR itself, which, as set out above, also indicates that those at the September 2016 stakeholder workshop took the view that only 29% of industrial emissions interventions had been achieved, and 39% were a "work in progress".[110] No explanation is provided for these different conclusions, but what is clear is that industrial interventions have made no meaningful impact on ambient air pollution. The limited data presented suggest that there has been no significant reduction in overall emissions from this source.

In relation to the failure (noted in the MTR) of industries to report to the NAEIS, we strongly recommend that action be taking against defaulting industries. The NAEIS Reporting Regulations, 2015 make it an offence, punishable by a fine of R5 million and/or five years' imprisonment (for a first offence) or R10 million and/or ten years' imprisonment (for a further offence), not to report to the NAEIS, or to report false or misleading information.[111] The default position in the Reporting Regulations is that NAEIS data must be public.[112] The GHG Reporting Regulations, 2017, make it an offence not to submit the required GHG emission data or to report false or misleading information.[113] Confidential information may be disclosed by the competent authority in certain circumstances.[114]

In terms of the List of Activities,[115] industries are required to report annually on their emissions (air pollutants and GHG emissions) to the licensing authorities, and these reports are required to be centrally saved and stored on the NAEIS for use in the compilation of atmospheric emission inventories. In such annual emission reports, industries are required to include, amongst other things: where periodic emission monitoring is required, the total volumetric flow of gas emitted by the listed activity;[116] where continuous emissions monitoring is required: results of the spot measurements or correlation tests carried out to verify

[109] p.1.
[110] p.78.
[111] Regulations 13 and 14.
[112] Regulation 12. Unless this promotes unfair competition, contravenes section 36 of the Promotion of Access to Information Act, or contravenes section 17 of the Statistics Act.
[113] Regulation 16.
[114] Regulation 12. If: the information is disclosed in compliance with the provisions of any law; the person is ordered to disclose the information by a court of law; or the information is disclosed for the purposes of the administration of justice.
[115] List of Activities paras 17 and 18.
[116] Para 18(b)(iv).

the accuracy of the continuous emission measurements and the most recent correlation tests;[117] and an explanation of all instances where MES were exceeded and remediation measures and associated implementation plans aimed at ensuring that the "accidences" do not reoccur.[118]

Based on these emission reports, licensing authorities such as NDM should be taking compliance and enforcement action – with such assistance from DEA and provincial authorities as is required – in cases of non-compliance with AEL conditions. Among other things, non-compliance with AELs is a criminal offence[119] (and, on conviction, in addition to a fine and/or imprisonment,[120] AELs can be withdrawn and the person disqualified from obtaining another for 5 years[121]), and non-compliance with a compliance notice issued by an inspector could result in the AEL being revoked.[122] Without strict compliance monitoring and enforcement action, there is unlikely to be any meaningful improvement in ambient air quality in NDM and the broader HPA.

Overall, and in response to the question whether key industrial facilities in NDM have reduced their emissions of key pollutants and GHGs since 2007, we were not able to obtain adequate data to answer this question fully. However, the graphs and NAAQS exceedances set out below and the information in the MTR provide a clear indication that there has been very little, if any improvement in compliance with NAAQS.

In addition, the fact that several industries in the HPA, including 11 Eskom CFPSs, PFG Glass in Ekurhuleni, and Sasol Secunda in Gert Sibande District Municipality, sought – and largely obtained – postponements of compliance with MES, that Sasol has again sought postponements, and that Eskom intends not only to continue to seek postponements, but has also indicated that it may extend the lives of some of its ageing, non-compliant stations, leads to the reasonable conclusion that the ambient air quality in the HPA will continue to be very poor for a long time to come. At this rate, it appears highly unlikely that Goals 2 of the HPA AQMP will be achieved by the set date of 2020. This situation will not change unless the industries take immediate measures to abate their emissions or until they decommission the facilities, or until meaningful criminal and administrative enforcement action is carried out for non-compliance.

In the interim, all HPA facilities must be required to comply with the MES, at a minimum (but ideally with stricter limits). The NAQO should consider withdrawing the postponements of MES granted to Eskom and Sasol. No further postponements of compliance with MES or other licence variations that permit exceedances of licence emission standards should be allowed. Licensing authorities must suspend the issuing of all new AELs in the HPA, until there is consistent compliance with all NAAQS. Approval and licensing of any expansion plans of existing industries must be contingent on a simultaneous substantial reduction in emissions. When facilities reach their scheduled end-of-life (particularly certain Eskom CFPSs), AELs must be withdrawn, and decommissioning and rehabilitation enforced.

In addition, in recognition of the crucial importance of air quality compliance in the HPA, a comprehensive compliance monitoring and enforcement programme must be put in place by DEA and local authorities to ensure that violations of AELs are detected, and enforcement action taken against those who violate licence conditions. As many environmental management inspectors as are required should be appropriately trained

[117] Para 18(c)(i)-(ii).
[118] Para 18(d).
[119] s.51(1)(e); s.51(3) of AQA.
[120] s.52(1) of AQA provides for a fine not exceeding R5 million and/or imprisonment for a period not exceeding 5 years, and in the case of a second or subsequent conviction, to a fine not exceeding R10 million and/or imprisonment for a period not exceeding 10 years.
[121] s.34C of NEMA.
[122] s.31N(2)(a) of NEMA.

and designated, in order to push for much stricter compliance monitoring and enforcement of industries in the HPA; including: suspension of licences for facilities until such time as emissions comply with licence conditions. Other enforcement action should also be employed, such as: the use of reports required in the AQA List of Activities and in AELS; AIRs (section 30 of AQA); criminal sanctions (chapter 7 of AQA and section 49A of NEMA); measures in terms of sections 31H and section 31K of NEMA; compliance notices (section 31L of NEMA) and reports of non-compliance with compliance notices (section 31N of NEMA); and such enforcement measures as are available in local government AQMPs and by-laws.

Below, we evaluate whether air quality in the HPA has improved since the declaration of the HPA.

HAS AIR QUALITY IN THE HPA IMPROVED?

The National Air Quality Indicator (NAQI) is used to measure the status of national air quality in South Africa. Annual averages of PM_{10} and SO_2 from all monitoring stations are used as a proxy measurement for the NAQI. The lower the figure, the better the air quality. The baseline NAQI was 0.972. This was the NAQI in 2012/13.[123] In 2013/14, it was 0.939;[124] and in 2014/15, it was 0.83.[125] The DEA Annual Report 2015/16 indicates that there has been a slight improvement in air quality in that the NAQI improved from the baseline of 0.972 to 0.79.[126] However, the estimated performance for 2016/17 is worse, with the NAQI deteriorating to 1.25.[127] The DEA's 2017-2018 Annual Performance Plan of 1.2 as the NAQI for 2017/18.[128]

It appears from the 2015 NAQO report (the most recent available report) that the NAQI of 0.79 is actually from 2014.[129] According to this report: "*between 1994 and 1999, SO2 was the pollutant that defined the national indicator*"; "*since 2000, PM_{10} has defined the NAQI*"; and "*although it appears that there has been a continuous air quality deterioration trend since 2000, this is largely (but not entirely) due to the fact that data from new stations in identified pollution "hotspots" such as [Vaal Triangle Airshed Priority Area] and HPA were added over this latter period*".[130]

The NAQO also states that "*since the number of monitoring stations reporting to SAAQIS is continuously changing over the years and the NAAQS annual average of PM_{10} is getting stricter from 01 January 2015, considerations have be made on how these changes will impact the NAQI is derived from a continuously moving baseline/target. For these reasons, the NAQI will be defined over two reporting phases/periods during which the number of stations and the NAAQS are constant*": phase 1: 2008-2014 and phase 2: 2015 onwards.

According to the NAQO, "*the majority of stations used to derive the NAQI are located in those areas that have been identified as experiencing significant human exposure to air pollution. As such, while the air quality might not indicate the national average since most of these zones are in urban areas, these ambient air quality measurements are representing the areas where people are most impacted by the adverse effects of air pollution in the country. For this reason, the NAQI should be used cautiously with background stations as these stations are specifically sited outside the zones of maximum human exposure. Including the background*

[123] https://www.environment.gov.za/sites/default/files/docs/environmental_affairs2012_2013_annualreport.pdf p.67.
[124] https://www.environment.gov.za/sites/default/files/reports/annual_report2013_14.pdf p.62.
[125] https://www.environment.gov.za/sites/default/files/reports/environmentalaffairs_annualreport2014_5.pdf p.58.
[126] https://www.environment.gov.za/sites/default/files/reports/2015_16annual_report_environmentalaffairs.pdf p.59.
[127] DEA Annual Performance Plan 2017-2018 p.57.
[128] p.62.
[129] NAQO's 2015 report p.43.
[130] NAQO's 2015 report p.44.

stations in the NAQI development could dilute the impact on human health, and possibly bias the efficacy of air quality management policies. It is for these reasons that the department has also developed dedicated regional air quality indicators for the Vaal Triangle and Highveld Air Quality Priority Areas in order to measure the effectiveness of priority area AQMPs."[131]

In this section, we provide information on data sourced from various reports presented by NDM and the DEA on the state of air in NDM and HPA. We also use information from the MTR and other DEA reports to evaluate whether air quality has improved in the HPA since its declaration. We also commissioned an expert in air quality, Mazwi Lushaba, to conduct an independent study of certain monitoring data. A summary of the findings is set out below.

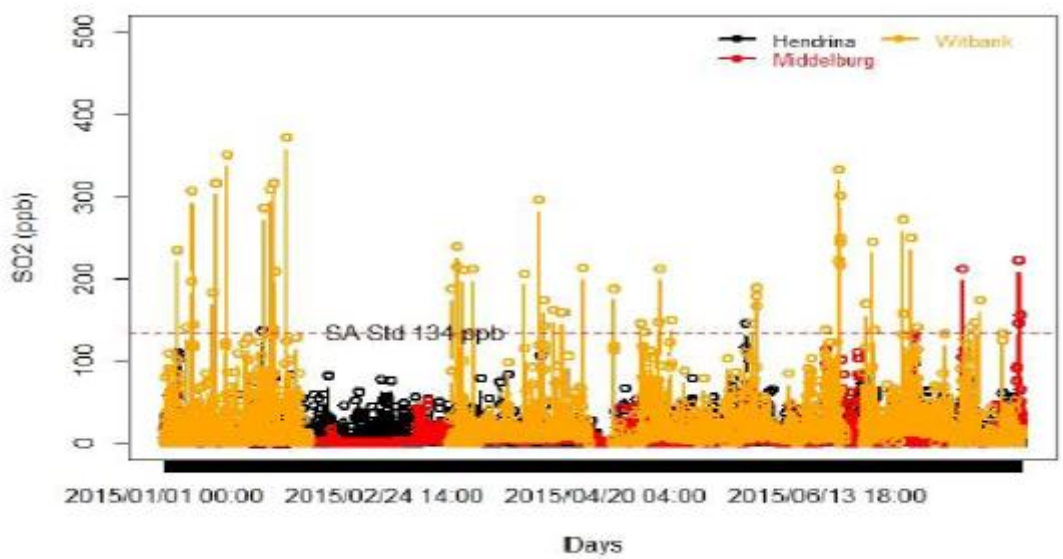
We particularly wanted to assess air quality in the HPA since its 2007 declaration. However, there is no data for 2007 and 2008, as the HPA monitoring stations were only installed in 2008 and monitoring data was only reported from 2009.

Government reports on monitoring data

The data presented are from ambient air quality monitoring equipment monitored by the SAWS and DEA and posted on the SAAQIS online. The pollutants that we consider are SO_2, PM_{10}, $PM_{2.5}$, NO_2, O_3 and CO.

Air quality data that focused on NDM were presented by SAWS at a 15 September 2015 ITT meeting, which showed data on SO_2, $PM_{2.5}$, and PM_{10}. Updated data on these three pollutants, as well as O_3 and CO, was also presented at a 16 May 2017 ITT meeting.

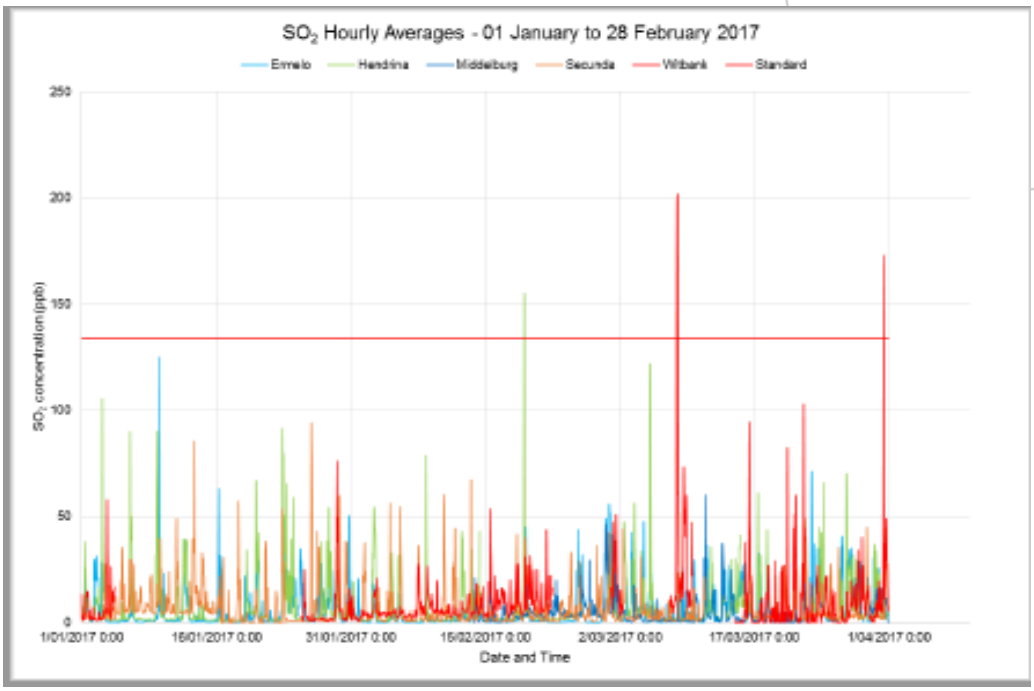
6 month SO_2 levels in Nkangala in 2015 (hourly averages)[132]



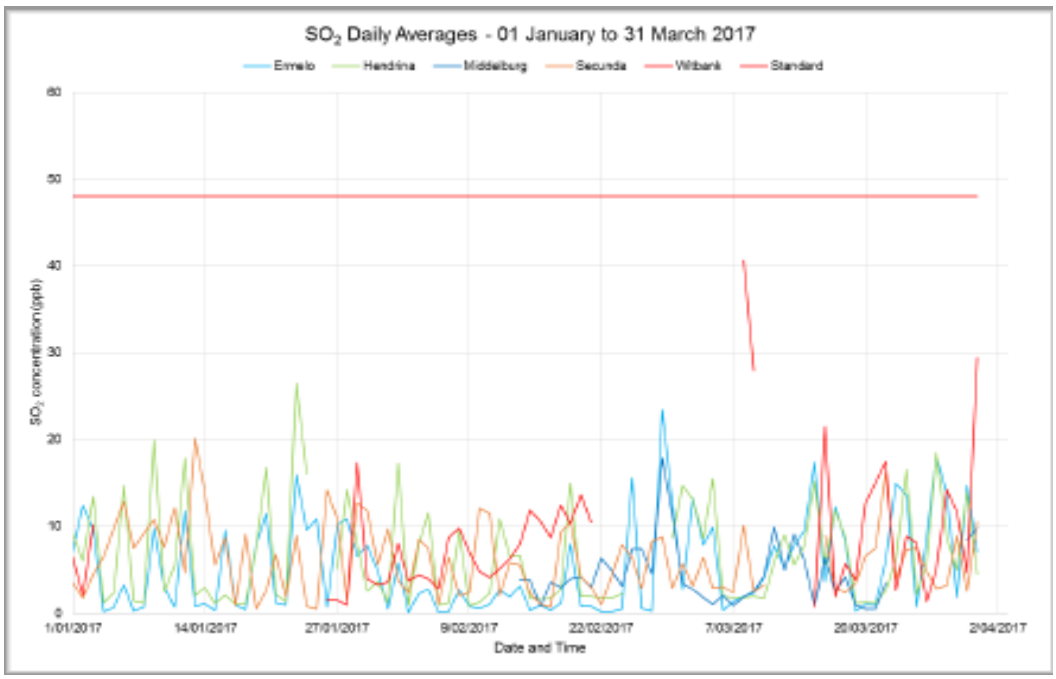
The graph above shows SO_2 NAAQS exceedences from January, February, April, and June 2015. Middelburg and eMalahleni (Witbank) SO_2 concentrations are high, and SO_2 concentrations exceed the hourly NAAQS for SO_2 of 350 ug/m^3 or 134 parts per billion (ppb). The readings go as high as 380 ppb, which is almost three times more than the standard.

[131] pp.44-45.
[132] Slide 7 Nkangala State of the Air Report September 2015.

2 month SO_2 levels in Nkangala in 2017 (hourly averages)[133]



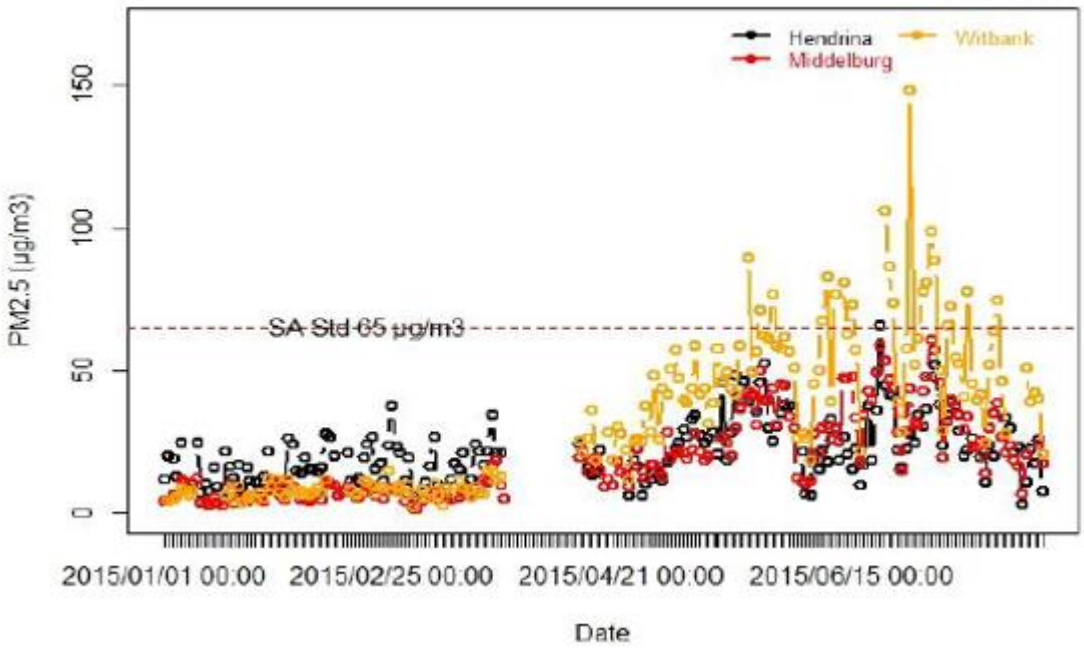
3 month SO_2 levels in Nkangala in 2017 (daily averages)[134]



These graphs shows that, for January to March 2017, there were no exceedances of the SO_2 daily average NAAQS, but there were exceedances of the hourly average.

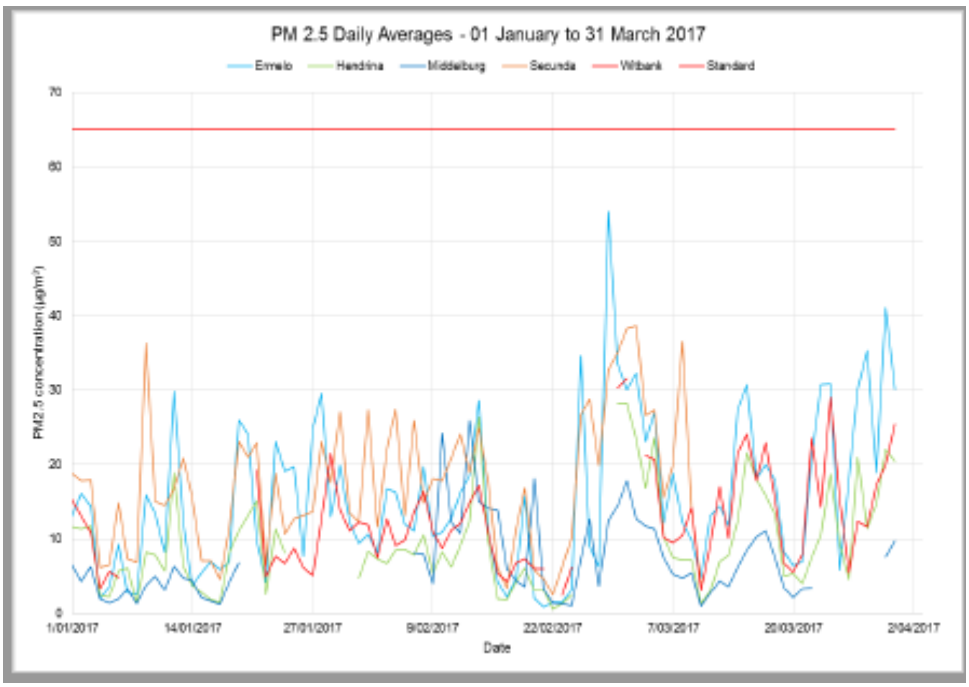
[133] Slide 7 NDM ITT presentation dated 16 May 2017.
[134] Slide 6 NDM ITT presentation dated 16 May 2017.

6 month $PM_{2.5}$ levels in Nkangala in 2015 (daily averages)[135]



The graph above shows the exceedances from January, February, April, and June 2015, depicting that eMalahleni has very high $PM_{2.5}$ exceedances at almost 150 ug/m^3, more than double the permitted 65 ug/m^3 standard. The 24 hour NAAQS for $PM_{2.5}$ from 2012 to 31 December 2015 was 65 ug/m^3, but this has since been replaced with the new, stricter standard for 1 January 2016 to 31 December 2029 of 40ug/m^3. It is inevitable that the stricter standards will result in more exceedances of the NAAQS.

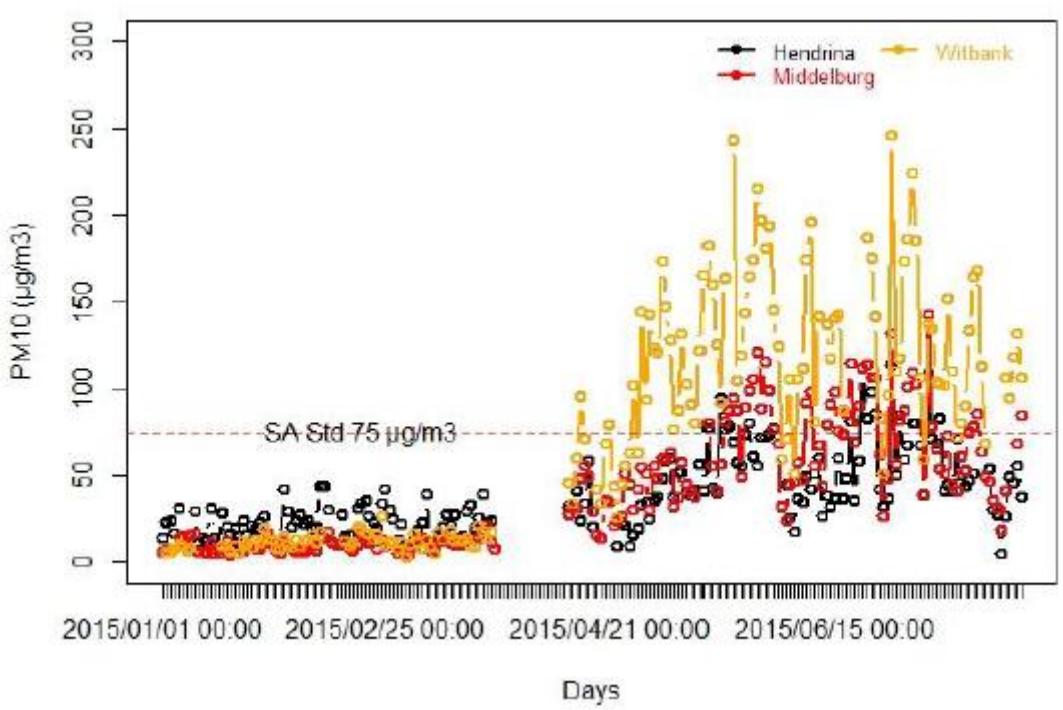
3 month SO_2 levels in Nkangala in 2017 (daily averages)[136]



[135] Slide 8 Nkangala State of the Air Report September 2015.
[136] Slide 5 NDM ITT presentation dated 16 May 2017.

This graph shows that, for January to March 2017, there were no exceedances of the $PM_{2.5}$ daily average NAAQS.

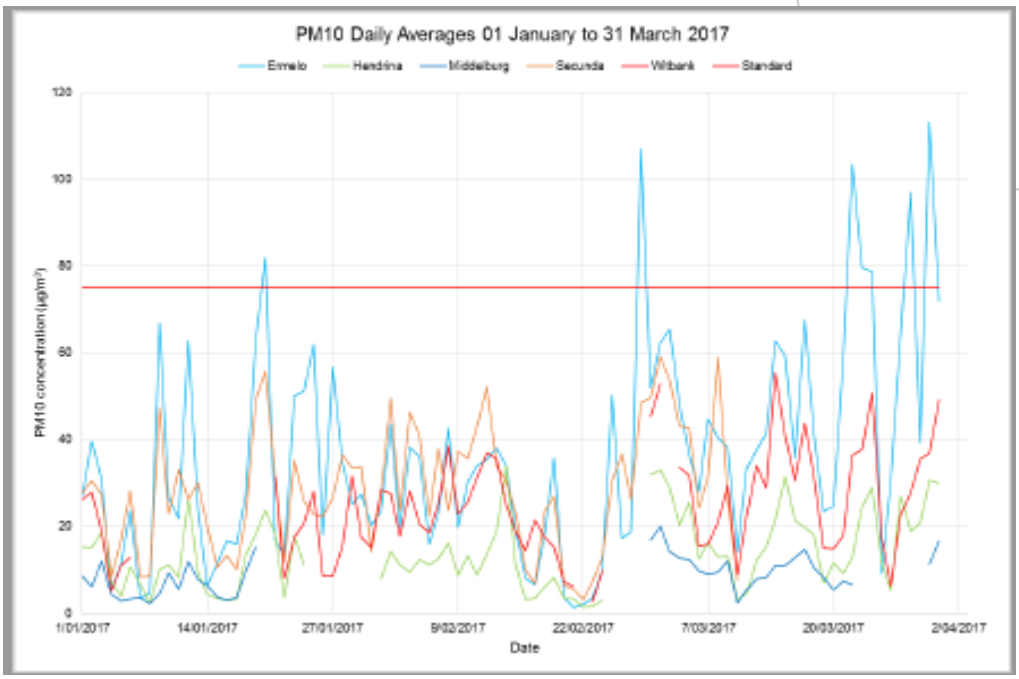
6 month PM_{10} levels in Nkangala in 2015 (daily averages)[137]



The 24 hour NAAQS for PM_{10} is set at 75ug/m^3 from 1 January 2015. The above graph shows the exceedences from January, February, April, and June 2015, depicting that eMalahleni and Middelburg have very high PM_{10} exceedences at almost 150 ug/m^3 (double the 75 ug/m_3 standard) for Middelburg, and more than triple the permitted 75 ug/m^3 standard in eMalahleni at above 250 ug/m^3.

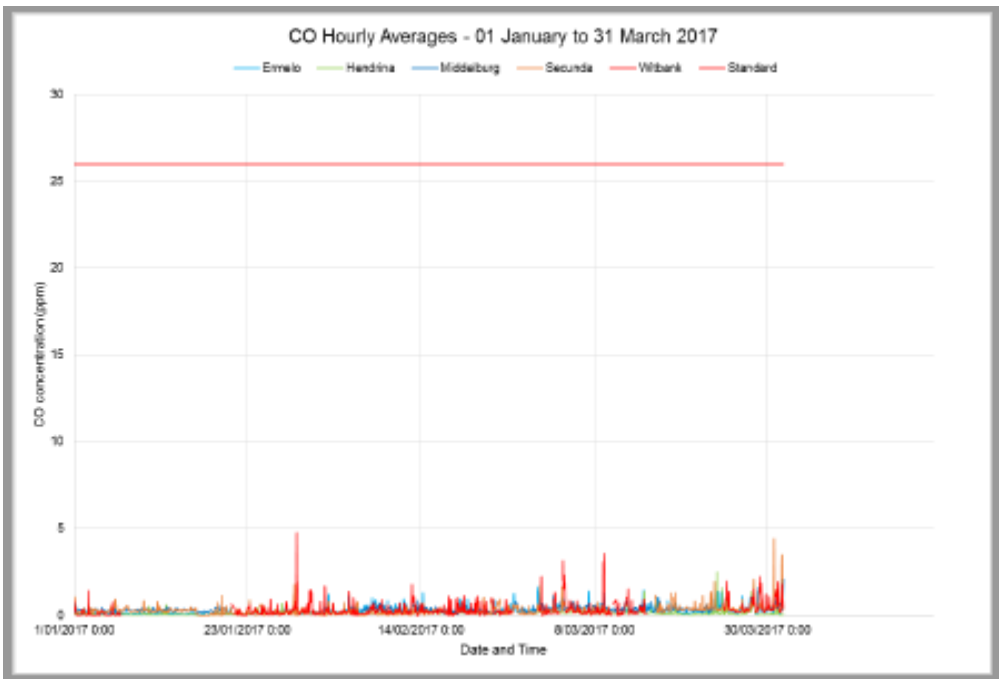
[137] Slide 9 Nkangala State of the Air Report September 2015.

3 month PM_{10} levels at Nkangala in 2017 (daily averages)[138]



The graphs shows that, from January to March 2017, there were several exceedances of the PM_{10} daily average NAAQS recorded at Ermelo.

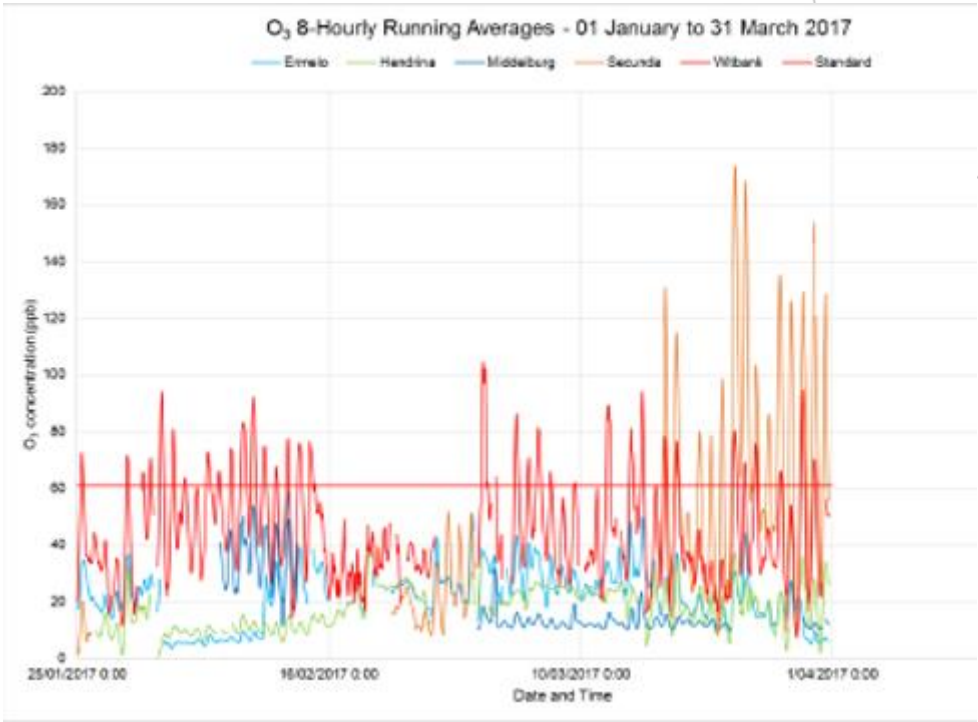
3 month CO levels in Nkangala in 2017 (hourly averages)[139]



This graph shows that, for the first three months of 2017, there were no exceedances of the CO hourly average NAAQS.

[138] Slide 4 NDM ITT presentation dated 16 May 2017.
[139] Slide 8 NDM ITT presentation dated 16 May 2017.

3 month O_3 levels in Nkangala in 2017 (8-hourly averages)[140]



This graph shows that, from January to March 2017, there were multiple, ongoing exceedances of the O_3 8-hourly running average, particularly in Secunda and eMalahleni.

In response to our questions to ELM as to whether air quality had improved, it indicated that air pollution appeared to be worsening:

> **The municipality cannot say with certainty whether there has been improvement or not, though a lot has been done in terms of implementation of the HPA AQMP. It is also very difficult for the municipality to respond to this question due to the following reasons:**
>
> - **The municipal department that deals with environmental management issues was established in 2014,**
> - **The AQO was designated in 2013,**
> - **The does not conduct ambient air quality monitoring and therefore cannot confirm whether there is improvement or not,**
> - **The municipality does not have an air quality management plan which can be used to assess performance and achievement on the key priority programmes.**
>
> **The municipality is in the process of developing its own air quality management By-laws which are expected to be promulgated by December 2016. Pollution exposure can only be established through air quality monitoring network, unfortunately the municipality has since decommissioned its monitoring station in 2009 due to budgetary constraints. However, from mere physical observation, pollution exposure levels have not improved since 2007 and its getting worse.**

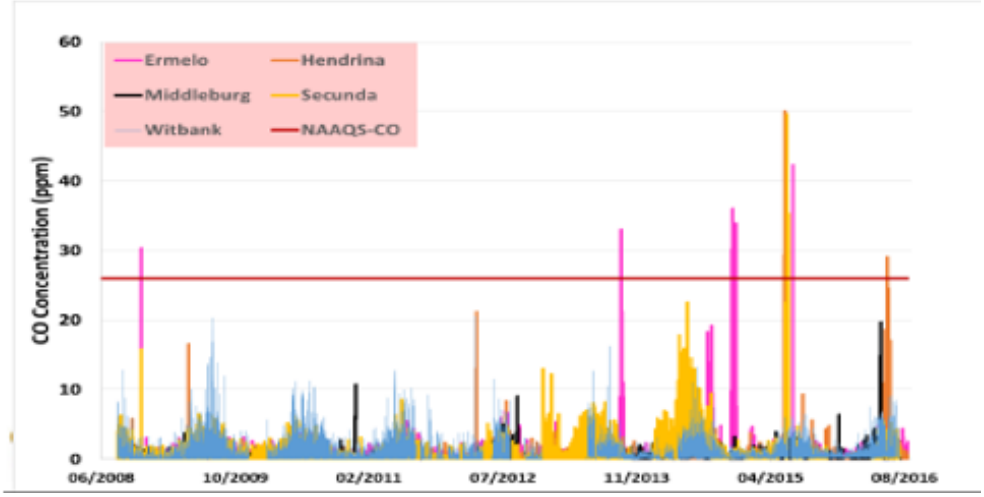
The graphs below show the hourly averages for CO, NO_2, O_3, and SO_2 from 2008 to 2016 from the HPA State of Air report dated 28 September 2016. We also present the most recent available data on the HPA state of

[140] Slide 10 NDM ITT presentation dated 16 May 2017.

air from April 2016 to May 2017 below, as presented at the HPA MSRG on 25 May 2017, to illustrate whether there has been any difference in air quality since the 2016 State of the Air Report. We also present the daily averages for SO_2, $PM_{2.5}$, and PM_{10} from the 25 May 2017 MSRG for the period April 2016 to May 2017.

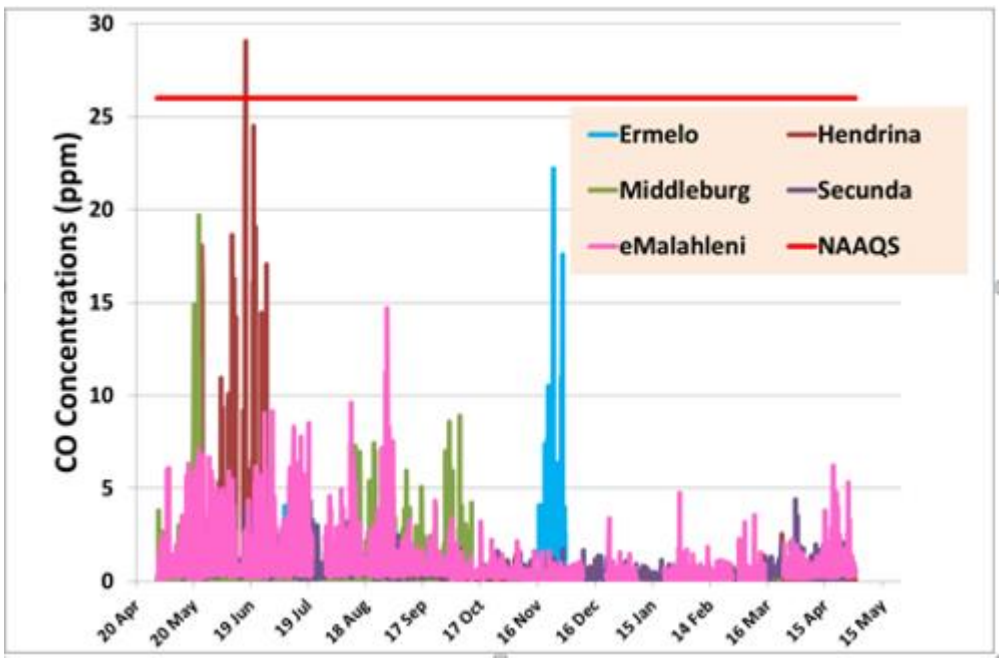
The overall data relate to the HPA, but also reflect the specific data from the five DEA HPA various monitoring stations.

CO HPA hourly averages from 2008-2016[141]



The hourly NAAQS for CO is 30 mg/m^3 or 26 ppb. The graph above shows that the hourly averages for CO (which contributes to GHG concentrations) for the last years, from 2008 to 2016, are high in Hendrina and Ermelo, at almost double the allowed concentration.

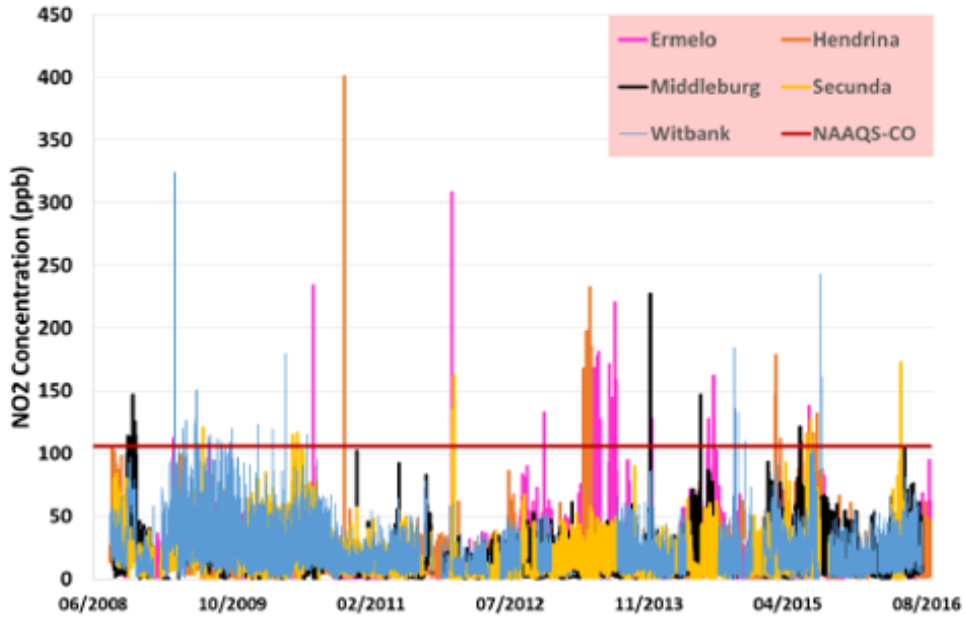
CO HPA hourly averages from April 2016 – May 2017 [142]



[141] Slide 11 State of Air Report MRSG workshop presentation dated 28 September 2016.
[142] Slide 7 State of Air Report MSRG presentation dated 25 May 2017.

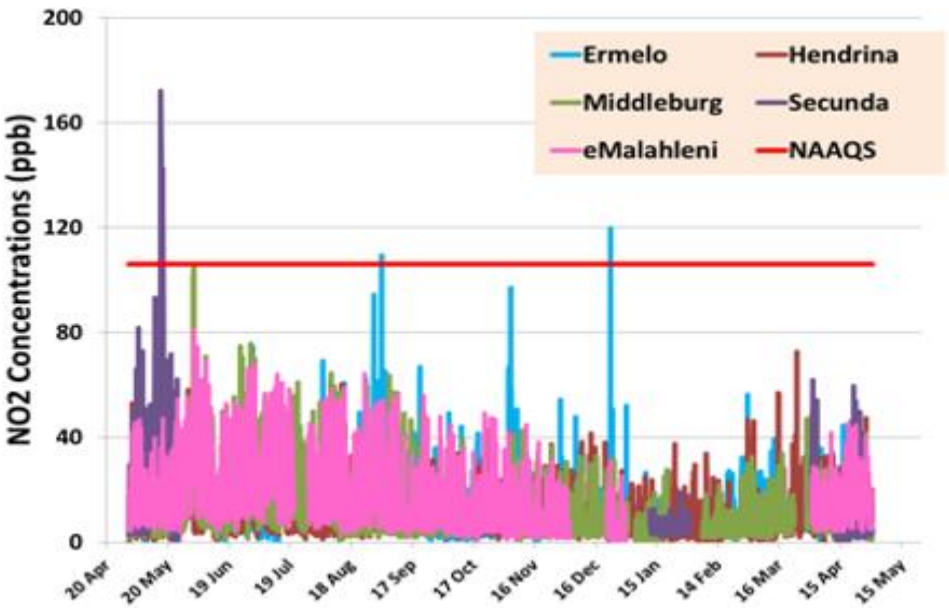
The graph above shows the hourly averages for CO for April 2016 to May 2017. It is clear that emissions were high in Middelburg, Hendrina, and Ermelo between May 2016 and December 2016. The concentrations were highest in Hendrina between May and July 2016 when the CO concentrations exceeded the standard i.e. 30 mg/m^3 or 26 ppb.

NO_2 HPA hourly averages from 2008-2016[143]



The hourly NAAQS for NO_2 is 200 ug/m^3 or 106 ppb. The graph above shows that hourly averages for NO_2 (which contributes to GHG concentrations) for the last 8 years, from 2008 to 2016, have been high in eMalahleni, Middelburg, Hendrina and Ermelo. The exceedances are highest in Hendrina, at almost 4 times the permitted amount.

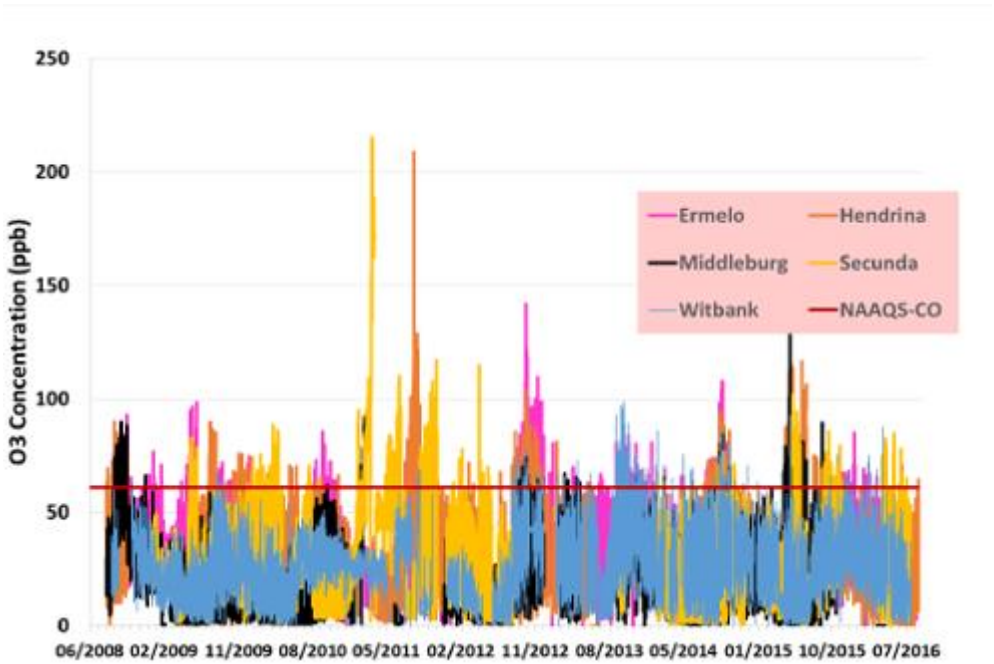
NO_2 HPA hourly averages from Oct 2015 – Sept 2016 [144]



[143] Slide 9 State of Air Report MRSG workshop presentation dated 28 September 2016.
[144] Slide 8 State of Air Report MSRG presentation dated 25 May 2017.

The graph above shows the hourly averages for NO_2 for the year from April 2016 to May 2017. It is clear that emissions were high in Middelburg, Secunda, and Ermelo between April 2016 and January 2017. The concentrations were highest in Secunda between May and June 2016, Middelburg in June 2016, Ermelo between August and September 2016, and between December 2016 and January 2017, and the NO_2 standard i.e. 200 ug/m^3 or 106 ppb was exceeded.

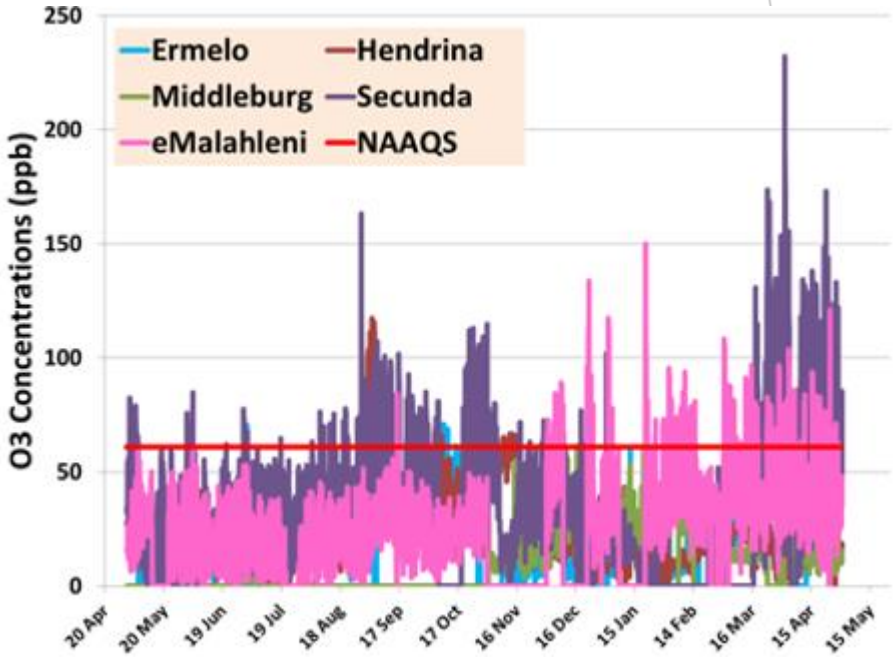
O_3 HPA 8-hourly averages from 2008-2016[145]



The O_3 NAAQS for 8 hours is 120 ug/m^3 or 61 ppb. It is clear that Hendrina and Ermelo have had consistently high O_3 concentrations over the last eight years. O_3 also contributes to GHG concentrations. Ermelo has had the highest NAAQS concentration at more than double the permitted amount. O_3 is a secondary pollutant and its formation is dependent on the presence of the pre-cursors such as NOx, organic compounds and sometimes hydrocarbons or VOCs and sunlight energy.

[145] Slide 12 State of Air Report MRSG workshop presentation dated 28 September 2016.

O_3 HPA 8 hourly averages from April 2016 –May 2017[146]



The graph above shows the 8 hourly averages for O_3 for the period April 2016 to May 2017; it is clear that concentrations were high in all five stations (with the position exception of Middelburg) throughout the year. Concentrations in Secunda and eMalahleni consistently exceed the standard of 120 ug/m^3 or 61 ppb, with the highest concentrations highest in Secunda in April 2017 when O_3 exceeded the standard i.e. by almost four times the legislated amount.

As depicted above, Hendrina and Ermelo have had very high O_3 concentrations since 2009. The Middelburg exceedances are also relatively high.

Overall, it is clear that the O_3 concentrations are high in all five stations in NDM. O_3 is a GHG. It is important that action be taken as speedily as possible in order to reduce GHG emissions in the HPA and in South Africa as a whole. This is essential, given South Africa's commitments in terms of our Nationally Determined Contribution (NDC) under the Paris Agreement.[147] South Africa ratified the Paris Agreement on 1 November 2016, and the Agreement entered into force on 4 November 2016.

Also insofar as climate change is concerned, the DEA has promulgated various legislation[148] and a draft Climate Change Bill is expected for comment by the end of 2017.

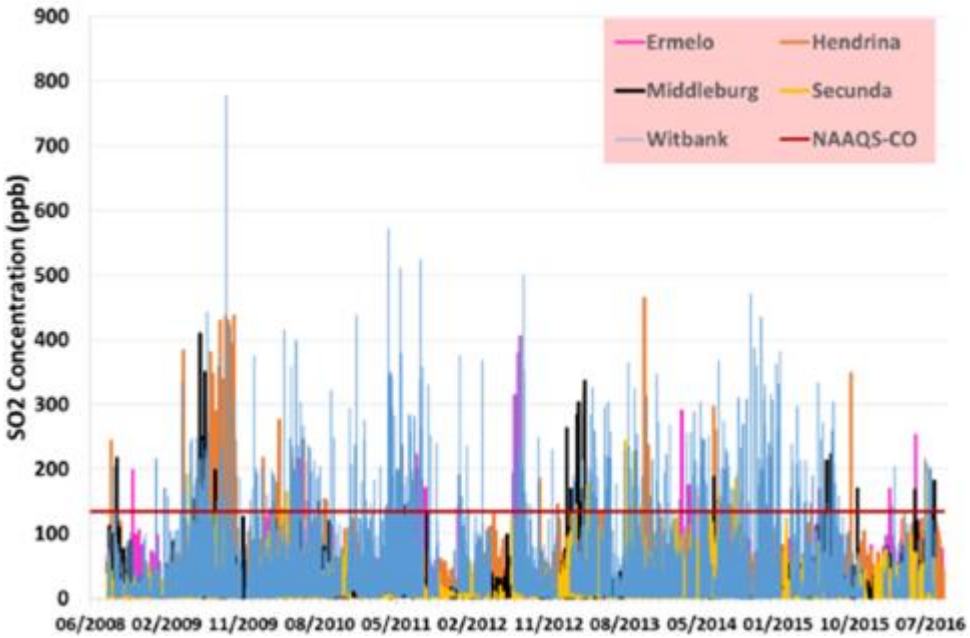
Next, we consider SO_2 hourly averages in the HPA.

[146] Slide 10 State of Air Report MSRG presentation dated 25 May 2017.

[147] The Paris Agreement was adopted at the Conference of the Parties in Paris in December 2015 and came into effect on 1 November 2016 https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

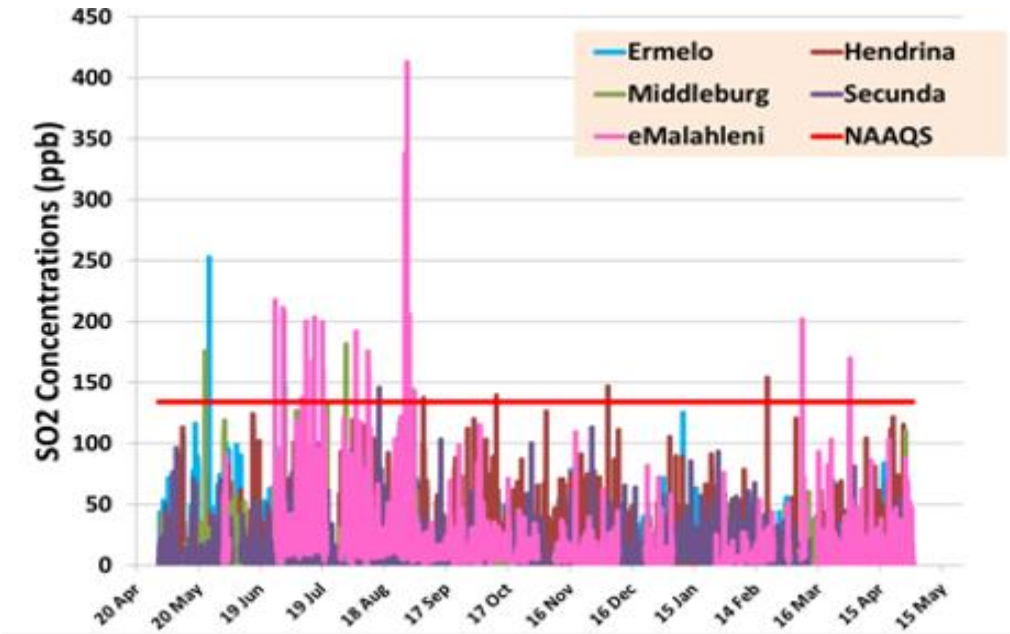
[148] National Atmospheric Emission Reporting Regulations, 2015; National GHG Emission Reporting Regulations, 2017; National Pollution Prevention Plan Regulations, 2017; and the Declaration of GHGs as Priority Air Pollutants, 2017.

SO_2 HPA hourly averages from 2008-2016[149]



The graph above shows that Hendrina, Middelburg, eMalahleni and Ermelo have had consistently high SO_2 concentrations and there have been several exceedances of NAAQS since 2008. The prescribed hourly NAAQS for SO_2 is 350 ug/m^3 or 134 ppb.

SO_2 hourly averages from April 2016 – May 2017[150]

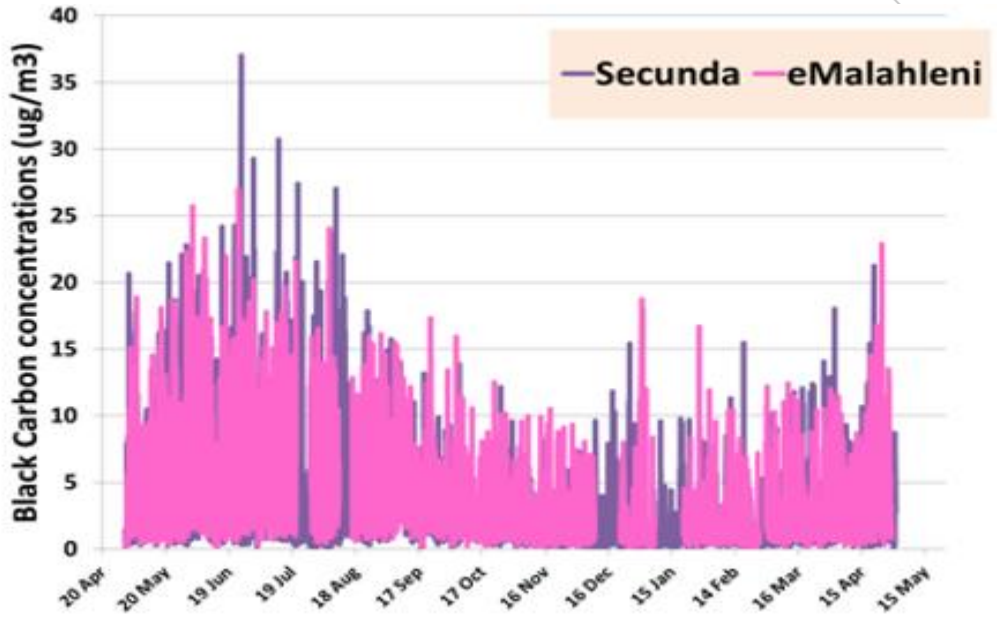


The graph above shows the SO_2 hourly averages from April 2016 to May 2017. It is clear that emissions were high in Middelburg, eMalahleni and Ermelo, with some exceedances also in Hendrina and Secunda. The concentrations were highest in eMalahleni between August and September 2016 when concentrations were three times higher than the SO_2 standard of 350 ug/m^3 or 134 ppb.

[149] Slide 10 State of Air Report MRSG workshop presentation dated 28 September 2016.
[150] Slide 9 State of Air Report MSRG presentation dated 25 May 2017.

At the 25 May 2017 MSRG, the DEA presented the hourly averages at Secunda and eMalahleni monitoring stations for black carbon (a component of $PM_{2.5}$), although there are no NAAQS for black carbon.

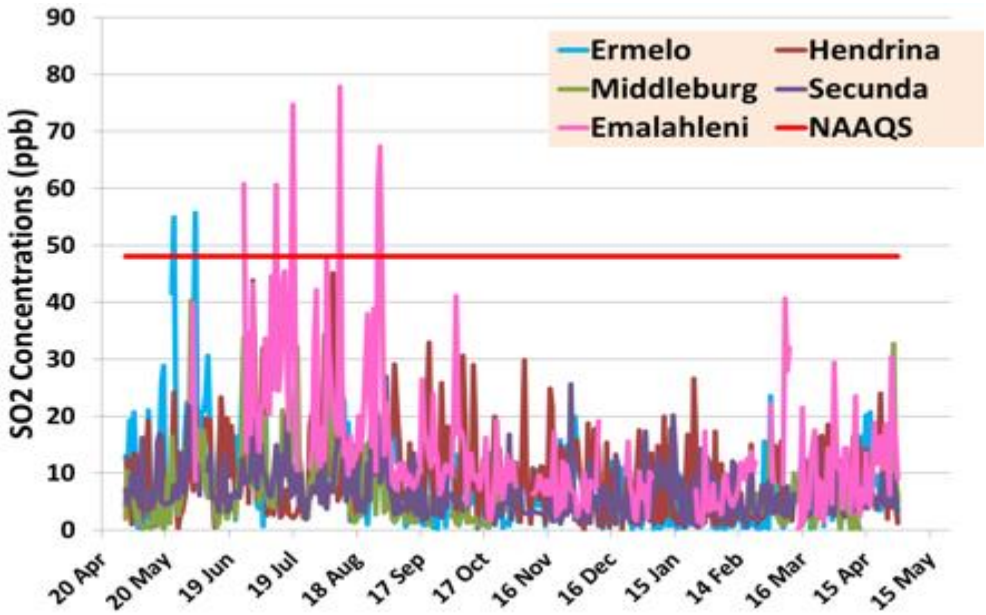
Black carbon hourly averages from April 2016 to May 2017[151]



Black carbon is a significant climate-forcing pollutant. It absorbs sunlight, heating the atmosphere and, if deposited on snow, accelerates melting. There is no emission standard, but cumulative black carbon emissions (of which diesel vehicles are the main source) may contribute significantly to global warming.

Next, we consider the daily averages for SO_2, $PM_{2.5}$ and PM_{10} as presented at the 25 May 2017 MSRG.

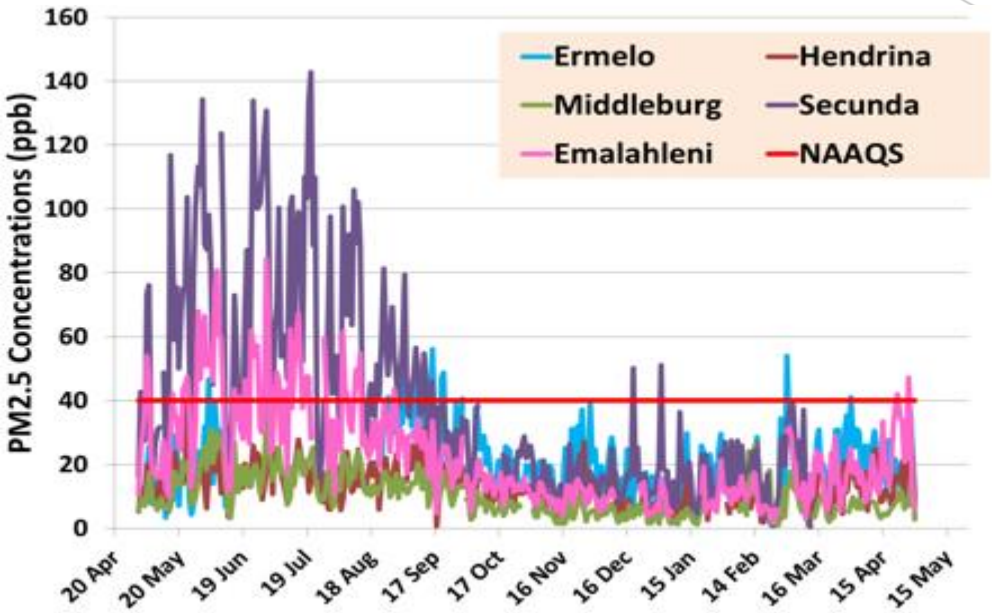
SO_2 daily averages from April 2016-May 2017[152]



[151] Slide 11 State of Air Report MSRG presentation dated 25 May 2017.
[152] Slide 13 State of Air Report MSRG presentation dated 25 May 2017.

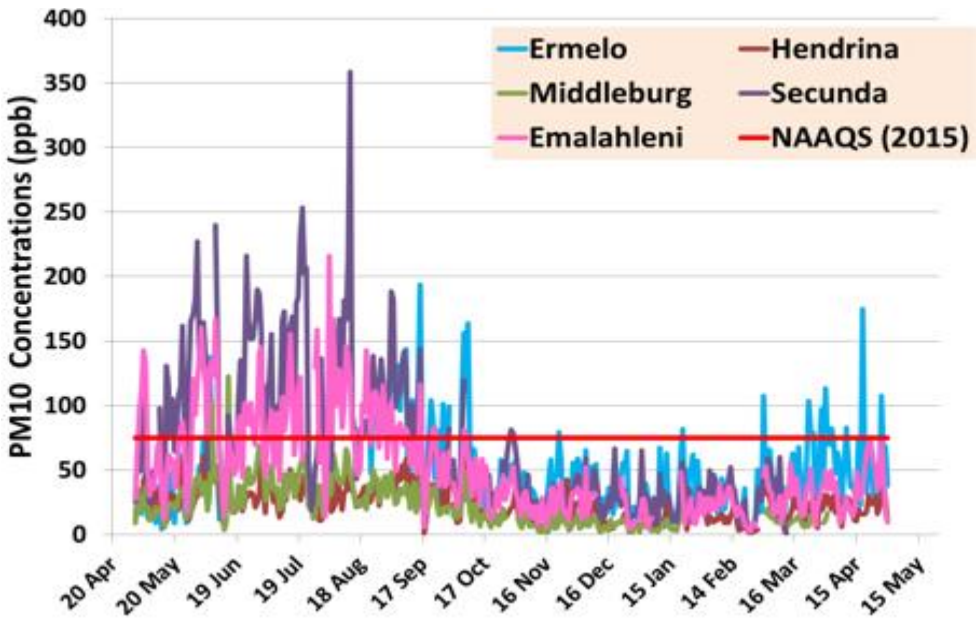
The graph above reflects several exceedances of the SO_2 daily average of 125 ug/m^3 or 48 ppb in Ermelo and eMalahleni between May and September 2016, with the highest exceedances in eMalahleni between July and August 2016.

$PM_{2.5}$ daily average from April 2016-May 2017[153]



The graph above demonstrates (though the y-axis reference to ppb is an error – it should be µg/m^3) that there were regular exceedances of the $PM_{2.5}$ daily average of 40 ug/m^3, particularly in Secunda, Ermelo, and eMalahleni. Exceedances were particularly high in Secunda from April to September 2016, with exceedances between July and August 2016 more than three-and-a-half times the NAAQS.

PM_{10} daily averages from April 2016 to May 2017[154]



[153] Slide 14 State of Air Report MSRG presentation dated 25 May 2017.
[154] Slide 15 State of Air Report MSRG presentation dated 25 May 2017.

It is clear from this graph (which also incorrectly refers to ppb instead of µg/m^3) that exceedances of the PM_{10} daily average of 75 ug/m^3 were common from April 2016 to May 2017, particularly in Ermelo, Secunda and eMalahleni. The highest exceedance was between July and August 2016, where emissions were almost five times the NAAQS.

The following summary of exceedances was presented at the 25 May 2017 MSRG:[155]

Daily and Hourly Exceedances

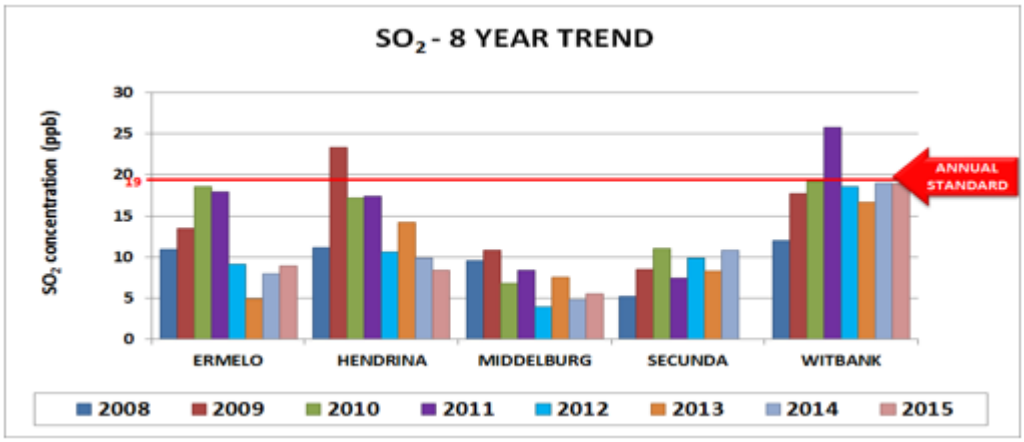
	PM_{10} (4)	$PM_{2.5}$ (4)	SO_2 (4)	O_3(11)
Ermelo	41	13	2	241
Hendrina	1	1	0	329
Middelburg	2	0	0	33
Secunda	105	98	0	1130
eMalahleni	81	52	6	562

Exceedances of O_3 NAAQS were high at all stations, and in Secunda especially. Exceedances of NAAQS for PM_{10}, and $PM_{2.5}$ were high in Ermelo, Secunda and eMalahleni, with the highest exceedances of both in Secunda. Although the number of SO_2 exceedences of the NAAQS was low, this does not indicate that SO_2 health impacts are minimal – the SO_2 24 hour NAAQS is more than 5 times higher (more lenient) than the WHO guideline value.

The graphs below show the annual averages for SO_2, $PM_{2.5}$ and PM_{10} from 2008 to 2015, as presented at the MSRG on 25 May 2017. In this regard, we understand that the data for annual averages are not contained in any report issued by DEA or SAWS. As a result, we are unable to verify the accuracy of these graphs. We have requested the results for 2016, but understand that this information will not be available before it is presented at the Air Quality Lekgotla in October 2017.

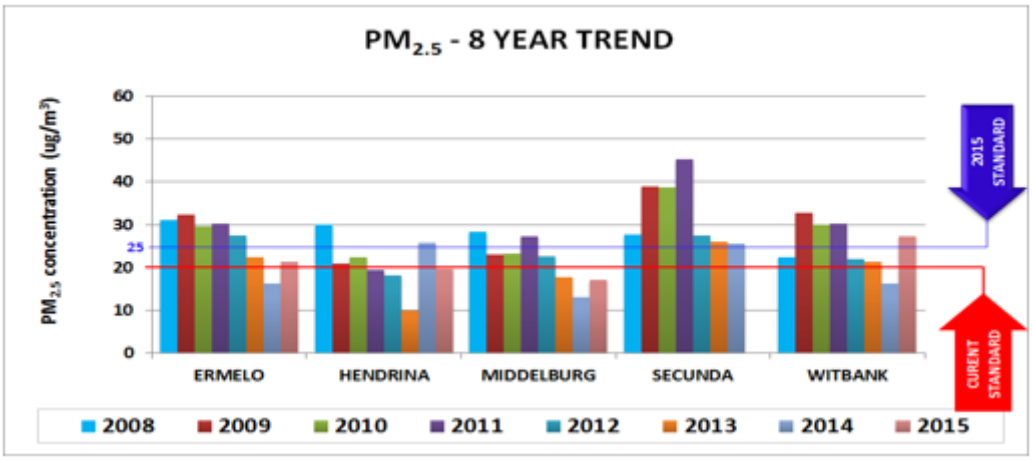
[155] Slide 17 State of Air Report MSRG presentation dated 25 May 2017.

SO_2 annual averages from 2008-2015[156]



The prescribed annual NAAQS for SO_2 is 50 ug/m^3 or 19 ppb. The graph above shows that exceedances were highest in eMalahleni over the years, followed by Hendrina - which has shown an improvement from 2013 to 2015. Overall, there appears to have been some reduction in emissions in 2012 for Ermelo, Hendrina, Middelburg and eMalahleni, but emissions increase again in 2014 and 2015 for Ermelo, eMalahleni and Middelburg. Overall, emissions of SO_2 have increased in Secunda and eMalahleni, when compared with 2008 data. It is not clear why no 2015 data for Secunda has been included.

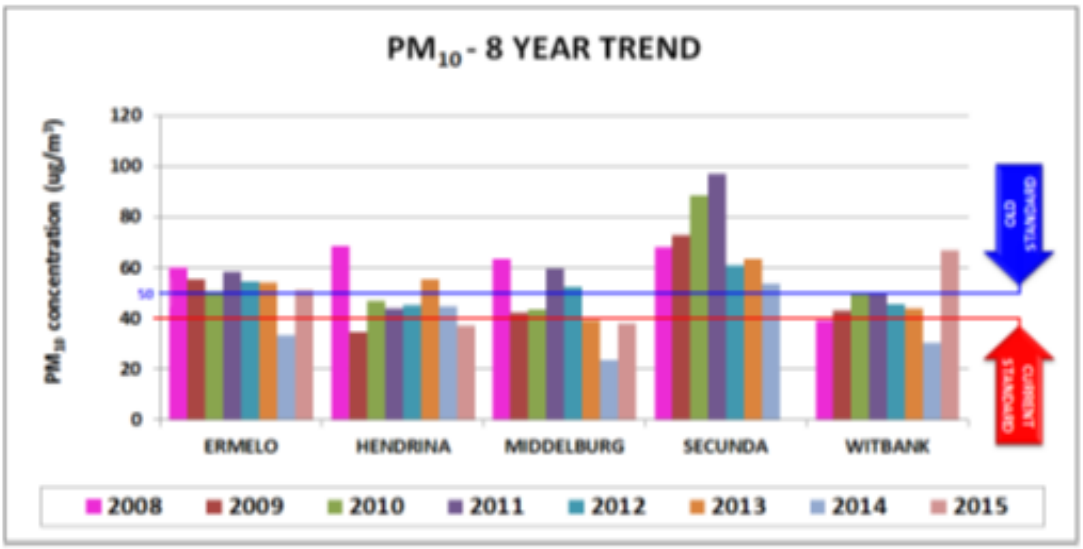
$PM_{2.5}$ annual averages from 2008-2015[157]



The prescribed annual NAAQS for $PM_{2.5}$ from January 2016 to December 2029 is 20 ug/m^3; before this it was 25 ug/m^3.The graph above shows that there have been several exceedances over the years, particularly of the old NAAQS. There appeared to be a slight improvement in 2013 and 2014 for Ermelo, Middelburg, and eMalahleni, and then there was an increase in $PM_{2.5}$ concentrations in 2015 for Ermelo, Middelburg, and eMalahleni. The graph does not reflect $PM_{2.5}$ data for Secunda for 2015, nor of any data for 2016, but it is clear that exceedances in Secunda in 2015 were likely – having regard to previous years. It is also clear that exceedances of the 2016 NAAQS are likely in all stations except Middelburg.

[156] Slide 20 State of Air Report MSRG presentation dated 25 May 2017.
[157] Slide 21 State of Air Report MSRG presentation dated 25 May 2017.

PM_{10} annual averages from 2008-2015[158]



The prescribed annual NAAQS for PM_{10} since 1 January 2015 is 40 ug/m^3. From 2009 to December 2014, the standard was 50 ug/m^3. The graph above shows that there were exceedances of the old NAAQS in all stations (except perhaps eMalahleni). The emissions seemed to drop in 2014 for all stations, but increased again in 2015 for Ermelo, Middelburg and eMalahleni. Although we do not have data for Secunda in 2015, or any 2016 data, exceedances of the current NAAQS were recorded in Ermelo and eMalahleni in 2015 and, based on the trend in Secunda, it is likely to have been in non-compliance in 2015. It looks likely that there would have been non-compliance in 2016 in Ermelo, Secunda and eMalahleni.

The DEA confirmed at the 25 May 2017 MSRG that $PM_{2.5}$, PM_{10}, and O_3 NAAQS had been exceeded in all stations for the period April 2016 to May 2017, and that the HPA was therefore in non-compliance with the NAAQS.[159]

While some year-to-year variations in annual average concentrations occur, there is no consistent decreasing trend in ambient pollutant concentrations. This is corroborated below by findings from other expert studies.

There is also an indication that instruments have been malfunctioning over extended periods. This creates serious uncertainty regarding the accuracy of the data. The concerns with the monitoring network are addressed in an article prepared by Cairncross, titled "The State of South Africa's Air Quality Monitoring Network, and its Air Quality" (attached as annexure **A**) and are summarised below.

According to the MTR, *"Measured ambient data does not indicate any significant improvement in air quality since the gazetting of the AQMP. These data also indicate significant exceedances of the National Ambient Air Quality standards (NAAQS)…. It is clear that from these and measured results for other pollutants, that ambient air quality is still a concern in the HPA".*[160] It also states that: *"In general, the ambient air quality data in the HPA shows that there are significant exceedances of the NAAQS for several pollutants in several locations. There are no clear trends in the data from year to year and it can thus be concluded that there has*

[158] Slide 19 State of Air Report MSRG presentation dated 25 May 2017.
[159] Slide 23 State of Air Report MSRG presentation dated 25 May 2017.
[160] p.v.

not been an appreciable improvement in ambient air quality since the gazetting of the HPA AQMP and subsequent implementation."[161]

In spite of severe limitations in the methodology used, the MTR confirms that aggregate emissions have not decreased significantly since the HPA AQMP was developed.

The DEA's Annual Report 2015/16 indicates that, working on SAWS's standard of 80% data recovery, there are 145 monitoring stations (116 government and 29 industry-owned stations) reporting to SAAQIS and 22 air quality monitoring stations are currently meeting minimum data requirements.[162] "Data recovery" refers to the percentage of validated data recovered from an instrument. So, using SAWS's figure of 80%, the total of all data gaps (when data are not available) in a given period (say 1 year) should not exceed 20%. If the instrument was not functioning, for example, no data are recovered for the period. If data are recovered, but the instrument failed a periodic calibration check, the data are also not valid. In other words, both criteria have to be satisfied. What this means is that, at the time of the report, 123 of 145 stations were not working properly.

The DEA's 2017-2018 Annual Performance Plan indicates that its "estimated performance" for 2016/17 is 75 government stations reporting to SAAQIS, with 80 the year after, and 85 in 2019/20.[163] It is not understood why the number of government-owned stations would reduce so significantly. Attempts to clarify this with the DEA were unsuccessful, as they have not responded to correspondence about this.

The MTR indicates that: "s*ince the formulation of the HPA AQMP, there has been an increase in ambient air quality monitoring stations across the HPA. Most of these monitoring stations belong to DEA, Sasol and Eskom. Furthermore, The Ekurhuleni Metropolitan Municipality (EMM) have recently resuscitated their monitoring network, however there are still some lags in data availability for certain periods (EMM, 2015). Additionally, the MDEDET (sic) own some monitoring stations within the priority area, however, data is currently not available due to technical issues with these stations*."[164] The MTR has not presented data to support the conclusion that monitoring stations have increased. This is not, in fact, correct.

The MTR also states that "*ever since the implementation of the HPA AQMP was initiated in 2013, the monitoring network has grown from 20 to 31. The challenge is that some of the stations are not functional due to resource and capacity reasons".*[165]

In a meeting the CER and others attended in August 2016 with the DEA and SAWS, the DEA advised that, at the time, only about 47 of some 136 stations report "live" data to SAWS (the custodians of SAAQIS), and that there was some reluctance from local government and certain industries to report live data.

We were also advised that the monitoring network was under significant strain. We understand that several municipal stations are not operating and/or are apparently located in the wrong areas. We were advised that an ambient air quality monitoring strategy had been devised and that the DEA was providing training, capacity and support to local government. The DEA also advised that, once the Norms and Standards for Air Quality Monitoring were in place, live data reporting to SAAQIS would be required. However, SAAQIS is

[161] p.52.
[162] p.59
[163] p.57, p.62.
[164] p.iv.
[165] p.29.

functioning sub-optimally. The MTR acknowledges that there are issues with accessibility of SAAQIS.[166] Addressing these SAAQIS issues must be prioritised.

The DEA's draft 2017 National Framework amendment initial working document (for the review of the Framework for Air Quality Management) indicates that: the SAAQIS upgrade will be done by 2017/18; the timeframe for the air quality monitoring norms and standards is 2017/18; live reporting of all monitoring stations to SAAQIS is planned for 2018/19; and that 2018/19 is the target for the National Ambient Air Quality Monitoring Strategy.

The MTR also identifies various concerns with the accuracy of the data; such as: "*only 75% of the listed activities in the HPA reported emissions to the [National Atmospheric Emissions Inventory System]. Additionally, Section 23 (S23) emission inventory was not compiled due to data unavailability…".* It also noted several inconsistencies regarding the domestic fuel burning figures.[167]

This inaccuracy is clearly illustrated in several cases in the MTR. For example, Table B[168] gives precisely the same PM_{10} figures for 2010 and 2015 for transport-related emissions, domestic fuel burning, mining, and biomass burning, and almost exactly the same figures for 2010 and 2015 for industrial emissions. This can simply not be the case and again calls into question the accuracy of this data.

Despite our concerns about the accuracy and completeness of ambient air quality data, it is clear from government's own reports and data that ambient air quality remains out of compliance with NAAQS in the HPA/ This means that the overall objective of the HPA AQMP is not being met, and it appears to be no closer to being met than when the HPA was declared almost ten years ago.

As indicated above, in addition to evaluating the DEA and NDM's own HPA reports, we commissioned an expert in air quality – Mazwi Lushaba - to conduct an independent study of the monitoring data to establish whether there have been any improvements in air quality since the HPA was declared. He focused on 2009-2015 data from the DEA monitoring station in Witbank.

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[166] p.81. Our concerns in this regard have previously been raised with the DEA. In the August 2016 meeting, the DEA and SAWS indicated that the documentation of the code (software) supporting the system is poor or non-existent, rendering upgrading or modification of the existing system risky and excessively time-consuming: modification of the existing system would be a waste of time and effort in view of the current plan for a major upgrade, essentially by starting from scratch. We were advised that SAAQIS was undergoing an upgrade - the service provider had recently been appointed and was required to have done the work within 8 months from mid-August 2016. However, in February 2017, the NAQO indicated to CER that the service provider had decided it was not able to do the work and the project had to be readvertised. Once the new service provider is appointed, the upgrades are expected to take a year.

[167] pp.iii-iv. "*It is notable that there are inconsistencies in the information pertaining to fuel types combusted, emission factors to be used, volumes of fuel used, diurnal and seasonal patterns of fuel usage, the combustion equipment used as well as the manner in which fuel is used within combustion equipment. Additionally, another limitation is the reliance on census data. The way in which the census data questionnaire was structured residents could only say one fuel they used for heating, lighting etc. This can be misleading as some households may use more than one fuel, for instances houses that use predominantly coal for heating may use wood to start before adding the coal. This information is lost within the current structure of the census questionnaire."*

[168] p.iv.

Independent evaluations of monitoring data

Review of air quality data from 2009[169] - 2015

As mentioned above, ambient air quality monitoring was established in 2008. The five monitoring stations set up by the DEA are located in eMalahleni, Hendrina, Middelburg, Secunda, and Ermelo. These five stations monitor the following pollutants: PM_{10}, $PM_{2.5}$ (which was only monitored from 2012), SO_2, NO_x, CO, O_3, benzene, toluene, ethylbenzene and xylene (BTEX) and mercury.[170] The data analysis by Lushaba focuses on and evaluates SO_2, O_3, PM_{10}, and $PM_{2.5}$ data from the Witbank (eMalahleni) station in NDM.[171]

The methodology adopted for the analysis looked at the monthly reports from 2009 to 2015 to analyse station performance. In conducting the analysis, station performance and data availability were also taken into consideration. The exceedances data were then evaluated for the duration of the period in which air pollution levels have been non-compliant with the NAAQS in the NDM.

The analysis found that there has been no consistent decrease in ambient pollution levels at the Witbank monitoring station, in that the air quality in 2014/15 was not significantly different to the air quality in 2008/9.

Below, we summarise a paper by Cairncross on "*The State of South Africa's Air Quality Monitoring Network, and its Air Quality*", which also considers the credibility of air quality monitoring assessments, a copy of which is attached hereto as Annexure **A**. Cairncross presented this paper at the 2016 National Association for Clean Air (NACA) Conference.[172]

The State of South Africa's Air Quality Monitoring Network, and Air Quality

Cairncross points out that continuous monitoring of air pollutant concentrations at a network of locations is essential, but not sufficient for a credible assessment of ambient air quality. He states that a monitoring network has limited spatial representativity, but the more spatially-representative methods such as air quality modelling and remote sensing are reliant on monitoring for validation and calibration of their outputs.[173]

He establishes that, in 2012, only 11 stations, all in the Vaal Triangle and the Highveld Priority Areas, of about seventy-eight nominally active monitoring stations, monitored $PM_{2.5}$. It was established that annual average $PM_{2.5}$ at ten of these stations exceeded the current NAAQS and that daily averages were also non-compliant.[174]

Cairncross highlights his concerns about the insufficient development of a national air quality framework. His analysis evaluates PM_{10} data from 25 stations to estimate $PM_{2.5}$ concentrations using $PM_{2.5}$:PM_{10} ratios

[169] As explained above, this starts from 2009 because air quality monitoring started in 2008, therefore the reports from 2008 monitoring were only available in 2009.

[170] 4 more monitoring stations were deployed by the Mpumalanga Provincial Government from April 2009 and these measure the same pollutants as are being monitored by the DEA monitoring stations. They differ in that the averaging period is 5 minutes, the DEA stations have a 5 second period. The Mpumalanga Provincial Government monitoring also includes Pb which is not included in the DEA stations.

[171] p.3.

[172] http://www.naca.org.za/uploads/NACAconference_proceedings2016.pdf

[173] Eugene K. Cairncross 'The State of South Africa's Air Quality Monitoring Network, and its Air Quality' p.1

[174] p.1.

in each area. The annual recoveries of emission data were found to be quite poor, at less than 25%, compared to the acceptable minimum 80% recovery. The overall assessment revealed that the current $PM_{2.5}$ NAAQS was exceeded at 11 of 12 monitoring stations in the Tshwane, Johannesburg, and Ekurhuleni networks.[175]

$PM_{2.5}$ and PM_{10} data for the period 2012- 2015 were analysed with respect to spatial distribution, data recovery, daily and annual average time trends, and compliance with NAAQS. Cairncross specifically highlights that $PM_{2.5}$ is the pollutant with the greatest attributable health risk.[176] In this regard, the recent study by the International Growth Centre found that 7.4% of all deaths in South Africa in 2012 were due to chronic exposure to fine PM, costing the country up to 6% of its Gross Domestic Product.[177]

We highlight below extracts from the paper that are relevant to the HPA. Often in the absence of $PM_{2.5}$ data, available PM_{10} data are used to estimate corresponding daily average $PM_{2.5}$ values using appropriate $PM_{2.5}$:PM_{10} ratios selected according to Brauer et al's protocol.[178]

The data recovery efficiency - the percentage of validated daily values for the year - was calculated for each monitoring station and compared with a benchmark of 80%. The South African National Accreditation System (SANAS) requirement for the accreditation of air quality monitoring stations is for data to be supplied for 90% of the monitoring period (not less than three months), but "data supply" appears to refer to data recovered before application of validation checks.[179]

Annual average $PM_{2.5}$ values, directly monitored and calculated from the PM_{10} monitored values using area-appropriate ratios, are compared with the current NAAQS. $PM_{2.5}$ trends over the period 2012-2015 in the priority areas are assessed by plotting daily average values over the entire period, by examining annual average concentrations and trend analysis.[180]

Annual average values, calculated using valid daily values only, showed that there was consistent exceedance of the $PM_{2.5}$ NAAQS. The extract below shows the calculated daily values in the HPA, revealing that data recovery was above 80% in four out of five stations.[181]

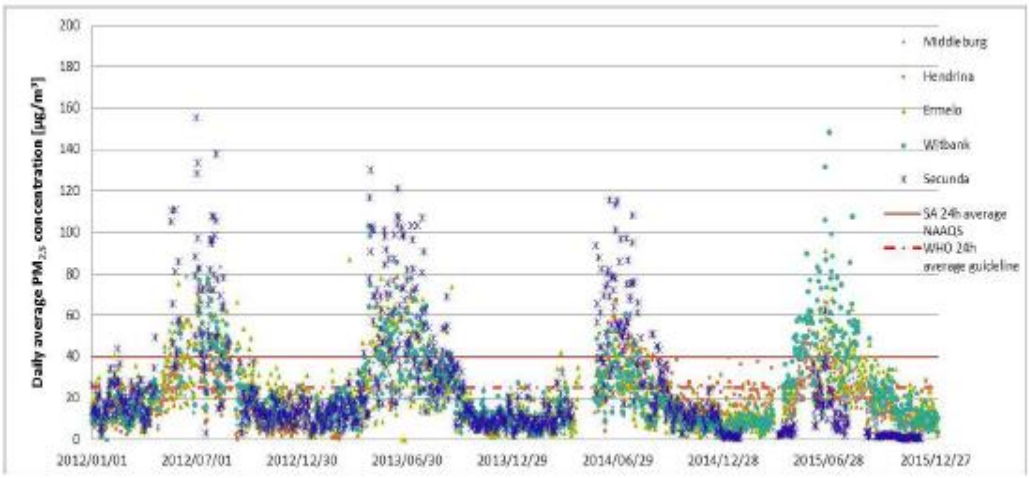
Table 2: 2012 annual average $PM_{2.5}$ concentrations and data recoveries, by area, network and monitoring station

Area	Monitoring station	Coordinates		Data recovery	Annual average PM2.5 [µg/m3]	Network
		Latitude	Longitude			
HPA	Witbank	-26.49348	29.969002	72%	22	HPA
	Secunda	-26.131995	29.734349	81%	27	HPA
	Middleburg	-25.796061	29.463623	97%	23	HPA
	Hendrina	-26.548578	29.080055	87%	18	HPA
	Ermelo	-25.877812	29.188664	93%	28	HPA

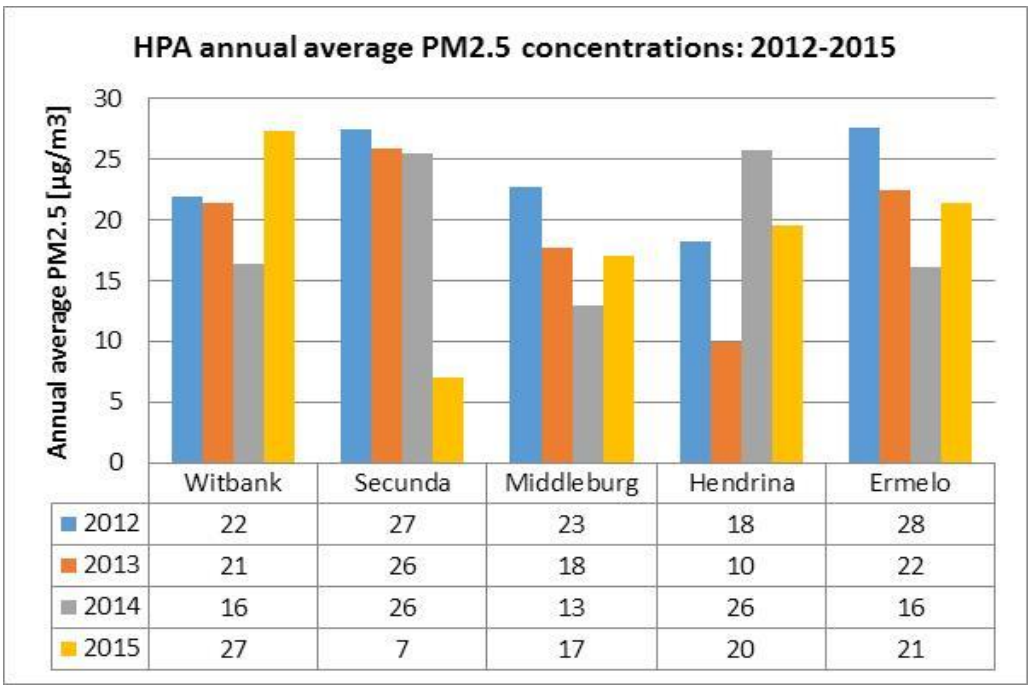
The figure below shows a four year time series of the HPA daily average $PM_{2.5}$ concentration. The four-year $PM_{2.5}$ data recoveries for nine of the 11 HPA and Vaal Triangle Airshed Priority Area (VTAPA) monitoring

[175] p.2.
[176] p.1.
[177] https://www.theigc.org/blog/the-cost-of-air-pollution-in-south-africa/.
[178] Brauer M et al. Exposure assessment for estimation of the global burden of disease attributable to outdoor air pollution. *Environmental Science and Technology*, 2012, 46:652–660; Cairncross p.2.
[179] p.2.
[180] p.2.
[181] p.4.

stations exceeded 80%; for Secunda, it was 78%, and for Hendrina, 61%. The 24 hour average NAAQS for $PM_{2.5}$ of 40 µg/m^3 and the corresponding WHO guideline value of 25 µg/m^3 are also shown for comparison.



This figure below shows the annual average $PM_{2.5}$ concentrations for the HPA networks over the four year period 2012-2015. The low and invalid annual $PM_{2.5}$ values for Hendrina in 2013 (10ug/m^3) and for Secunda in 2015 (97ug/m^3) are associated with low annual data recoveries of 7% and 53% respectively.[182]



	Witbank	Secunda	Middleburg	Hendrina	Ermelo
2012	22	27	23	18	28
2013	21	26	18	10	22
2014	16	26	13	26	16
2015	27	7	17	20	21

Cairncross' findings reveal that the daily average $PM_{2.5}$ concentrations for all the priority area monitors over the period 2012-2015 show numerous exceedances of the daily standard, and do not show a statistically-significant decrease (or change) over this period.[183] The HPA remains non-compliant with the annual average $PM_{2.5}$ standard.[184]

[182] p.5.
[183] p.6.
[184] p.6.

He also notes that the national air quality network remains poorly developed with respect to PM monitoring: in 2012, only about 20% of the stations monitored $PM_{2.5}$ concentrations and about 50% monitored PM_{10} concentrations.[185] He states that analysis of data available highlights the need for consistent quality assurance and reporting practices, as well as the streamlining of data accessibility.[186]

Without adequately-functioning, accredited monitoring stations, we do not know whether the air quality is actually far worse than it appears. The HPA ambient air quality monitoring network has deteriorated since its declaration – the 2012 HPA AQMP listed 23 monitoring sites with available data; the MTR listed just nine monitoring stations with available data. Only five of the nine stations publish timeous monthly reports, available on the SAAQIS website.

The air quality monitoring station network must urgently be improved upon and adequately managed and maintained, so as to produce verified, reliable HPA air quality data that are readily and publicly available.

Conclusion regarding air quality

There is a clear indication is that there has been a neglect of monitoring instruments to the extent that, in 2012, data capture of less than 20% was experienced. The monthly reports produced for the HPA network omit certain important parameters that talk to the compliance with NAAQS in that the annual standards for all pollutants are not reported on.

The expert analysis also highlights that monitoring stations have gone through a period of neglect, resulting in data and information generated being inaccurate or otherwise inadequate. It is important to evaluate the underlying causes that have allowed such valuable resources to be neglected to the extent of not producing data that can be relied on when decisions have to be made.

Fewer than half of the monitoring stations appear to be reporting data to the SAAQIS system, although the exact status of the monitoring network cannot be verified due to problems with SAAQIS. Only a small minority of the monitoring stations appear to be following rigorous data quality assurance and reporting procedures (such as required by the SANAS accreditation system).

This complicates an assessment as to whether or not air quality has improved. There is a clear indication that when the data capture percentage decreases, the number of exceedances also decrease. This presents a concern in the use of the number of exceedances as an indicator to demonstrate improvement or non-improvement in the air quality status. The exceedance parameter is dependent on the data capture percentage, which is linked to the functioning of monitoring instruments. Unless the instruments are properly calibrated and SANAS-accredited, it is highly likely that misleading conclusions can be drawn - only data from an instrument that is consistent over a long period of time can be used to draw conclusion on whether air quality is improving or not.

Although this situation limits the ability to draw conclusive results with regard to the compliance assessment of NAAQS, the information gathered from DEA and NDM Reports, the NAQO Reports, the MTR, the data analysis above, and Cairncross's paper all make clear that the ambient air quality for the HPA has not improved meaningfully or at all; it may even have deteriorated. From the data analysed, even taking into account faulty equipment, there is daily non-compliance with relevant NAAQS.

[185] p.6.
[186] p.6.

There is a wealth of both local and international evidence about the health impacts of air pollution. In South Africa, various studies have demonstrated these devastating impacts.[187] This is also recognised in the DEA's latest (2017-2018) annual performance plan.[188] There is also a long-delayed health study underway for the HPA which is estimated to take three years. The first phase of the study – the community health survey of 2700 households – was due to commence in winter 2017. According to the presentation made at the 25 May 2017 MSRG, preparatory work for the survey had started and would be followed by a child respiratory study (of 500 children) to be initiated once approval had been obtained. The community health survey data will be analysed and a human health risk assessment desktop study will be the third phase.

One of the more recent health impact studies is dated 31 March 2017 and was conducted by Dr Mike Holland.[189] It estimates the health impacts and associated economic costs of current emissions of air pollutants from Eskom's CFPSs in South Africa. The report only evaluates the impact of emissions from CFPSs; excluding, among other things: the significant impacts of air pollution from mining (such as the effects of

[187] See, for example: 'Eskom health studies' at https://cer.org.za/programmes/pollution-climate-change/key-information;
Holland, M. (2017). "Health impacts of coal fired power plants in South Africa"; available at http://cer.org.za/wp-content/uploads/2017/04/Annexure-Health-impacts-of-coal-fired-generation-in-South-Africa-310317.pdf;
Myllyvirta, L. (2014). "Health impacts and social costs of Eskom's proposed non-compliance with South Africa's air emission standards"; available at http://cer.org.za/wp-content/uploads/2014/02/Annexure-5_Health-impacts-of-Eskom-applications-2014-_final.pdf;
Keen, S & Altieri, K. (2016). "The health benefits of attaining and strengthening air quality standards in Cape Town". *Clean Air Journal*, 26(2); available at http://www.cleanairjournal.org.za/download/caj_vol26_no2_2016_p22.pdf;
Nkambule, NP & Blignaut, JN. (2012). "The external costs of coal mining: the case of collieries supplying Kusile power station." *Journal of Energy in Southern Africa*, 23(4); available at http://www.rncalliance.org/WebRoot/rncalliance/Shops/rncalliance/52BE/8623/FB60/5A46/3A4E/C0A8/D2F8/5BA3/JESA4-mining-Nkambule_0026_Blignaut.pdf;
Pretorius, I, Piketh, S, Burger, R & Neomagus, H. (2015). "A perspective on South African coal fired power station emissions". *Journal of Energy in Southern Africa*, 26(3); available at https://www.researchgate.net/publication/287521074_A_perspective_on_South_African_coal_fired_power_station_emissions;
Albers, PN, Wright, CY, Voyi, KV, & Mathee, A. (2015). "Household fuel use and child respiratory ill health in two towns in Mpumalanga, South Africa". *South African Medical Journal*, Vol 105(7); available at http://www.samj.org.za/index.php/samj/article/view/9429/6851
McDaid, L. (2014). "The Health Impact of Coal. The responsibility that coal-fired power stations bear for ambient air quality associated health impacts"; available at http://www.groundwork.org.za/specialreports/groundWork%20The%20Health%20Impact%20of%20Coal%20final%2020%20May%202014.pdf;
Shirinde, J, Wichmann, J, & Voyi, K. (2014). "Association between wheeze and selected air pollution sources in an air pollution priority area in South Africa: a cross-sectional study". *Enviromental Health*, 13(1), 32; available at https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-13-32;
Thompson, AA, Matamale, L, & Kharidza, SD. (2012). "Impact of climate change on children's health in Limpopo Province, South Africa". *International Journal of Environmental Research and Public Health*, 9(3); available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3367281/pdf/ijerph-09-00831.pdf;
Naidoo, RN, Robins, TG, Batterman, S, Mentz, G, & Jack, C. (2013). "Ambient pollution and respiratory outcomes among schoolchildren in Durban, South Africa". *South African Journal of Child Health*, 7(4); available at http://www.sajch.org.za/index.php/SAJCH/article/view/598/474;
Kistnasamy, E.J, Robins, TG, Naidoo, N. (2008). "The relationship between asthma and ambient air pollutants among primary school students in Durban, South Africa". *International Journal of Environment and Health*, 2(3/4); available at http://www.ehrn.co.za/publications/download/121.pdf;
Naidoo RGN, Batterman S, Robins T. (2007). "South Durban Health Study. Final Project Report"; available at http://doeh.ukzn.ac.za/Libraries/Documents/SDHS_FINAL_Report_revision_February_2007.sflb.ashx

[188] p.2.

[189] https://cer.org.za/wp-content/uploads/2017/04/Annexure-Health-impacts-of-coal-fired-generation-in-South-Africa-310317.pdf

coal dust on workers and on the public), the transportation of coal, and water contamination. Some $int 2.4 billion is the estimate annual health cost of these impacts.[190]

Table 3-2. Annual health impacts linked to coal fired generation in South Africa.

	Cases, etc	Value, $int, millions
Equivalent attributable deaths		
Lung cancer	*157*	
Ischaemic heart disease	*1,110*	
Chronic obstructive pulmonary disease	*73*	
Stroke	*719*	
Lower respiratory infection	*180*	
Total equivalent attributable deaths	**2,239**	**2,121.94**
Chronic Bronchitis (adults, cases)	2,781	64.64
Bronchitis in children aged 6 to 12	9,533	2.19
Equivalent hospital admissions	2,379	2.79
Restricted Activity Days (all ages)	3,972,902	132.72
Asthma symptom days (children 5-19yr)	94,680	1.44
Lost working days	996,628	47.05
Total costs		**2,372.78**

The report allocates these impacts to individual CFPSs as follows:[191]

[190] p.15.
[191] p.16.

Table 3-3. Health impacts and associated costs ($int, millions) allocated to individual power stations.

	Total equivalent annual death	Chronic Bronchitis (adults, cases	Bronchitis in children aged 6 to 1	Equivalent hospital admission	Restricted Activity Days (all ages	Asthma symptom days (children 5-19yr	Lost working day	Total costs, $int, million
Arnot	79	98	335	84	139,569	3,326	35,012	83.36
Camden	84	104	357	89	148,980	3,550	37,373	88.98
Duvha U1-3	143	178	609	152	253,845	6,050	63,679	151.61
Grootvlei	58	72	247	62	103,011	2,455	25,841	61.52
Hendrina	105	130	445	111	185,467	4,420	46,525	110.77
Kendal	210	261	894	223	372,400	8,875	93,419	222.41
Kriel	141	176	602	150	250,866	5,979	62,931	149.83
Komati	28	35	120	30	50,188	1,196	12,590	29.97
Lethabo	204	253	868	217	361,646	8,619	90,721	215.99
Majuba	177	219	752	188	313,579	7,473	78,663	187.28
Matimba	262	326	1,117	279	465,404	11,091	116,749	277.96
Matla	192	238	817	204	340,278	8,109	85,361	203.23
Medupi	364	453	1,552	387	646,706	15,412	162,230	386.24
Tutuka	192	239	818	204	340,963	8,126	85,533	203.64
Totals	**2,239**	**2,781**	**9,533**	**2,379**	**3,972,902**	**94,680**	**996,628**	**2,373**

Notwithstanding these health impacts and costs, and despite our request for its participation and input, the DOH has not participated in the HPA process.

Despite ten years having passed since the declaration of the HPA, air quality remains poor, negatively affecting human health and wellbeing and violating constitutional rights. The significant air pollution means that HPA residents are dying prematurely, and suffering from respiratory and cardiac illnesses that inhibit their prospecting and wellbeing.

CONCLUSION AND RECOMMENDATIONS

The situation in the HPA is dire. Some ten years after the area's declaration, widespread non-compliance with the NAAQS is common. This is, in large part, due to very poor local government capacity and a dearth of available resources required for municipalities to perform their essential AQM functions, and the failure of key major industrial facilities to reduce their emissions either adequately, or at all. Industrial emissions remain high and industries are not held to account for failure to meet their licensed limits. Instead, major emitters have been granted postponement of compliance with legislated emission standards. Eskom, as the biggest emitter in the HPA, has made clear that it never intends to meet many of the MES. What makes this worse is that it is investigating extending the lives of its ageing, non-compliant stations. In addition, very

little has been done to address significant air pollution from dust, particularly from mining activities – one of the major contributors to poor air quality in the HPA. The DMR, which is responsible for regulating the environmental impacts of mines – including on air quality – is absent from the HPA process. Limited steps have been taken to reduce air pollution in dense, low income settlements. There is a distinct lack of adequate, measurable, and progressive plans to address indoor air pollution. The draft Strategy also fails to make adequate provision for the participation of community-based organisations and NGOs in its design, implementation, review and updating.

The strategic objective of the AQMP is to achieve compliance to the health-based standards in the shortest timeframe. Compliance with the NAAQS is a social imperative and a requirement for compliance with the Constitution. Clearly the current approach is not working. The 2015 AQMP goal about optimising capacity was not met, and authorities are not on track to meet the other 2020 goals.

The DEA's MTR concludes as follows: "*In conclusion, there are several improvements required in terms of improving the AQMP and the tools therein to achieve the ultimate objective of air quality that is not harmful to health in the HPA. These broadly include, but are not limited to: Updated objectives and targets, which are more realistic and aligned with new developments in the Air Quality fraternity; Improved reporting of industrial and mining emissions to the National Atmospheric Emissions Inventory System (NAEIS); Improved quantification of emissions through the development and use of standardised emissions inventory approach; Source apportionment to inform the interventions; Robust engagements with the relevant National departments to influence their policy Increase in capacity to ensure implementation of the AQMP can be achieved; and Improved management of the implementation and review of the AQMP progress with better accountability and feedback.*

…

In general, it is recommended that the revised /updated AQMP (in terms of interventions) should have the following: A revised plan with SMART (Specific, Measurable, Attainable, Realistic and Timely) goals; Outputs/outcomes must have clear indicators; Activities under each goal must focus on big gain interventions; Interventions must be tested for their relevance in enabling the achievement of the goals".[192]

Although we agree with certain of these conclusions, we dispute others. We strongly object to the approach, which we argue is inappropriate and opportunistic, simply to revise the AQMP to change the objectives that have not been met and to include "more realistic" targets. This is clearly not the way to improve the air quality in the HPA. We recommend that the DEA publish, in terms of section 20 of AQA, draft regulations necessary for implementing and enforcing approved priority area AQMPs. AQMPs must be reviewed to ensure that they include time-bound and effective emission reduction plans. Non-compliance with these measures must be taken seriously and be met with meaningful enforcement action.

In the PPCEA on 13 June 2017, the NAQO claimed that slow progress was being made in improving air quality, and there would eventually be NAAQS compliance. A similar sentiment was expressed by the DEA in the PPCEA on 13 September 2017. Apart from the lack of objective evidence of even slow progress, this is simply not good enough. There is much more that government must be doing if it is serious about making priority areas work.

[192] p.86.

Priority area implementation requires the backing of the inter-governmental political and institutional support, such that there is a structured, coordinated, and efficient resolution to the air pollution problem, with its accompanying impacts on constitutional rights.

We make the following suggestions to improve the effectiveness of the HPA meetings – the majority of which we have made on previous occasions:

- the terms of reference for HPA meetings must be amended as per our submissions to address the various concerns raised in the way the meetings are run;[193]
- all documents, agendas, minutes, presentations, attendance registers and any other relevant documents from ITT and MSRG meetings must be stored centrally, online and made easily accessible;
- two weeks before every MSRG meeting, the DEA must require all industries to submit evidence of their compliance with obligations in terms of their AELs and their obligations in terms of the AQMP over the previous six months, so that non-compliance is understood by all, and that accountability to the MSRG is put into practice;
- the DEA must ensure that following are addressed as standing items at all HPA meetings:
    - progress reports against specific objectives and activities within the timeframes in the AQMP, and progress towards achieving the AQMP goals;
    - the status of the air quality and emission trends. This should include an air quality data presentation for at least the previous six months, discussing trends in emissions of the main sources, current emissions, exceedances, investigations into exceedances undertaken, and industrial source/facility plans for reducing emissions; and this should be compared to the previous six months or other agreed period;
    - a report on all applications for AELs, all applications to vary or renew AELs, all appeals against AELs, and any exemption or postponement applications from MES in the HPA (or relevant ITT jurisdiction, for ITT meetings), and any compliance monitoring and enforcement actions undertaken, and their status;
    - at every ITT meeting, at least three facilities present on their compliance with obligations in terms of their AELs and their obligations in terms of the AQMP. The industries to present at the next ITT meeting should be identified and agreed upon at the end of every meeting; and
- the DEA and municipalities must support the participation of community-based organisations at HPA meetings, by scheduling meetings at suitable locations and at appropriate times.

It is clear that, in ELM, there are standing arrangements to communicate issues on air quality. In NDM, although we did not receive responses to the questionnaire, we are aware through interacting with the municipality, through information contained in the NDM AQMP and attending meetings at NDM, that there is an AQO and that they are the atmospheric licensing authority in NDM. NDM conducted a section 78 Systems Act analysis in 2012 and it established that there were capacity constraints and 3 positions of responsibility required to effectively execute atmospheric emission licensing.[194] Therefore, although there do not appear to be any formal agreements stating that the NDM is the responsible atmospheric emission licensing and AQM authority, it appears that there are existing arrangements and informal agreements with local municipalities, and it is clear that NDM takes on the AQM responsibility.

It is therefore not necessary to have any separate formal agreements at this point. The only thing that could be done to improve the AQM relationship between municipalities is to assess the effectiveness of the

[193] https://cer.org.za/wp-content/uploads/2016/07/CER-Final-Comments-on-the-ToR-for-the-Implementation-of-the-HPA-MSRG-AQMP-11-Dec-2015.pdf

[194] NDM AQMP pp.81-85.

existing AQM relations. We recommend that a proper review of AQM responsibility, constraints, and the way forward be urgently undertaken in order to facilitate the proper implementation of the AQMP and reduction of emissions in NDM and HPA as a whole. It may be useful to develop a guideline for the municipalities (and if necessary the province) on how to deal with all AQM issues in a manner that ensures that there is adequate delegation of authority, sufficient financial and human resources support for all authorities, and sustainable management of all air quality issues.

NDM and the local municipalities in the HPA do not have the sufficient resources i.e. human resources, technical resources and financial resources to fully achieve their AQM functions. ELM and NDM have both reported that they do not have sufficient budgets to fulfil their functions, with NDM indicating that it did not even have sufficient capacity to respond to our questionnaire. Both municipalities require financial and institutional support to accommodate the AQM functions. We recommend an increase in the overall AQM budget for both these municipalities and others in the HPA to ensure that there are enough resources to reduce emissions and improve ambient air quality. Both the Constitution and AQA require the protection of human health and the environment, and additional resources are required to enable local government to fulfill its critical AQM roles. We recommend that more people be trained and equipped with these skills.

We conclude that neither NDM nor the local HPA municipalities have enough of the right people to do the AQM job. They also do not have adequate support from the DEA. We recommend that more human resources – dedicated, appropriately trained and skilled staff - be allocated to assist with the air quality work in the municipalities if the HPA AQMP goals are to be achieved. NDM only has three officials designated to compliance monitoring and enforcement, and these officials have undertaken few compliance inspections of polluting facilities. Various HPA municipalities do not have designated AQOs or AQMPs. More AQM officers, and designated Green Scorpions for compliance monitoring and enforcement are required to effectively monitor and improve emissions in the HPA.

Only limited efforts have been made since 2007 to reduce dust emissions, including compliance inspections, passing by-laws, and the publication of the National Dust Control Regulations. But such steps as have been taken are wholly inadequate to reduce the dust problem. Various interventions are necessary to improve the dust situation in NDM and HPA in general. We recommend that urgent measures be taken to amend the Dust Control Regulations and to address the dust problem from mine haul roads and other mining activities. More resources ought to be devoted towards dust compliance monitoring and various other combination tools should be adopted to regulate dust. We have addressed correspondence in this regard to the DEA and engaged with them, as set out above. The DMR does not participate in the HPA process, despite our requests for them to do so.

The DEA published the Draft Strategy to Address Pollution in dense Low-Income Settlements for comment on 24 June 2016. We made comments on this Strategy, highlighting its inadequacy. Thereafter, roadshows were held in November and December 2016 and in January 2017. It is not clear what the way forward will be, but the failure to address this issue adequately and urgently is resulting in violations of constitutional rights to health and wellbeing. We recommend that urgent measures be taken to reduce the prevalent problem of domestic fuel burning in the already extremely-polluted NDM and in the wider HPA area. Municipalities should take measures locally to provide easier access to alternative, cleaner forms of cooking and heating energy and/or subsidised electricity, especially in winter, to limit domestic fuel burning.

We recommend that the combined efforts of municipalities (including NDM and ELM), the DEA, industries, and affected communities be utilised to achieve a reduction of emissions from domestic fuel burning as soon as possible to alleviate the health risks that the people of the HPA have had to endure for a long time.

The health costs of air pollution are already a significant burden on the state. The DEA, and departments like the DoH, the DMR, and the Department of Human Settlements must collaborate closely with the municipalities, industries and communities to find alternatives to domestic fuel burning.

Green and renewable energy solutions such as the use of solar geysers, improving the energy efficiency of housing, biogas digesters and other solar heating solutions should be used to alleviate the domestic fuel burning problem in the HPA. The resources currently being directed at treating the health effects of coal burning could be redirected to renewable energy so that the burning of domestic fuels can be significantly reduced, and ideally eradicated.

It is difficult to assess directly whether key industries have reduced emissions, given that there are very few documents publicly available for review for the relevant period. Some of the information is or may be available on the NAEIS and SAAQIS and in annual emission reports, but this information is not very easily accessible to the public, and such information as is available, also has to be evaluated and interpreted by air quality experts - which is often not practical or affordable. It is, however, clear that Eskom - the largest air polluter in the HPA (and in South Africa) - regularly exceeds its licensed limits and will continue to do so.

We recommend that, for future review purposes, municipalities should assess and report on whether key facilities in their areas have made progress in reducing their emissions, the reasons for this, and future plans to reduce emissions (also of GHGs) and to ensure compliance with AELs and the MES. Industries should also report, including at MSRG meetings, on progress with the emission reduction plans, as well as on their compliance with their AELs.

Since the monitoring stations are not all adequately-functioning and accredited, the air quality may be even worse than data demonstrates. The HPA ambient air quality monitoring network has deteriorated since its declaration – the AQMP listed 23 monitoring stations with available data, and the MTR listed just nine. Only five of these nine stations publish timeous monthly reports, available on SAAQIS.

However, it is clear that air quality has not improved, despite the declaration of the HPA and the development of the AQMP. This is supported by the DEA's own MTR and other reports, as well as expert data analysis. We established from the reports and data assessed that O_3, NO_2 and CO concentrations are high in the eMalahleni, Middelburg, Hendrina, and Ermelo areas in NDM. In addition, there are regular incidents of non-compliance with NAAQS for pollutants such as SO_2, $PM_{2.5}$, PM_{10}, and NO_2, CO, O_3 in the HPA. Given the significant concentration of polluting facilities in the HPA, it is likely that the continued non-compliance with NAAQS is, in large part, due to the failure of key industrial facilities to reduce their emissions, as well as the granting of MES postponements to the two biggest polluters – Eskom and Sasol - and the failure to include stricter emission limits in AELs.

This report concludes that the HPA has, to date, dismally failed in its purpose: to improve air quality so that it at least meets the NAAQS. The people of the HPA have suffered and continue to suffer from poor health and premature deaths as a result of the heavy air pollution.[195] Unless adequate, urgent measures are implemented, the impacts on the fiscus of the health effects of heavy reliance on coal and of industrial pollution on the fiscus will continue to get worse, and constitutional environmental rights will continue to be violated.

[195] See, for example: http://cer.org.za/wp-content/uploads/2014/02/Annexure-5_Health-impacts-of-Eskom-applications-2014-_final.pdf

Community people living in the HPA, and NGOs who have been active and vocal participants in the HPA structures, are angry and frustrated by government's failure to protect health by reducing in air pollution in priority areas. Democratic constitutional commitments are being violated i.e. pollution is not being adequately monitored or reduced, and polluters are not held accountable. It is likely that civil society will investigate other means to protect their constitutional rights. Neglecting to ensure that the HPA AQMP goals are achieved, means not only failing the people of the HPA, but opens government up to the risk of litigation.

Urgent and immediate action must be taken to reduce emissions in the HPA and in South Africa as a whole so as to avoid additional negative health impacts and social costs (like deepening poverty, absenteeism, shortened livelihoods) on people and their enjoyment of their constitutional rights. It is also important that more resources be devoted towards compliance monitoring and enforcement, in order to ensure improvement in air quality in the HPA. Such action is also essential given South Africa's vulnerability to climate change, its commitments in terms of the Paris Agreement, as well as the significant health impacts and impacts on water availability and air quality that will be exacerbated as climate change increasingly manifests.

The following steps must be taken urgently by various authorities:

Given the continued non-compliance with NAAQS in the HPA, immediate steps must be taken to reduce emissions of pollutants:

- All facilities in the HPA must be required to comply with at least with the MES. Therefore, having heard representations from the facilities and affected communities, the NAQO should use her powers under AQA to consider withdrawing the postponements of compliance with MES granted to Eskom and Sasol.
- No further postponements of compliance with MES or other licence variations that permit exceedances of licence emission standards should be allowed.
- Licensing authorities must suspend the issuing of all new AELs in the HPA, until there is consistent compliance with all NAAQS. Approval and licensing of any expansion plans of existing industries must be contingent on a simultaneous substantial reduction in emissions.
- When facilities reach their scheduled end-of-life (particularly certain Eskom CFPSs), AELs must be withdrawn, and decommissioning and rehabilitation enforced.
- The Dust Control Regulations must be amended to ensure adequate monitoring, measurement, and reduction of the significant dust emissions in the HPA, particularly from mining sources.

In recognition of the crucial importance of air quality compliance in the HPA, a comprehensive compliance monitoring and enforcement programme must be put in place by DEA and local authorities to ensure that violations of AELs are detected, and enforcement action taken against those who violate licence conditions. Such enforcement action must include suspension of licences for facilities until such time as emissions comply with licence conditions.

The institutions charged with ensuring improved air quality in the HPA must be strengthened and appropriately resourced:

- The DEA, the Mpumalanga and Gauteng provincial governments, and municipalities must demonstrate accountability for the proper management of priority areas, recognising that they have an ongoing responsibility for implementing and enforcing approved priority area AQMPs.
- National government, provincial government, and local authorities in the HPA must allocate adequate financial and human resources to fulfill AQM functions, including the right tools, training, and

equipment to enable the reduction of emissions and improvement of the ambient air quality in NDM, ELM and HPA as a whole.

- To bolster resources for compliance monitoring and enforcement, the DEA must give serious consideration to requiring all existing facilities in priority areas to pay a substantial annual licensing fee, rather than simply a once-off application fee.
- Municipalities must take urgent steps to ensure the appointment and training of suitable AQOs, Environmental Management Inspectors, the development of AQMPs, and the incorporation of those plans into IDPs.
- The DMR and DoH – and other relevant departments, when appropriate – must participate in the HPA process to ensure that air pollution from mining is reduced, and human health impacts are addressed adequately.

To build trust in the integrity of the management of the HPA, and enable meaningful and informed participation by all stakeholders, there must be **far greater transparency about regulation, monitoring, and compliance in the HPA**:

- AELs for all facilities in the HPA with significant polluting emissions must require real-time emissions monitoring, and that real-time emissions data be publicly available online and on request.
- The air quality monitoring station network must urgently be improved upon and adequately managed and maintained, so as to produce verified, reliable HPA air quality data that are readily and publicly available.
- The DEA and all licensing authorities within the HPA must make all AELs and annual emission reports submitted to them publicly available, and all licence-holders must be required to make these documents available on their websites and on request.

We regard the above measures as reasonable and the minimum required in order for the DEA to meet its constitutional obligations under section 24 (the environmental right) and for all authorities to meet their obligations under AQA.