Sasolburg Operations

Motivation for the postponement of Compliance Timeframes in terms of Regulation 11 of the Listed Activities and Associated Minimum Emission Standards identified in terms of the Section 21 of the National Environmental Management: Air Quality Act 39 of 2004 as amended.

Motivation Report prepared by

March 2019

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Motivation for the postponement of compliance timeframes in terms of Regulation 11 of the Listed Activities and Associated Minimum Emission Standards identified in terms of Section 21 National Environmental Management: Air Quality Act 39 of 2004 as amended.

For Public Comment

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Executive Summary

Sasol South Africa Limited (Sasol) was established in 1950 and started producing synthetic fuels and chemicals in 1955. Today Sasol is a multinational organisation with key activities in South Africa. In 2005 the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA) came into effect. A list of activities was published in 2010 (Government Notice (GN) 248) and revised in 2013 (GN 893) and 2018 (GN 1207) for a range of activities that result in atmospheric emissions, obliging emitters to obtain atmospheric emission licences (AELs) and comply with Minimum Emission Standards (MES) within specified timeframes.

Critics of Sasol's inability to comply with the MES timeframes argue that Sasol was a key stakeholder in the consultation that underpinned the formulation of the MES and thus should have known what was expected and planned for compliance accordingly. However, when the MES was finally published, there were some inclusions that Sasol opposed and disputed during the consultation process. Perhaps the most telling of the inclusions was the obligation for existing plants to comply with the new MES within a period of 5 years. Sasol's argument was that some abatement projects of this nature require at least a 10 to 15-year implementation period. Industry has consistently argued that this extended timeframe is reasonable based on both Sasol's own experience and international benchmarks to safely retrofit such technologies on brownfield sites. With postponements being the only recognised mechanism available, Sasol was therefore left with no alternative but to apply for a postponement of compliance timeframes. Sasol's previous postponement applications extended across much of their South African operations including Sasolburg, Secunda, Natref and Ekandustria.

While Sasol has achieved significant successes in their compliance journey, there remain two sources at the Sasolburg Operations that will be unable to meet the MES within the compliance timeframe namely, the steam stations and thermal oxidation plant (made up of three incinerators). In the past 8 years, Sasol have identified and tested options to achieve the MES, some that were successful and some less so.

Based on these investigations and trials Sasol have identified technology to meet the MES but require a 5 year postponement in order to retrofit the technology to the twelve boilers that make up the steam stations and then optimise the technology to ensure that it meets the MES. Similarly, while Sasol has the technical ability to customise the technology, a 5 year postponement is required to customise, fit and optimise the technology to achieve the MES by 2025.

During the 5 year postponement period Sasol commits to operating in terms of alternative ceiling emission limits that are detailed in Section 6 of this motivation. However, it may well be the case that reduced emission limits will be proposed to the Department of Environmental Affairs at the end of 2019 after the performance levels of the newly installed technology is confirmed.

As required by the MES, as part of the postponement application an Atmospheric Impact Report (AIR) was prepared by Airshed Planning Professionals to determine the impact of:

- Sasol's current emissions (Baseline Scenario).
- Theoretical emissions assuming compliance with the MES (Compliance Scenario).
- Theoretical emissions assuming Sasol operated at the proposed alternative emission limits (Alternative Scenario). It is critical to note that Sasol will not increase emissions, but this scenario aims to illustrate the impact to ambient Air Quality if they were to operate at the proposed alternative emission limits, which they will not.

The AIR concluded that for all criteria pollutants, for all scenarios, the modelled concentrations of pollutants are below the National Ambient Air Quality Standards (NAAQS) (a limit at which the risk to health should be considered tolerable). Further for all criteria pollutants, barring PM and SO_2, the

monitored ambient concentrations are below the NAAQS demonstrating the contribution to ambient concentrations of PM and SO_2 are predominantly from other sources. For PM and SO_2 Sasol's meeting the MES, will not result in the ambient air achieving compliance with the NAAQS.

In terms of the MES an application for postponement must contain a concluded Public Participation Process. The requirements of which are detailed in Chapter 6 of the EIA Regulations (Government Notice No. 326, 7 April 2017). As part of the Public Participation Process the Draft Motivation Report and Atmospheric Impact Report was made available for public comment. Public Open Days were held in January 2019 to facilitate comments from the public on the documents. All comments received, and associated responses have been documented and are included in the Comments and Response Report, in the attached Annexure D.

In conclusion, Sasol is applying for postponement of certain compliance timeframes in the MES to allow for sufficient time to complete the necessary compliance project activities underway to meet the MES new plant standards. This motivation document serves to detail the basis of, and reasons for, the request for postponement. The tables below summarise the requests detailed in the postponement application.

Table 1: Summary of Sasolburg's Steam Station request

Emission	**New plant MES**	**Alternative Emission Limit Requested**		**Compliance averaging period**
		Steam Station 1	**Steam Station 2**	
		The limits requested are the same as the limits granted in 2015		
All values specified at 10% O_2 273 K and 101.3 kPa, mg/Nm^3				
NO_x	750	1 450	1250	Daily average
PM	50	165	100	Daily average

Table 2: Summary of Sasolburg's Thermal Oxidation Plant request

Emission	**New plant MES**	**Incinerator B6930**	**Incinerator B6993**	**Incinerator B6990**	**Compliance averaging period**
		Emission limits as granted as a result of the 2017 postponement application are proposed as alternative emissions limits for this application			
All values specified at 10% O_2, 273 K and 101.3 kPa, mg/Nm^3 unless otherwise specified					
PM	10	100	300	600	Daily average
SO_2	50	3 600	260	1 050	Daily average
CO	50	NA	1 110	NA	Daily average
NO_x	200	800	420	570	Daily average
Pb+As+Sb+Cr+Co+Cu+Mn+Ni+V	0.5	6	20	60	Hourly average
Cd+Tl	0.05	NA	NA	NA	Hourly average
Hg	0.05	NA	NA	NA	Hourly average
NH_3	10	NA	NA	NA	Daily average
HF	1	NA	NA	3.3	Daily average
HCl	10	NA	NA	NA	Daily average

TOC	10	15	20	15	Daily average
Dioxin & Furan	0.1	NA	NA	NA	Hourly average
[ng I-TEQ/Nm^3, dry at 10% O2]					
Flue gas Temperature	200 ºC	NA	NA	Below 1 000 ºC	Daily average

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Glossary

Definitions in terms of National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA). and the List of Activities and Associated Minimum Emission Standards identified in terms of Section 21 of NEM:AQA (GN 893, as amended by GN 551 and 1207) that have relevance to this application:

Existing Plant – Any plant or process that was legally authorised to operate before 1 April 2010 or any plant where an application for authorisation in terms of the National Environmental Management Act (Act No.107 of 1998) was made before 1 April 2010.

Fugitive emissions - emissions to the air from a facility, other than those emitted from a point source.

Licencing authority – refers to an authority responsible for implementing the licensing system.

Listed activity – In terms of Section 21 of the NEM:AQA, the Minister of Environmental Affairs has listed activities that require an AEL. Listed activities must comply with prescribed emission standards. The standards are predominantly based on 'point sources', which are single identifiable sources of emissions, with fixed location, including industrial emission stacks, called a "point of compliance".

Minister – The Minister of Environmental Affairs.

New plant – Any plant or process where the application for authorisation in terms of the National Environmental Management Act (Act No.107 of 1998) was made on or after 1 April 2010.

Point source – A single identifiable source and fixed location of atmospheric emission, and includes smoke stacks.

Priority area - means an area declared as such in terms of Section 18.

Priority area air quality management plan - means a plan referred to in Section 19.

Total volatile organic compounds (VOCs or TVOCs) – means organic compounds listed under United State Environmental Protection Agency Compendium Method TO-14.

Additional definitions provided for the purpose of clarity:

Alternative emissions limits – the emissions limits proposed by SO based on what is considered reasonable and achievable as a consequence of the various technical and environmental assessments conducted and which SO proposes as an alternative standard to be incorporated as a licence condition with which it must comply during the period of postponement. The alternative emissions limits are specified as ceiling emissions limits or maximum emission concentrations, as defined in this glossary. In all instances, these alternative emissions limits seek either to maintain emission levels under normal operating conditions as per current plant operations, or to reduce current emission levels, but to some limit which is not identical to the promulgated MES (as defined). Specifically, these alternative emissions limits do not propose an increase in current average baseline emissions.

Alternative special arrangements – An arrangement different to that contained in Part 3 of GN 893 and proposed by SO based on what is considered reasonable and achievable as a consequence of the assessments conducted and which Sasol proposes as an alternative special arrangement to be incorporated as a licence condition with which it must comply during the period of postponement.

Ambient standard - The maximum tolerable concentration of any outdoor air pollutant as set out in the National Ambient Air Quality Standards in terms of Section 9(1) of the NEM:AQA.

Atmospheric Emission License – SO Atmospheric Emission Licence: Licence no. FDDM-MET-2013-23-P2 Issued to SASOL South Africa Limited., through its Sasolburg Operations' Gas Loop, Utilities and Chemicals and dated 18 May 2018.

Atmospheric impact report (AIR) - in terms of the Minimum Emission Standards an application for postponement must be accompanied by an AIR as per Section 30 of NEM:AQA. Regulations prescribing the format of the AIR were published in Government Notice 747 of 2013 as amended by GN 284.

Ceiling emissions limit – Synonymous with "maximum emission concentrations". The administrative basis of the MES is to require compliance with the prescribed emission limits specified for existing plant standards and new plant standards under normal operating conditions, excluding shut down, start up and upset conditions. Whereas average emission values reflect the arithmetic mean value of emissions measurements for a given process under all operational conditions, the ceiling emission would be the 100th percentile value of emissions measurements obtained. Hence, ceiling emission values would be higher than average emission values, with the extent of difference between ceiling and average values being dependent on the range of emission levels seen under different operational conditions. Since the MES specify emissions limits as ceiling emissions limits or maximum emission concentrations, SO has aligned its proposed alternative emissions limits with this format, to indicate what the 100th percentile emissions measurement value would be under any operational condition (excluding shut down, start up and upset conditions). It is reiterated that Sasol will request lower ceiling values representative of actual operations closer to the time of decision making, but cannot do so at this stage as the newly installed technology is still undergoing optimisation.

Criteria pollutants – Section 9 of NEM:AQA provides a mandate to the Minister to identify a national list of pollutants in the ambient environment which present a risk to human health, well-being or the environment, which are referred to in the National Framework for Air Quality Management as "criteria pollutants". In terms of Section 9, the Minister must establish national standards for ambient air quality in respect of these criteria pollutants. Presently, eight criteria pollutants have been identified, including sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), particulate matter (PM_{10}), particulate matter ($PM_{2.5}$) and benzene (C_6H_6). In this document, any pollutant not specified in the National Ambient Air Quality Standards ("NAAQS") is called a "non-criteria pollutant".

Existing plant standards - The emission standards which existing plants are required to meet. Emission parameters are set for various substances which may be emitted, including but not limited to, for example, PM_{10}, nitrogen oxides (NO_x) and SO_2.

Fugitive emission monitoring plan – The plan detailing monitoring of fugitive emissions from equipment, pumps, tanks and other non-point sources on the Sasolburg site and the associated corrective actions to manage these emissions.

GN 551 – Government Notice 551, Gazette No. 38863 dated 15 June 2016, published in terms of Section 21 of the NEM:AQA and entitled '*Amendments to the list of Activities which result in Atmospheric Emission 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 – Government Notice 893, Gazette No. 37054 dated 22 November 2013, published in terms of Section 21 of the NEM:AQA and entitled '*List of Activities which Result in Atmospheric Emissions which have or may have a Significant Detrimental Effect on the Environment, Including Health and Social Conditions, Economic Conditions, Ecological Conditions or Cultural Heritage'*. GN 893 repeals the prior List of Activities published in terms of Section 21, namely GN 248, Gazette No. 33064 dated 31 March 2010. GN 893 deal with aspects including: the identification of activities which result in atmospheric emissions; establishing minimum emissions standards for listed activities; prescribing

compliance timeframes by which minimum emissions standards must be achieved; and detailing the requirements for applications for postponement of stipulated compliance timeframes.

GN 1207 - Government Notice 2017, Gazette No. 42013 dated 31 October 2018, published in terms of Section 21 of the NEM:AQA and entitled '*Amendments to the Listed Activities and Associated Minimum Emission Standards Identified in Terms of Section 21 of the National Environment Management: Air Quality Act, 2004 (Act No.39 of 2004)*.

Maximum emission concentrations – Synonymous with "ceiling emissions limits". Refer to glossary definition specific to this application for ceiling emissions limits.

Minimum Emissions Standards (MES) – Prescribed maximum emission limits and the manner in which they must be measured, for specified pollutants. These standards are published in Part 3 of GN 893, as amended by GN551 and GN1207. These standards are referred to herein as MES.

New plant standards - The emission standards which existing plants are required to meet, by April 2020, and which new plants had to meet since 2015. MES are set for various substances which may be emitted, including, for example, PM_{10}, NO_x and SO_2.

Postponement – A postponement of compliance timeframes for new plant standards and their associated special arrangements, in terms of regulation 11 of GN 893, as amended by GN1207.

Sasol – refers generally to Sasol South Africa Limited and its various operations and operating entities.

Shutdown schedule - A programme for the scheduled period for which a plant, or a portion thereof or piece of equipment, such as a tank, is out of commission for maintenance for an extended period of time.

Special arrangements – Any specific compliance requirements associated with a listed activity's prescribed emissions limits in Part 3 of GN 893, as amended by GN 551. These include, amongst others, reference conditions applicable to the prescribed emission limits of the listed activity, abatement technology prescriptions and transitional arrangements.

SO – the applicant in this postponement application refers to Sasol South Africa Limited operating through its Sasolburg Operations.

Special arrangements – Any specific compliance requirements associated with a listed activity's prescribed emissions limits in Part 3 of GN 893, as amended by GN 551 and GN 1207. These include, amongst others, reference conditions applicable to the prescribed emission limits of the listed activity, abatement technology prescriptions and transitional arrangements.

2014 postponement application - Postponement application submitted ahead of the 1 April 2015 compliance timeframe for existing plant standards, for various sources at the SO facility and incorporated into the Atmospheric Emissions License (AEL).

2017 postponement application – Postponement application submitted by SO to extend the initial three year compliance extension granted ahead of the 1 April 2015 compliance timeframe, for three incinerators at the SO Thermal Oxidation plant.

2019 postponement application - This postponement application submitted by SO ahead of the 1 April 2020 compliance timeframe for new plant standards, for the SO Steam Stations and three incinerators at the thermal oxidation plant.

List of Abbreviations

AEL	Atmospheric Emission Licence
AFR	Alternative Fuel Resources
AIR	Atmospheric Impact Report
AQMS	Ambient air quality monitoring stations
BO	Beneficial operation
CTL	Coal-to-liquid
CO	Carbon Monoxide
CRR	Comments and Response Report
C_6H_6	Benzene
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
ESPs	Electrostatic Precipitators
FT	Fischer-Tropsch
GN	Government Notice
GO	General Overhaul
HCL	Hydrogen Chloride
HF	Hydrogen Fluoride
HSP	High sulfur pitch
I&APs	Interested and Affected Parties
ISOCORRAG	Equation developed to predict annual corrosion rates
LNB	Low NO_x burner
MES	Minimum Emission Standards
NAQO	National Air Quality Officer
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NH_3	Ammonia
NO_x	Oxides of Nitrogen
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with radius of less than 2.5 µm
PM_{10}	Particulate Matter with radius of less than 10 µm
PPP	Public Participation Process
RFC	Ready for commissioning
RFO	Ready for operation
SO	Sasolburg Operations
SO_2	Sulfur dioxide
t/h	Tons per hour
TOC	Total Organic Compounds
VOC	Volatile Organic Compound; equivalent to TVOC (Total Volatile Organic Compounds)

1 Introduction

Sasol was established in 1950 and started producing synthetic fuels and chemicals in 1955, from the world's first commercial coal-to-liquids (CTL) complex in Sasolburg. Today Sasol is a multinational organisation with key activities in South Africa in Secunda (mining, coal and gas to liquids and chemical operations) and Sasolburg (mining, provision of utilities, chemical operations and petroleum refining) together with other smaller operations at various locations in the country. As with any large petroleum and chemicals manufacturing activities, Sasol's activities result in environmental and social aspects including resource use (such as coal, water, natural gas and land), waste and pollution (solid waste, effluent and atmospheric emissions) and employment, spending and skills transfer.

In 2004 the National Environmental Management: Air Quality Act (NEM:AQA) was promulgated and stemming from that Act, National Ambient Air Quality Standards (NAAQS) were published in 2009. Commensurate emission limits were promulgated in the form of Minimum Emission Standards (MES) in 2010 and amended in 2013 and 2018. The MES identifies a list of activities that result in atmospheric emissions and obliging such emitters to obtain atmospheric emission licences (AELs) for the listed activities. Given the nature of Sasol's activities, the MES is applicable to Sasol's South African operations.

For various reasons, Sasol is unable to meet some of the MES new plant standards. Sasol is therefore using a provision in the MES that allows for an existing plant to apply for a once off postponement of compliance timeframes with new plant standards and to also propose alternative emission limits for the postponement period. Such postponement applications require a detailed justification and reasons for the application together with an independent Atmospheric Impact Report (AIR) and a concluded public participation process. This document serves as justification for the application for postponement of certain compliance timeframes as stipulated in the MES for Sasol's Sasolburg Operations (SO). The justification is structured to present the major activities at the Sasolburg site and the associated atmospheric emissions, followed by a description of which emissions currently comply or will comply timeously, and which require postponement. The specific reasons for requiring postponement are then presented together with proposed alternative emission limits.

2 Sasolburg Operations

2.1 Overview

The plant in Sasolburg was the first coal-to-liquids plant in South Africa. In broad terms this saw coal mined in the area being 'gasified' and the gas being converted into principally liquid fuels but also other chemicals developed from the waste streams from the gasification process. The gasifiers require 'lumpy' coal to work most effectively and so the fine coal which is an inevitable product of mining, was used to fuel boilers on the plant. The boilers provided steam primarily, but also electricity for the industrial process. In 2004 natural gas was brought to the Sasolburg plant, coal mining scaled back significantly and the gasifiers shut down. SO changed focus from liquid fuels to chemical products, although 4 boilers out of the original 15 boilers were shut down as part of natural gas conversion process (one of these 4 boilers were re-commissioned in 2009 due to steam demand), the remainder of the boilers (including the additional boiler) that were fuelled by the fine coal were retained to continue to generate steam and electricity, for both Sasol's operations and for other industrial tenants that also require steam for their production processes. Sasol continues a relatively small coal mining operation at Mooikraal to provide the coal necessary to fuel the boilers at SO.

2.2 The Sasolburg Industrial Complex

The SO site (formerly known as Sasol Infrachem) is located in Sasolburg in the Metsimaholo Local Municipality which is part of the Fezile Dabi District Municipality in the Free State Province. The relative position of SO to other industrial activities, Natref (the adjacent petroleum refinery that is a joint venture between Sasol and Total) and residential areas around the complex is shown in Figure 2-1.

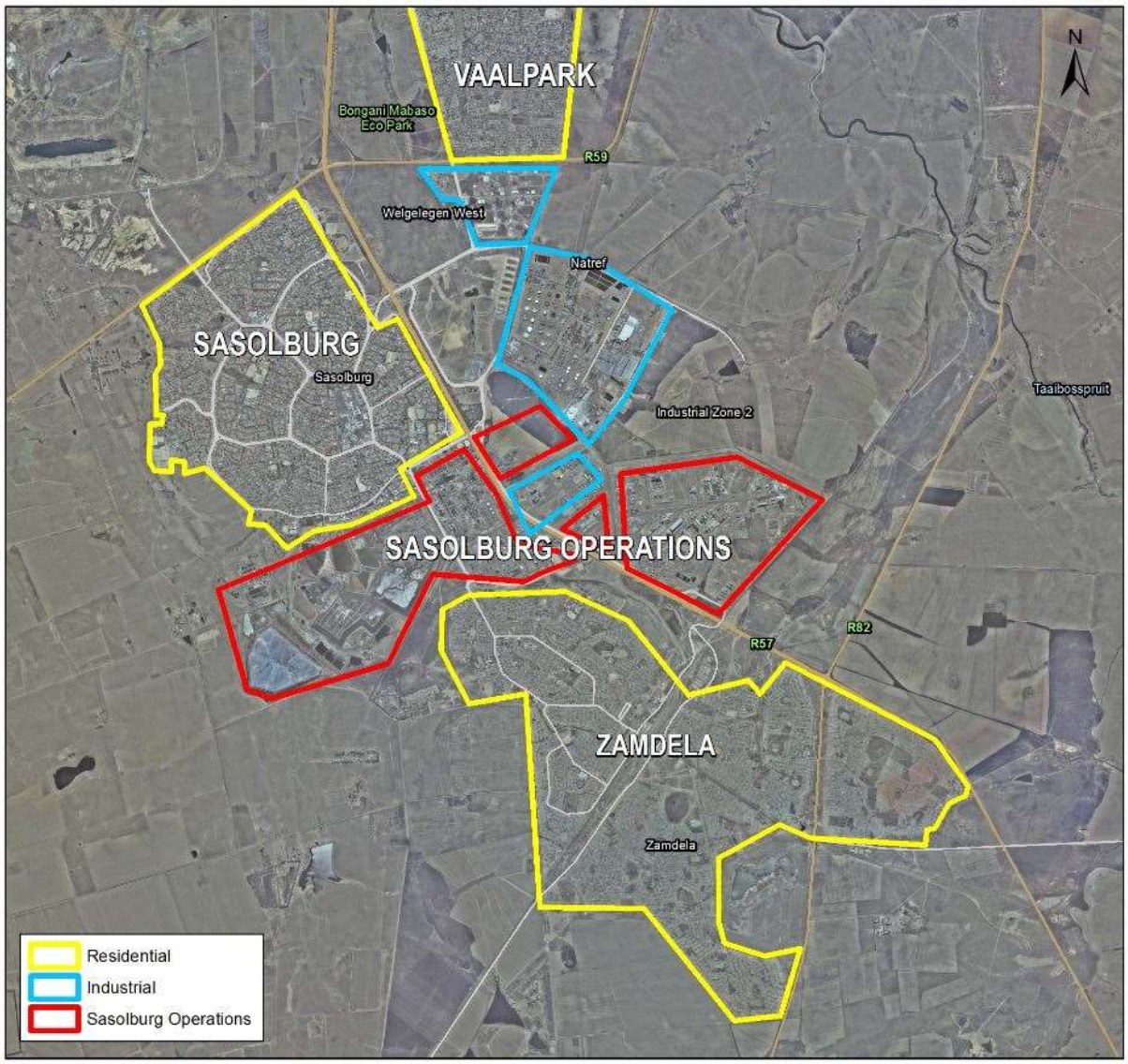

Figure 2-1: Map showing the position of SO

At the SO industrial complex a number of activities are conducted, including the provision of utilities (industrial water, steam and electricity), gas reforming and several chemical manufacturing activities including Wax, Butanol/AAA, Solvents, Phenolics, Monomers, Polymers, Caustic Soda, Hydrochloric Acid, Sodium Cyanide, Hydrogen, Nitric Acid and Ammonia together with Ammonium Nitrate. SO is responsible for supplying utilities and services (including infrastructure, waste management and waste water treatment) to the various activities on the site as well as external businesses in Sasolburg, including Natref and the Metsimaholo Local Municipality on whose behalf Sasol treats the domestic waste water. The main activities on the site and the integration between the different operations is shown conceptually in Figure 2-2.

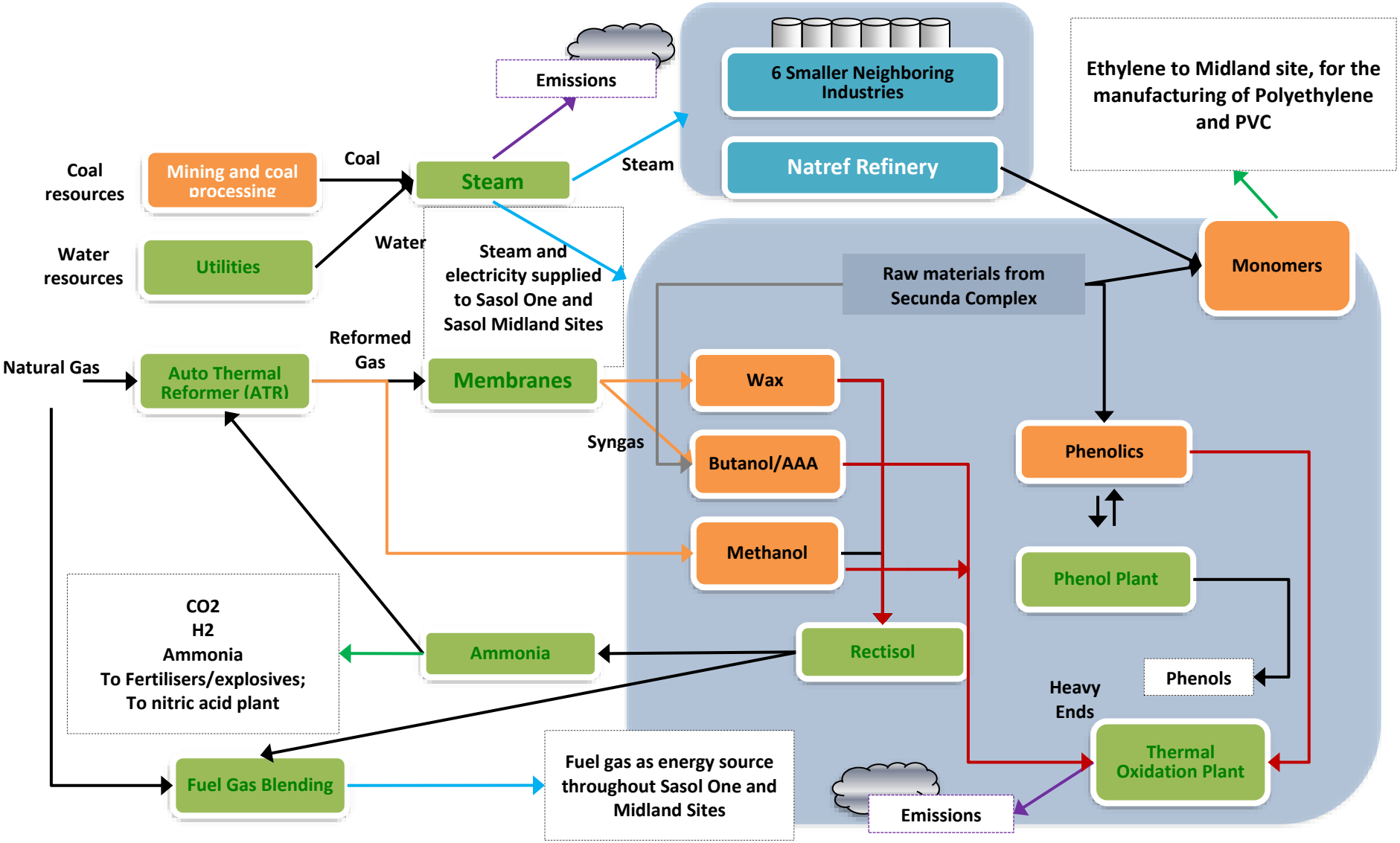

Figure 2-2: Conceptual presentation of the various industrial activities at Sasolburg operations highlighting the integration between the different activities

2.3 Atmospheric emission from SO

SO is the holder of Atmospheric Emission Licences (AEL) for certain activities it conducts at its facilities in Sasolburg and which are listed activities in terms of the MES. This application relates to those for which postponement is requested, namely the Steam Stations 1 and 2 and the Thermal Oxidation plant.

2.4 Steam Stations

Steam is a critical industrial process requirement for Sasol's operations directly as well as supplying external customers. Process steam must be available at the right quality (correct temperature and pressure) and quantity (volume of steam demanded) at all times. To meet these exacting steam requirements SO has a large fleet of smaller boilers rather than a small fleet of large boilers. The fleet of boilers allows both planned and unplanned disruptions to steam generation to be managed without compromising the supply of steam to the various users. The boilers in turn make up two steam stations. Steam Station 1 (five boilers) is an older station located on the Sasol One site while Steam Station 2 (seven boilers) is a newer facility north of the Sasol One site. Steam Station 1 also supplies electricity to the Sasolburg complex, with excess supply going into the national grid. Atmospheric emissions from the steam stations are regulated in the MES under subcategory 1.1, for the following substances, PM, SO_2 and NO_x as shown in Table 2-1 below.

Table 2-1: The minimum emission standards that apply to the SO steam stations (Category 1: Subcategory 1.1)

Substance(s)	New plant standards (in mg/Nm^3)
Particulate matter (PM)	50
Sulfur dioxide (SO_2)	1 000
Oxides of nitrogen (NO_x)	750

Note: Only the new plant standards are shown.

2.5 Thermal Oxidation Plant

Hazardous waste streams from most of SO's chemical manufacturing operations can be incinerated in three incinerators that make up the thermal oxidation plant situated within the Sasol One industrial complex, although temporarily decommissioned since November 2016 as described further in Section 4.4 below. The hazardous waste streams are generated by the Phenolics plant (previously known as Merisol), various solvent producing plants and the Monomers facility. There are three principal waste types, each of which is treated in a dedicated incinerator, namely:

1. 'High sulfur pitch' (HSP): (high-sulfur pitch, organic solvents and organic wastewater) which is treated in the **B6930 Incinerator**,
2. 'Heavy ends B' (heavy oils, off-specification waxes, Sasol spent catalyst, Funda filter cake, slop solvents and high-calorific-value organic waste) which is treated in the **B6990 Incinerator**; and,
3. 'Spent Caustic (spent caustic solution, heavy ends A and off-specification solvent products) which is treated in the **B6993 Incinerator**.

Atmospheric emissions from the thermal oxidation plant are regulated in the MES under subcategory 8.1 and in particular the following substances, PM, SO_2, NO_x, CO, HCl, TOCs, dioxins and furans, metals, mercury (Hg), cadmium and thallium (Cd + Tl), hydrogen fluoride (HF) and ammonia (NH_3) as shown in Table 2-2 below. The nature of atmospheric emissions from incinerators is one of high concentrations (of the various pollutants listed above) but with limited flows resulting in a generally small emissions mass (load) and corresponding limited ambient impact.

Table 2-2: The minimum emission standards that apply to the SO thermal oxidation plant (Category 8: Subcategory 8.1)

Substance(s)	New plant standards (in mg/Nm^3 unless otherwise stated)
Particulate matter	10
Carbon Monoxide	50
Sulfur dioxide	50
Oxides of nitrogen	200
Hydrogen chloride	10
Hydrogen fluoride	1
Sum of Lead, arsenic, antimony, chromium, cobalt, copper, manganese, nickel, vanadium	0.5
Mercury	0.05
Cadmium + Thallium	0.05
Total Organic Compounds	10
Ammonia	10
Dioxins and furans	0.1 ng TEQ/Nm^3
Exit gas temperatures must be maintained below 200ºC	

Note: Only the new plant standards are shown.

3 Sasol's Atmospheric Emissions Abatement History

3.1 General

Sasol's emissions abatement has traditionally been risk based and focussed on control of particulate matter (PM) because PM was deemed to pose the greatest risk of adverse health and/or environmental impacts. Some material sources of PM were equipped accordingly with electrostatic precipitators (ESPs). In an ESP, flyash (PM) in the exhaust stream is given an electrical charge and then removed from the exhaust stream by magnetic plates that attract the charged PM particles. The ESPs serve to remove in excess of 99% of PM emissions from Sasol's various activities. Elsewhere Sasol has focussed intensely on the abatement of VOC emissions, again considering such to pose the greatest risk of adverse health effects, especially to Sasol employees.

3.2 Participation in the formulation of the MES

Sasol participated actively in the process of developing the MES repeatedly highlighting that there were severe impediments to the installation of the abatement technologies needed to meet the MES, at Sasol's operations. In addition, Sasol also campaigned for the MES to be expressed as a load (mass of pollutant emitted) rather than as a concentration because ambient air quality is only indirectly a function of an emissions concentration and more directly a function of the load being emitted. Despite highlighting the difficulties that would be faced in meeting the MES that were mooted during the consultation process, these standards were included in the final version of the MES that was promulgated.

3.3 Planning for MES compliance

Critics of Sasol's inability to meet the MES timeframes argue that Sasol was a key stakeholder in the consultation that underpinned the formulation of the MES and thus should have known what was expected and planned for compliance accordingly. When the MES were published, however, there

were some inclusions that were opposed in the consultation process. Perhaps the most telling of these inclusions was the obligation for existing plants to comply, within a period of 5 years from the implementation of the existing plant standards, with the new plant standards. In response Sasol then opted to pursue a once off installation of abatement technology roadmap that would result in meeting the new plant MES. There was simply no logic in retrofitting to comply with the existing plant standards, and then five years later, retrofitting again to comply with the new plant standards. The once-off abatement approach meant having to operate for a period after the implementation date outside of the existing plant MES. The net effect was that Sasol was compelled to apply for postponements of the compliance timeframes for the existing plant standards in 2014.

3.4 Previous postponement applications

Sasol's previous postponement applications (for the 2015 existing plant standards) extended across much of their South African operations including Sasolburg, Secunda, Natref and Ekandustria. For SO, Sasol applied for postponement of the compliance timeframes for SO_2, PM and NO_x for emissions from the steam stations and for PM, SO_2, NO_x, CO, HCl, TOCs, metals, cadmium and thallium (Cd + Tl) and hydrogen fluoride (HF) for the thermal oxidation plant. The application for postponement was granted for the steam stations for the requested five years for NO_x and PM. Given that Sasol was able to meet the existing plant standards for SO_2 but was challenged to meet the new plant standards, Sasol applied for and was granted a postponement to the new plant standards between 2020 and 2025. For the thermal oxidation plant Sasol had limited emissions information at the time of the postponement application and so the NAQO allowed only a three years postponement during which time Sasol was instructed to develop a more comprehensive emissions baseline. On the back of the new baseline, Sasol then reapplied for postponement and was granted the remaining two years of the five-year postponement period until 2020.

3.5 Reasons for previous postponement applications

The reasons cited by Sasol in the 2014 postponement applications included:

- Limited abatement technology options that could be retrofitted to the existing Sasol infrastructure.
- Lack of space within the existing site to install the abatement equipment.
- High levels of integration between the various Sasol operations and so changes to one part of the operation inevitably would have knock-on effects for other parts of the operation.
- The General Overhaul (GO) maintenance schedule.

4 Sasolburg Operations Atmospheric Emissions Abatement Technologies

4.1 General

Given the above and the new plant MES that will come into effect on 1 April 2020 SO is required to reduce emissions concentrations of PM and NO_x on all the boilers, and PM, SO_2, NO_x, TOCs, metals, cadmium and thallium (Cd + Tl) and Hydrogen Fluoride (HF) for the thermal oxidation plant.

4.2 PM emissions from the boilers

Investigations have shown that the ESP performance on the boilers can be improved to meet the new plant MES for PM through improving the internals and enhancing the power supply to the ESPs. As previously described, an ESP uses electrical power to negatively charge the PM and positively charge steel plates that then attract the PM, removing it from the exhaust stream. Improving the way that power gets delivered to the ESP has the potential to improve the removal efficiency of the ESP and

SO has investigated the installation of high frequency inverters to improve the power supply to the ESPs on each of the boilers. Two units were already retrofitted with high frequency inverters and two ESP upgrades have already been completed. Some challenges were however experienced with the performance of the units, however optimisation efforts are continuing to obtain optimal performance.

4.3 NO_x emissions from the boilers

After considering a range of possible abatement technologies for NO_x emissions from the boilers, a low NO_x burner (LNB) technology was identified that was compatible with the SO boilers and which had the potential to ensure the MES can be met. LNB reduces the burner flame temperature and the lower flame temperature limits the formation of NO_x. SO then commissioned the installation of the selected LNB technology on one of the boilers (Boiler 12) as a pilot to determine whether the abatement technology would be effective enough to meet the new plant MES for NO_x with the intent to retrofit all the boilers. Even though LNB is a robust technology that is used effectively on many coal combustion operations, retrofitting the SO boilers is unfortunately not a 'plug and play' exercise. One of several reasons for this complexity is that the LNB requires consistent fuel quality within certain size and distribution specifications, which the mine and 50-year-old mills at SO are challenged to consistently meet.

The pilot LNB on Boiler 12 has shown promising results with NO_x emissions being reduced to approximately 900 mg/Nm^3 from the 1100 mg/Nm^3 baseline but not yet meeting the 750 mg/Nm^3 of the new plant NO_x MES. A period of process optimisation is now required that will see iterative improvements in the mill, air plant optimization and low NO_x burner adjustments to meet the required MES new plant standards whilst maintaining the required steam production efficiency and safe operations. The net effect is that simply installing LNBs on each boiler will not immediately bring about compliance with the MES and there will need to be a period of process optimisation following each retrofit. Sasol has committed the capital required for acquiring, retrofitting and optimising LNBs on each of the boilers at SO.

4.4 Emissions from the thermal oxidisers

Due to compliance challenges the thermal oxidation plant was shut down in November 2016 and have since not been operational. As such, and in keeping with the waste management hierarchy of reusing before disposal as far as practical, the waste streams have been rerouted. The spent methanol, previously disposed of via B6993 has been routed to the fuels market. The heavy ends from B6993 incinerator and the highest volume waste streams associated with the B6990 incinerator have been routed to the Alternative Fuel Resources (AFR) market. Unfortunately, no alternative use has been found for HSP, which is currently treated and landfilled, and so it is essential that the B6930 incinerator be retrofitted and brought into compliance as SO's immediate priority. It will however not be possible to get the incinerator compliant before the 2020 deadline. SO has investigated a range of different abatement technologies and decided on a combination of a bag filter together with a wet scrubber system that will bring the incinerators emissions into compliance. SO is therefore applying for postponement for all three incinerators that make up the thermal oxidation plant to allow for installation of the abatement technologies and to allow for sufficient time for optimisation of the abatement equipment to ensure compliance to new plant standards.

5 Justification for the Postponement

The primary reason for the application for postponement by SO is quite simply that sufficient time is required for both the retrofitting of the abatement technology and the process optimisation that has to follow to ensure that the abatement technology is effective in meeting the MES new plant standards.

In the case of the boilers, these cannot be retrofitted in parallel but must be retrofitted as a function of the scheduled statutory downtime (GO schedule) of the individual boilers. The steam provided by the boilers is so critical to the various chemical production processes operated by Sasol as well as to other industrial customers and as such boiler downtime has to be very carefully scheduled and limited to a predefined duration.

This schedule is known as the General Overhaul or 'GO' schedule and sees each boiler shutting down for a period of approximately three months once every three years. Whatever maintenance needs to be done on the boiler has to be completed within the defined GO schedule and of necessity that includes the retrofitting of the LNBs and the installation of the ESP modifications. The primary driver of the GO schedule is ensuring an uninterrupted steam supply of the required quantity and quality while assuring the physical integrity of the boilers, but the GO schedule also accommodates other important limitations including limited space, availability and management of contractors and employee health and safety and as such cannot be compromised.

In the case of the thermal oxidation plant the following needs to be recognised. There is no standard way of treating the various emissions from the incinerators and so the selected abatement technology, although based on existing technologies will also require technology customisation for the specifics of the incinerators. Sasol certainly has the technical capacity to customise the technology and will make use of the standard project governance process that has been developed by Sasol for all of its projects. The project governance process is one of a series of project stages with so-called 'gates' or decision hold points between each stage. A gate cannot be passed until all the criteria for a particular stage has been met and this ensures that the project is effectively costed, planned, resourced and executed so that it will be successfully implemented and operate as intended. Where the project is relatively straightforward and makes use of existing technology the project governance process can be completed relatively quickly but where there are major uncertainties about the technology and its efficacy, as is the current case, the process takes longer to complete. It is for these reasons that a period of five years is anticipated to reach a point where emissions from the thermal oxidation plant will comply with the relevant MES new plant standards.

Sasol is fully committed to meeting the MES requirements for the activities at SO, but will, for the reasons cited above, not be able to meet it by the 1 April 2020 deadline. The roadmap for the installation of the abatement technologies is detailed in Section 8 below. Initially the planning was to meet the MES by 2023 but that was on the assumption that there would be compliance with the MES immediately following the retrofit of the abatement technologies. The learnings from the pilot LNB retrofit has indicated that there will have to be a period of process optimisation after the installation of the abatement technology that will extend that period to meet the MES. Sasol would however ensure that the process optimisation activity is completed by no later than the 2025 deadline or pursue alternative means to comply with the MES should the application for postponement be granted.

6 Proposed Alternative Emissions Limits

6.1 Overview

In addition to providing an option for applying for postponement, the MES regulations also provide for emitters to apply for alternative emissions limits that would then apply during the period of the postponement. Before presenting the proposed alternative emissions limits it is necessary to briefly describe the context that has framed Sasol's thinking in this regard. Perhaps one of the greatest challenges in complying with the MES is the very narrow definition of when in a given operational year the MES apply. With the best will in the world there will always be circumstances when the abatement technologies perform sub-optimally or stop working completely as a result of a breakdown. The MES

recognises such abnormal operating conditions but allows for no more than 48 hours in which to bring the abatement control back into full operation.

6.2 Ceiling emission limits

For a large and complex industrial operation such as SO, compliance with such a short duration provision for unplanned downtime or upset conditions is extremely difficult and, in some circumstances, impossible. Sasol has a plant, for example, which takes five days just to cool down enough to allow safe access. Recognising the limited allowable downtime, Sasol must then apply for ceiling emissions limits that it knows it will be able to meet under all operational circumstances. Such limits then become more of an administrative limit than necessarily a reflection of the real operating circumstances and in most instances the emissions that occur without the abatement equipment being fully operational. It is within that context that the following alternative emission limits are proposed to apply during the period of the postponement.

6.3 Alternative proposed limits for the steam stations

An additional complexity that must be managed at the steam stations is that for Steam Station 1, there are five boilers feeding into three stacks. Two of the stacks each have two boilers feeding into them and one stack has one boiler. For Steam Station 2, all seven boilers feed into a single stack. Given that the compliance points are emissions from the stacks and not the individual boilers, it will only be after the installation, stabilisation and optimisation of the abatement technology that the actual performance of the units can be determined. SO's intention is to apply initially for its existing AEL limits with the intention to reduce the requested emission limits to where the newly abated plants' proven achievable performance is by December 2019. A letter will then be issued to the NAQO to inform her of the performance levels for SO, which will be lower than the current limit values, that SO will sustainably be able to meet. For these various reasons the current proposed alternative emission limits during the postponement period are as shown in Table 6-1 and Table 6-2.

Table 6-1: Proposed alternative emission limits for the postponement period from 1 April 2020 until 31 March 2025 requested for Steam Station 1

Emission	Emission standard for new plants	Limit granted in decision on 2014 postponement application	Alternative Emission Limit Requested (*ceiling limit*)[a]	Compliance averaging period
All values specified at 10% O_2 273 K and 101.3 kPa, mg/Nm^3				
NO_x	750	1 450	1 450	Daily average
PM	50	165	165	Daily average

Table 6-2: Proposed alternative emission limits for the postponement period from 1 April 2020 until 31 March 2025 requested for Steam Station 2

Emission	Emission standard for new plants	Limit granted in decision on 2014 postponement application	Alternative Emission Limit Requested (*ceiling limit*)[a]	Compliance averaging period
All values specified at 10% O_2 273 K and 101.3 kPa, mg/Nm^3				
NO_x	750	1 250	1 250	Daily average
PM	50	100	100	Daily average

6.4 Alternative proposed limits for the thermal oxidation plant

The proposed emissions alternative limits for emissions from the thermal oxidation plant (made up of three incinerators) are shown in Table 6-3. The proposed limits are the same as those that were approved by the NAQO following the 2017 postponement application.

Table 6-3: Proposed alternative emission limits for the postponement period from 1 April 2020 until 31 March 2025 requested for the thermal oxidation plant

Emission	New plant MES	Incinerator B6930	Incinerator B6993	Incinerator B6990	Averaging period
		Emissions limit granted following 2017 postponement application and proposed as alternative emissions limit for this application			
All values specified at 10% O_2, 273 K and 101.3 kPa, mg/Nm^3 unless otherwise specified					
PM	10	100	300	600	Daily
SO_2	50	3 600	260	1 050	Daily
CO	50	NA	1 110	NA	Daily
NO_x	200	800	420	570	Daily
Pb+As+Sb+Cr+Co+Cu +Mn+Ni+V	0.5	6	20	60	Hourly
Cd+Tl	0.05	NA	NA	NA	Hourly
Hg	0.05	NA	NA	NA	Hourly
NH_3	10	NA	NA	NA	Daily
HF	1	NA	NA	3.3	Daily
HCl	10	NA	NA	NA	Daily
TOC	10	15	20	15	Daily
Dioxin & Furan	0.1	NA	NA	NA	Hourly
[ng I-TEQ/Nm^3, dry at 10% O2]					
Flue gas Temperature	200 ºC	NA	NA	Below 1 000 ºC	Daily

7 The Atmospheric Impact Report

7.1 Overview

As required by the Regulations and in support of the postponement applications, Sasol commissioned an independent AIR to assess the ambient air quality implications and associated environmental and human health risks of the postponement application and the proposed alternative emissions limits. Airshed Planning Professionals was appointed to conduct the atmospheric impact assessment independently and the methodology and datasets were independently peer reviewed by E^{x}ponent Inc. The AIR is submitted as a stand-alone document included in Annexure A, but a summary is included here to facilitate I&AP comments thereon.

7.2 Study approach and method

A dispersion model serves to simulate the way in which emissions will manifest as 'ground-level' or 'ambient' concentrations. The AIR prepared as part of SO's postponement application was compiled

in accordance with the Regulations prescribing the format of the AIR of 2013. Further, the Regulations regarding air dispersion modelling determined the dispersion model selection.

As opposed to predicted ambient concentrations using a dispersion model, ambient air quality monitoring serves to provide direct physical measurements of selected key pollutants. Sasol operates three residential ambient air quality monitoring stations in and around Sasolburg, namely Leitrim, AJ Jacobs and Eco Park. In addition, the DEA operates three air quality monitoring stations in close proximity to Sasolburg as part of the Vaal Triangle Airshed Priority Area, namely Three Rivers, Sharpeville and Zamdela.

Data from the Sasol and DEA monitoring stations for 2015, 2016 and 2017 were included in this investigation. The Sasol monitoring stations are accredited (ISO/IEC17025) to ensure data quality and validity. Accreditation certificates from the DEA monitoring stations have not been provided. These measured values are indicated as orange dots in all the AIR graphs.

In order to assess the impact of the postponements for which SO is applying, three emissions scenarios were modelled.

1. **Current baseline emissions**, reflective of the impacts of present operations, which are modelled as *maximum allowable emissions.* This scenario is represented by the first column in all AIR graphs.
2. **Compliance with the MES.** This is modelled as a ceiling emissions limit (i.e. maximum emission concentration) aligned with the prescribed standard and reflects a scenario where abatement equipment is introduced to theoretically reduce emissions to conform to the standards. This scenario is then represented by the second column in all AIR graphs.
3. **A worst-case scenario of operating constantly at the requested alternative emissions limits**, which have been specified as ceiling emissions limits (i.e. maximum emission concentrations). This scenario is then represented by the third column in the presentation of all AIR graphs. It is re-emphasised that SO will apply for lower alternative emission limits than what is modelled once the technology performance has been confirmed.

Once ambient concentrations have been predicted using the dispersion model they are compared to the NAAQS. NAAQS have been set for criteria pollutants at limits deemed to uphold a permissible or tolerated level of health risk. The NAAQS are represented as an orange line in all the AIR graphs. This comparison provides an assessment of the potential for air quality to impact on human health. Where no NAAQS exists for a relevant non-criteria pollutant, health screening effect levels based on international guidelines are used. In addition, the measured concentrations are also used to ascertain the representativeness of the modelling and to assess the extent to which the NAAQS are met as a function of all sources of emissions.

Forty-two (42) receptors were identified in the vicinity of SO (within the 57-by-57 km modelling domain). Sensitive receptors included residential areas, schools, hospitals and clinics, as well as monitoring stations. Ambient air quality monitoring stations (AQMS) were the first receptors identified because comparison of the predicted concentrations could be compared with measured concentrations for model validation. A full list of receptors is provided in Appendix K of the AIR.

The dispersion modelling methodology and datasets was reviewed by Exponent Inc., which was identified as the appropriate peer reviewer in light of its extensive international experience in the design, development, and application of research and regulatory air quality models. Airshed's Plan of Study, the peer reviewer's report and Airshed's comments on each of the findings are included as Annexure B.

7.3 Overall findings of the AIR

7.3.1 Meeting the NAAQS

The MES aims to achieve the intent of the NEM:AQA which means ensuring that ambient air quality does not threaten the health or well-being of people and the environment. As the NAAQS provide a limit at which the risk to health should be considered tolerable, postponement applications should be considered in terms of the extent to which ambient air quality that meets the NAAQS.

For all criteria pollutants, barring PM and SO_2, both the simulated and observed ambient concentrations are below the NAAQS. For PM and SO_2 (for daily and annual averaging periods), while the observed ambient concentrations are above the NAAQS (not all the time but the number of allowable exceedances in a year are exceeded), the simulated ambient concentrations emanating from SO's sources are well below the NAAQS demonstrating the contribution to ambient concentrations from other sources. To collectively contribute to the reduction of these other sources SO is in the process of executing a Joint Offset Implementation Plan with Natref that aims to achieve a reduction in PM and SO_2 emissions from some of the other sources.

7.3.2 The effect of the alternative emissions limits

The alternative emissions limits proposed by SO to be applicable during the requested transitional compliance period, are in some instances significantly higher than the MES (i.e. as reported on a concentration basis). It is reiterated that the administrative basis of the MES is to comply under all operational circumstances, with emissions exceeding the MES only being tolerated for shut down, start up and upset conditions. That administrative requirement means that SO must request ceiling emissions limits rather than average emissions limits to ensure that it can comply under all operating conditions given the known variability of emissions under normal operational circumstances.

The predicted ambient concentrations for the alternative emissions limits are a therefore worst-case depiction because they have been modelled as if the emission will be maintained at those levels continually, which they will not. Yet even under the worst-case emissions scenario meeting the NAAQS is predicted in all circumstances for SO's emissions.

The key finding is that compliance with the MES will in most circumstances reduce ambient concentrations, but in circumstances where the NAAQS are already being met. In the case of PM, compliance with the MES will not achieve meeting the NAAQS hence the need for the Offset Implementation Plan being executed in terms of the 2015 MES Postponement decision.

7.3.3 Health effects

The AIR Regulations prescribe an assessment of the health effects of the emissions for which temporary relief is sought from the MES through a request for extended compliance periods based on the degree to which the NAAQS are met. The World Health Organisation indicates that there is no safe limit in respect of exposure to PM. However, the NAAQS prescribe a permissible or tolerable level of health risk. The overall findings of the AIR are that the alternative emissions limits requested by SO in the interim will not result in an increase in ambient pollutant concentrations beyond the permissible health risk thresholds of the NAAQS.

7.3.4 Ecological effects

The impact of emissions on the environment is assessed in terms of Section 5.2 of the AIR. The analysis covers impacts to vegetation, of dustfall, potential corrosion and impacts associated with sulfur and nitrogen deposition.

The simulated off-site annual concentrations of SO_2 may exceed the critical levels for lichen (the most sensitive vegetation type). However, off-site NO_2 concentrations are likely to be below the critical levels for all vegetation types including lichen. Estimated dustfall rates for the simulation scenarios ranged between 0.10 and 39.79 mg/m^2.day, where the theoretical compliance with the MES standards would likely result in the lowest dustfall rates. No exceedances of the target dustfall rates of 600 mg/m^2.day (residential) and 1 200 mg/m^2/day required by the National Dust Control Regulations (Government Gazette No. 36974) were simulated off-site. Corrosion rates were calculated using the ISOCORRAG method (an equation developed to predict annual corrosion rates) and are listed in Table 5-45 of the AIR. It is noted that corrosion rates for the baseline and alternative emissions scenario are generally higher than corrosion rates for the MES compliance scenarios.

Estimates of sulfur (S) and nitrogen (N) deposition rates for the Highveld are comparable with some of the industrialised regions of Europe and North America raising concern that the acidic loading of sulfur and nitrogen on the ecosystems of the Highveld could have implications for ecosystem functioning. Investigating the impact of deposition on the Free State and Mpumalanga grasslands downwind of SO operations was beyond the time-frame of the accompanying postponement application especially since long-term impact studies are not yet available for South Africa.

8 Roadmap to Compliance

Following all the studies and technological options that have been considered, Sasol has advanced its abatement roadmap projects and the required optimisation of the performance of the installed technology to the implementation phase. Unfortunately, due to the time required to execute all the projects, SO will not be able to meet the Minimum Emission Standards by 1 April 2020, but a bit later as can be seen from the abatement implementation roadmaps below.

8.1 Steam Stations 1 and 2

As was discussed and described during previous postponement applications, doing major retrofits on a brownfields area is challenging and time consuming. Based on these difficulties and to ensure stable operations as well as the availability of reputable resources, SO is doing the necessary changeovers during the statutory general overhauls of the boilers. This is the safest and most appropriate time to install the Low NO_x burner (LNB) technology and doing the necessary changes on the ESPs. As indicated above, Steam Station 1 should be fully abated by March 2022. It should however be emphasised that due to the age of the plant as well as the space constraints there is an element of uncertainty as to whether the abatement retrofit will yield a fully compliant outcome. Therefore, although the plan is to be fully compliant by March 2022 as indicated in Table 8-1 below, there is a possibility that this will not be the case due to technology constraints. Unfortunately, this will only be known when the technology is installed, and all optimisation options have been exhausted.

Table 8-1: Compliance roadmap for steam station 1

Project	**Steam Station 1: Boiler PM & NO_x abatement**
Gate 2 governance	Complete
Feasibility (Select phase)	Complete
Gate 3 governance	Complete
Basic Engineering (Define phase)	Complete
Gate 4 governance + final investment decision	30-Oct-18
Detail design and construction (Implementation)	30-Oct-18 onwards
Ready for commissioning (RFC)	31 Dec 19 - 30 Apr 21

Ready for operation (RFO)	31 Jan 20 – 30 Jun 21
Beneficial operation (BO)	31 Mar 20 - 31 Aug 21
MES compliance*	30 Sept 20 - 28 Feb 22

Similarly Steam Station 2's Particulate and NO_x roadmap is indicated in Table 8-2 below. All plans are in place to be fully compliant by March 2023. It must however be emphasised that the technology performance for both Particulates and NO_x at both the Steam Stations are unproven due to the short duration that the technology is in operation and the difficulties associated with operating the units at the level of the MES new plant standards.

Therefore, although the abatement equipment will be installed, SO might require more time to implement optimisation options which may extend beyond the planned execution time to meet full compliance.

Table 8-2: Compliance roadmap for steam station 2

Project	**Steam Station 2: Boiler PM & NO_x abatement**
Gate 2 governance	Complete
Feasibility (Select phase)	Complete
Gate 3 governance	Complete
Basic Engineering (Define phase)	Complete
Gate 4 governance + final investment decision	Complete
Detail design and construction (Implementation)	In progress
Ready for commissioning (RFC)	30 Jun 18 - 31 May 22
Ready for operation (RFO)	31 Jul 18 – 30 Jun 22
Beneficial operation (BO)	30 Nov 18 - 31 Aug 22
MES compliance*	31 May 19 - 28 Feb 23

8.2 Thermal Oxidation Plant

The thermal oxidation plant compliance roadmap provided in Table 8-3 below demonstrated the intention to have the B6930 incinerator retrofitted by May 2023.

Table 8-3: Compliance roadmap for thermal oxidation plant

Project	**Thermal Oxidation Plant**
Gate 2 governance	Complete
Feasibility (Select phase)	31-Jul-19
Gate 3 governance	15-Sep-19
Basic Engineering (Define phase)	30-Sep-20
Gate 4 governance + final investment decision	20-Nov-20
Detail design and construction (Implementation)	31-May-22
Ready for commissioning (RFC)	30-Jun-22
Ready for operation (RFO)	31-Aug-22
Beneficial operation (BO)	31-Oct-22
MES compliance*	30-Apr-23

In all cases the relevant technology choices has been completed and it is a matter of finalising and completing the engineering as well as construction as per the plans above.

For thermal oxidation plant the B6990 incinerator will not be operational post 2022 since the unit will be demolished to make space for the retrofitted abatement technology required for the B6930 incinerator.

The current plan is to mothball the B6993 incinerator after the postponement period with the view to only re-commission when compliant with the MES new plant standards.

9 Postponement request

SO herewith applies for postponement to comply with the Minimum Emission Standards as follows:

a) Category 1.1: Steam Stations 1 and 2

Postponement is requested for a period of 5 years for particulate matter and NO_x and PM emissions for both Steam Station 1 and 2, from 1 April 2020 to 31 March 2025 to allow for the execution of SO's compliance roadmap as indicated above for the Steam Stations. Although indications in the roadmap is for the completion of the compliance roadmap in the beginning of 2023, and additional two years is requested since the technology as installed at the time of this application is not performing as expected and uncertainty exist whether the technology will yield full compliance with the minimum emission standards by the beginning of 2023.

The additional two years is therefore requested to allow sufficient time for further optimisation or the implementation of alternative measures in the event that the technology does not deliver the desired outcomes.

b) Category 8.1: Thermal Oxidation

SO requests postponement for its thermal oxidation plant, (B6990, B6993 and B6930 incinerators) to comply with the minimum emission standards' pollutants as per the table above for a period of 5 years from 1 April 2020 to 31 March 2025. Although the project schedule indicates that the B6930 incinerator will be abated by April 2023, the additional time is requested to ensure market stability for the rerouted waste streams as well as to ensure that the newly installed abatement technology on the B6930 incinerator delivers the required abatement efficiencies. Should there be problems with the technology, the additional time will be required to resolve the technological challenges as to fully comply with the Minimum Emission Standards by 1 April 2025, or earlier.

As the sustainability of the alternative measures implemented for the waste streams become certain, the affected incinerators will be removed from the postponement application.

Sasol has consistently communicated its commitment to meeting its compliance obligations in the **air quality improvement** roadmaps which informed and supported its previous postponement applications towards compliance with the MES by 2025. To the extent necessary, further applications as provided for in the applicable regulatory dispensation will be made.

10 Public Participation

In terms of the MES (Government Notice No. 893, 22 November 2013) a postponement application must include – "*a concluded public participation process undertaken as specified in the NEMA and the Environmental Impact Assessment Regulations made under section (24(5) of the aforementioned Act.*"

As such the Public Participation Process (PPP), undertaken as part of Sasol's application for postponement of the compliance timeframes, was structured to meet the requirements of Chapter 6 of the Environmental Impact Assessment (EIA) Regulations (Government Notice No. 326, 7April

2017) published under the National Environmental Management Act (Act 107 of 1998) (NEMA), as specified in the MES.

A Public Participation Report, detailing the project Public Participation Process undertaken is attached in **Annexure C,** while all comments received, with associated responses, are included in **Annexure D**.

The PPP is an important component of the application process and is closely linked to the technical activities required for the preparation of the Motivation Report (Figure 10-1).

The proposed technical and public participation activities, as well as the broad timeframes for roll out of these processes are shown below.

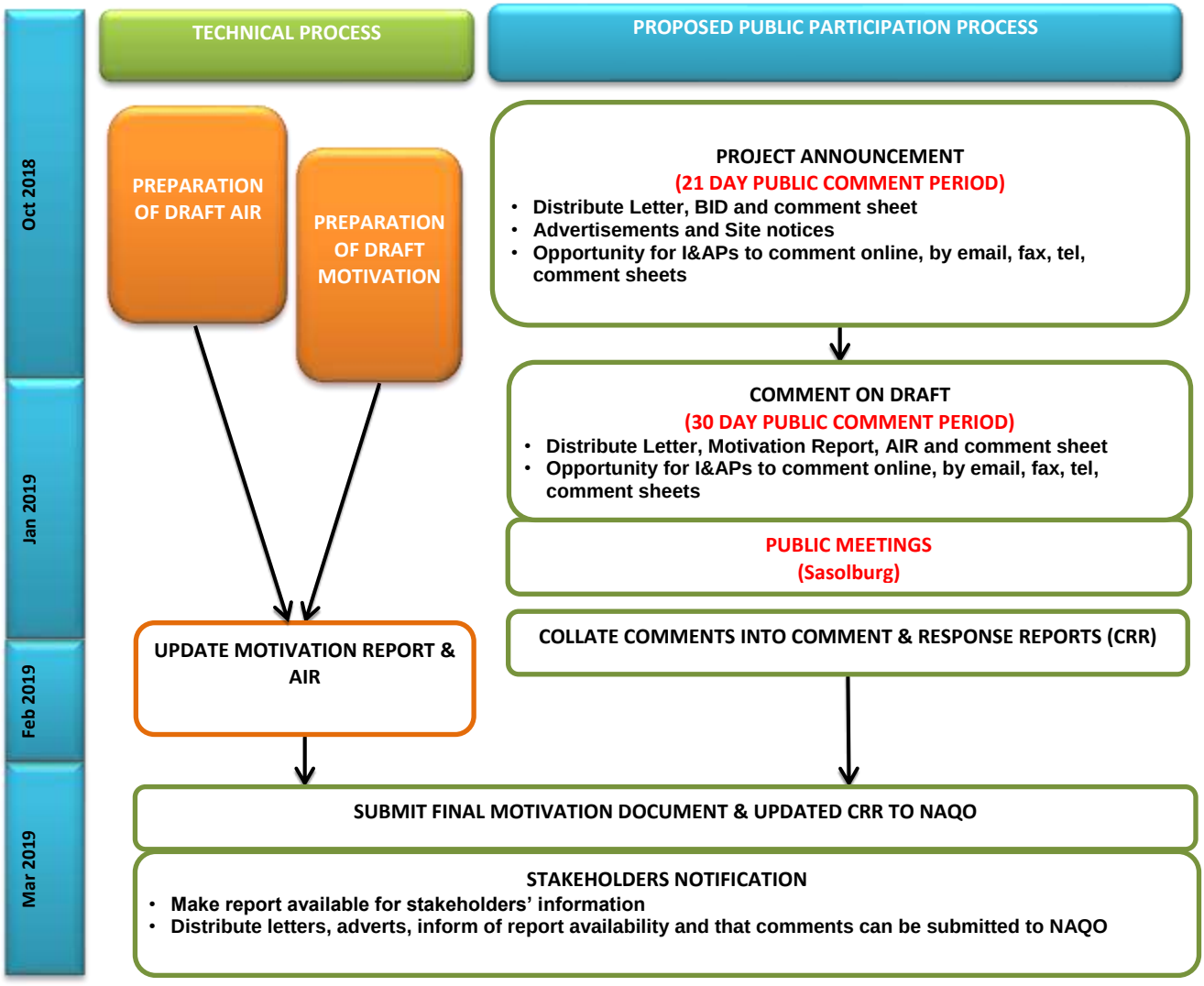

Figure 10-1: Technical and Public Participation Process

11 Conclusions and way forward

Sasol's Sasolburg operations date back to the 1950s when the country's first coal-to-liquids operation was started. That process has evolved over the years to the current position where Sasol's primary commercial activities at Sasolburg Operations (SO) is the manufacture of various chemical products. SO still makes use of two steam stations that date back to the origin of the operations and which provide steam for use in the industrial process, other industrial customers and the generation of

electricity for plant operations. Collectively the steam stations have 12 boilers which are rotated to ensure that there is a continuous supply of steam of both the right quantity and quality. SO also operates a thermal oxidation plant made up of three incinerators that are used to incinerate hazardous waste that stems from the chemical manufacturing process.

In 2004, South Africa published a new air quality act known as NEM:AQA and NAAQS were published in 2009. Following the publication of the NAAQS, the DEA published regulations requiring an AEL for a range of industrial processes and also detailing MES for the pollutants emitted from such processes. The MES requires existing plants to comply with the new plant standards by 2020. However, importantly, the MES provides for emitters to apply for postponement of the compliance timeframes. For various reasons, as explained earlier in this report, Sasol has not been able to comply with the compliance timeframes for several of its atmospheric emissions, SO specifically, has had to apply in the past for postponement of the MES. SO is now applying for postponement of the implementation of the new plant standards for the various boilers that make up the two steam stations and for the thermal oxidation plant.

Sasol intends to comply with the MES new plant standards but has been hamstrung by the need to find abatement technologies that suit the age and design of the boilers and the thermal oxidation plant. Sasol intends to install low NO_x burners (LNB) and upgrade the electrostatic precipitators (ESP) on each of the boilers that will see abatement of the NO_x and PM emissions respectively and compliance with the MES by 2025. Sasol also intends to retrofit the incinerators that make up the thermal oxidation plant with bag filters and wet scrubbers that would see compliance with the MES for the thermal oxidation plant by 2025. In both circumstances there will need to be process modifications and optimisation to meet the MES after the retrofit and, in the case of the thermal oxidation plant, a technology optimisation process to ensure compliance. In addition, the boilers are only available for retrofitting of abatement technology as a function of a statutory overhaul (GO) schedule that constrains the availability of the boilers for retrofitting. Sasol is committed to adhere as far as practically possible with its compliance roadmaps to which the proposed abatement technology is foreseen to be installed by 2023 and at which point compliance may be achieved, however SO is requesting postponement to 2025 to allow sufficient time should difficulties be encountered within the abatement technology and further optimisation or alternative additional technologies need to be included to meet the requirements of the MES new plant standards or pursue alternative means to ensure compliance to the MES . Sasol has proposed alternative emissions limits that SO could meet during the postponement period.

Annexures

Annexure A: Atmospheric Impact Report

Annexure B: Independent Peer Review Report

Annexure C: Public Participation Report

Annexure D: Comments and Response Report

Annexure E: Redacted Atmospheric Emission Licence

Annexure F: Sasolburg Annual Emissions Report