ArcelorMittal South Africa
Corporate Office

21 December 2017

TO: The Minister of Environmental Affairs
Department of Environmental Affairs
Environment House
473 Steve Biko Street
Arcadia
Pretoria
0083
South Africa

BY E-MAIL: RTshikalanke@environment.gov.za

AND BY HAND Environment House, Pretoria

FOR ATTENTION: Honourable Minister BEE Molewa
Mr RP Tshikalanke

Dear Madam/Sir

POLLUTION PREVENTION PLAN FOR ARCELORMITTAL SOUTH AFRICA LIMITED ("AMSA") (AS PER POLLUTION PREVENTION PLAN REGULATIONS PROMULGATED ON THE 21ST OF JULY 2017)

AMSA herewith submits with great pleasure its Pollution Prevention Plan as per the Regulations promulgated on the 21st of July 2017.

Your attention is drawn to paragraph 7 of the Regulations mentioned above that deals with confidentiality as some information in this plan is highly confidential at this stage and that it will be dealt with accordingly.

Should you have any further questions, please do not hesitate to contact our contact person namely [redacted] or alternatively at

Yours sincerely

ArcelorMittal

POLLUTION PREVENTION PLAN (IN TERMS OF REGULATION 712 PROMULGATED ON THE 21ST OF JULY 2017) ("regulations")
Period covered: 21 July 2017 to 31 December 2020

ArcelorMittal South Africa Limited
Registration number: 1989/002164/06, a limited liability company duly incorporated in the Republic of South Africa.

Contact Person:

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Cell:

Address:
DELFOS Boulevard
PO BOX 2
Vanderbijlpark
1900

Introduction

ArcelorMittal South Africa Limited, hereinafter referred to as "AMSA" is a significant emitter of Greenhouse Gases ("GHGs") of which the bulk falls within the "direct" or "scope 1" category covered by these regulations.

As has come to light on numerous occasions during the climate change and mitigation potential debate, the iron and steel industry is severely limited in reducing its direct emissions due to the fact that carbon is relied on as a reductant to convert iron ore into the final product namely steel.

As required by the regulations, the National Greenhouse Gas Emission Reporting Regulations form the basis for the reporting of AMSA's emissions. The Technical Guideline document, that accompanies the GHG Reporting Regulations, was however not finalized to accommodate all the process configurations, boundaries and practices as found within AMSA. AMSA is currently in discussion with the relevant persons within the Department of Environmental Affairs ("DEA") to finalise this process. This does not imply that AMSA cannot report its GHG emissions, but its rights need to be reserved as final changes to the Technical Guideline Document could result in changes to the final GHG emission outcome.

It needs to be stated further that the 2016 annual GHG emissions as reported in table 1 of this plan may increase significantly in future as AMSA's facilities were only operating at 73% capacity during this specific year.
AMSA's operations as per this plan are spread throughout South Africa and cover those activities over which the company has management control. Such operations and activities as covered in this plan are the same as those covered

in AMSA's registration in terms of the National Greenhouse Gas Reporting Regulations promulgated on the 3rd of April 2017. AMSA's registration was submitted to the DEA on the 3rd of May 2017. These registered facilities/operations comprise of:

- ArcelorMittal South Africa Limited: Vanderbijlpark Works
- ArcelorMittal South Africa Limited: Newcastle Works
- ArcelorMittal South AfricaLimited: Vereeniging Works
- ArcelorMittal South Africa Limited: Pretoria Works
- Saldanha Steel (Pty) Ltd, a fully owned subsidiary of ArcelorMittal South Africa Limited

Description of production processes

Steelmaking involves energy intensive processes to convert iron ore and/or scrap metal to iron and steel. This is typically done in a blast furnace and basic oxygen furnace combination (BF/BOF) or in a direct reduction kiln (DRI) followed by an electric arc furnace (EAF) or in some instances DRI is fed into a blast furnace (BF). AMSA also applies the unique Corex/Midrex process for the purpose of steelmaking, which has significant similarities with the BF/BOF route. However, AMSA does not make use of the outdated and less efficient open hearth furnace (OHF) technology for steel production which is often still mentioned in literature. Steelmaking configurations can also involve the use of an electric arc furnace (EAF) to recycle scrap steel. An overview of these conventional iron and steel production processes is given in Figure 1.

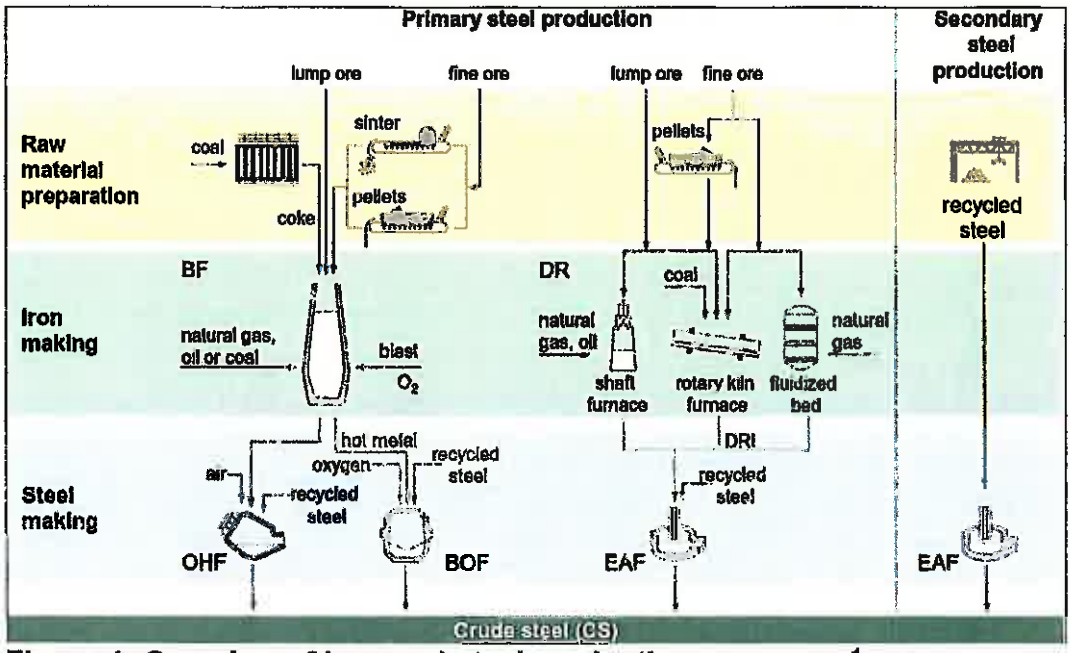

Figure 1: Overview of iron and steel production processes[1]

[1] Global CCS Institute (2013 Global Technology Roadmap for CCS in Industry: Steel Sector Report. http://hub.globalccsinstitute.com/sites/default/files/publications/15671/global-technology-roadmap-ccs-industry-steel-sectoral-report.pdf

Apart from standard blast furnace and direct reduction technology the unique Corex/Midrex process for primary iron making is shown in the Figure 2. The process gassifies coal and coke to produce a reducing gas (carbon monoxide and hydrogen) that reduces the iron oxide before it is melted to produce liquid iron. Surplus reducing gas is used in the Midrex process. The meltshop then combines conventional electric arc furnace technology (EAF) with basic oxygen furnace technology (BOF) to produce steel (Conarc). There is a lot of similarity between this process and the BF/BOF process in terms of both chemistry, GHG emissions and energy intensity, the latter being more favourable.

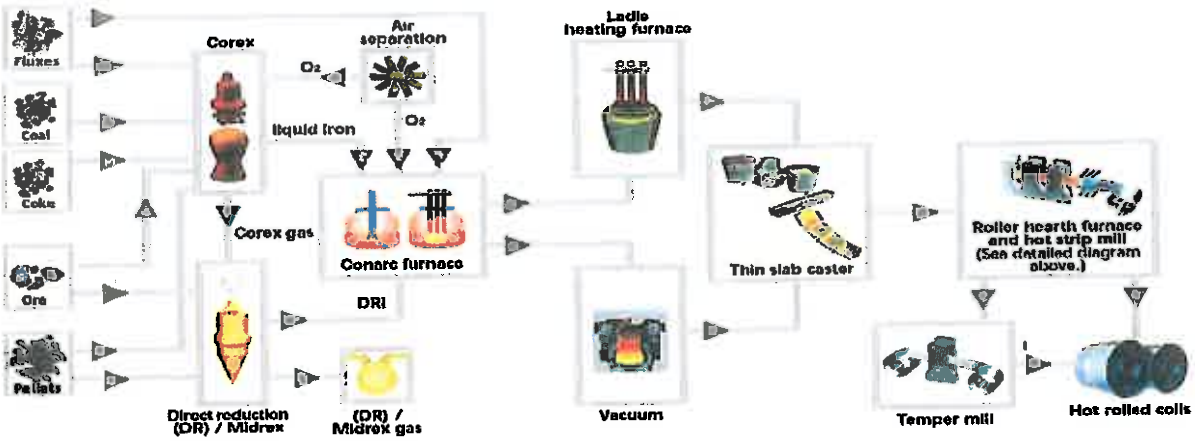

Figure 2: Saldanha Steel Corex/Midrex process[2]

Steelmaking is an energy intensive process that relies on the use of fossil fuels and electricity for two purposes. The first is to create high-temperatures that will allow the required chemical reactions to occur. The high temperatures are required to supply the endothermic heat of reaction for the reduction of iron oxide in the iron ores to metal. The second purpose is to act as chemical reagent in the reduction reaction. The energy requirement for the recycling of scrap steel is significantly lower as the feedstock to the EAF process is in a metallic state, and no significant reduction of oxides is required. The application of the process is however limited by the availability of scrap metal as raw material.

As mentioned before, the Technical Guideline Document that accompanies the National Greenhouse Gas Reporting Regulations is being revised to accompany the unique process configurations found in South Africa. It should be noted that for Tier 1 reporting purposes in terms of the IPCC guidelines the Corex/Midrex/Conarc process combination is regarded as similar to the BF/BOF route. DRI produced as a feed material into a BF and how to address the emissions from a tier 1 perspective, is also the subject of finalisation in the Technical Guideline Document.

Table 1 summarises AMSA's GHG emissions for 2016 after the above process descriptions were divided up into the various IPCC source categories in line with the GHG Reporting Regulations and the accompanying Technical Guideline Document.

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2 Steenkamp I, J. & du Preez, L. (2015) Introduction to the production of clean steel. Journal of the Southern African Institute of Mining and Metallurgy 11(6).

Mitigation measures

As mentioned before, the mitigation potential relating to direct emissions within the iron and steel industry is extremely limited. For this reason, mitigation measures that would reduce AMSA's indirect emissions are also included in Table 2. From an accounting perspective the direct and indirect GHG emission reductions should however be kept separate. It should be noted that all GHG emission reduction are quantified in terms of the National Greenhouse Gas Reporting regulations, except where electricity savings are at stake. In such cases an emission factor obtained from ESKOM is utilized.

One mitigation measure that could reduce direct GHG emissions fairly significantly within the limited scope is the utilization of higher quality raw materials. As such higher quality raw materials would need to be imported, AMSA has taken a conscious decision not to pursue such measures as they could result in job losses at a local level. This is a good example where future climate related punitive measures imposed by the authorities could have unintended consequences.

Other mitigation measures currently still fall within the realm of Research & Development and for this reason cannot be committed to in this plan. One such measure could be the sequestration and mineralization of CO_2 in slag, a by-product that is widely used within the civil sector.

Conclusion

Careful consideration was given to the fact that this plan should comply with the requirements as stipulated in Chapter 2 of the regulations. The above information combined with information in tables 1&2 more than adequately addresses such requirements.

As the reader of this plan may appreciate, the evolution of material mitigation measures is a dynamic process and it can be foreseen that further mitigation measures could be specified as the current plan is being reviewed.

AMSA is more than willing to share further information in the event of more clarity being required.

Apart from tables 1&2, a declaration is also attached as Annexure 1 to this plan to confirm the accuracy of information within the realms of specific concerns raised and review(s) of the Technical Guidelines being made.

ANNEXURE I

Declaration

Name of Company: ArcelorMittal South Africa Limited.

Declaration of accuracy of information provided:

I, [redacted] declare that the information provided in this report is in all respects factually true and correct to the best of my knowledge and conditions specified and as at the date of signature.

Signed at Vanderbijlpark on this 21st day of December 2017.

Signature

Capacity of Signatory

Table 1: Template for total annual emissions from each activity measured as $CO_{2\text{-eq}}$ for the preceding calendar year

Activity (IPCC Source Category)[1]	Year (insert calendar years for which data is provided)[2]	GHG1: CO_2 (t CO_2)	GHG2: CH_4 (t CH_4)	GHG3: N_2O (t N_2O)	GHG4 (t)	GHG5 (t)	GHG6 (t)	Methodology and GHG emission factors used to estimate baseline emissions[3]	Total GHG emissions in CO_2 equivalents ($tCO_{2\,eq}$)
1 A1ci (Manufacture of Solid Fuels) Coke Making	2016	979501	N/A	N/A	N/A	N/A	N/A	Tier 1, IPCC factor: 0.56 tCO_2/tcoke produced	979501
1A2a (Iron & Steel) Downstream Natural Gas/Sasol/LPG Combustion	2016	373932	6.64	0.66	N/A	N/A	N/A	Tier 1, Annexure A & Annexure H (Technical Guidelines). Natural Gas: 56100 $kgCO_2$/TJ (IPCC); LPG: 63100 $kgCO_2$/TJ LPG (IPCC); Global Warming Potential: CH_4: 23 tCO_2 eq (100 years); Global Warming Potential: N_2O: 296 tCO_2 eq	374280
1B1c (Solid Fuel Transformation (CH_4 from Coke Making)	2016	N/A	0.175	N/A	N/A	N/A	N/A	Tier 1, Annexure C & Annexure H (Technical Guidelines). CH_4: 0.1 gCH_4/t Coke produced (IPCC). Global Warming Potential: CH_4: 23 (100 years)	4
2C1 (Iron & Steel Production) Process Emissions	2016	8108091	N/A	N/A	N/A	N/A	N/A	Tier 1, IPCC Factors: BOF crude steel Produced: 1.46 tCO_2/tCS produced Sinter Production: 0.2 tCO_2/tsinter produced Direct Reduced Iron production: 0.7 tCO_2/tDRI produced	8108091
Total by gas	2016	9461524	6.82	0.66	N/A	N/A	N/A		9461876

1[1] Activities for which GHG data will be required for PPP reporting (activities are presented in the National GHG Reporting Regulations, 2017)

1[2] Provide a baseline of the GHGs emissions for the year preceding the implementation of the Regulations

1[3] As per the National Greenhouse Gas Emission Reporting Regulations, 2017

Note: In 2016 production levels were at 73% of installed capacity.

Table 2: Template for providing details of planned mitigation measures

Mitigation measure	Description of mitigation measure	Anticipated implementation date	Assumptions used to estimate anticipated GHG emission reduction	Affected GHG	Anticipated emission reduction (tonnes CO_2e)					
					Y1 : 2017	Y2 : 2018	Y3 : 2019	Y4 : 2020	Y5 : 2021	Total over 5 years
MITIGATION MEASURES REDUCING SCOPE 1 EMISSIONS (DIRECT EMISSIONS)										
Natural Gas Consumption Reduction	Efficient utilization of internally produced process gases.	July 2017	Coke Battery 2 was rebuilt in Newcastle to produce more coke and gas for the production processes. A saving of 76 000 GJ/month of Sasol Gas savings will be achieved. (5 months x 76 000 GJ/m for 2017 and using a Sasol Gas factor of 0.058 tCO_2/GJ Sasol gas.	CO_2	[redacted]					
CO_2 recovery from waste gas streams	Capturing of CO_2 from gases and reuse at other industries i.e.: ice blasting, cooling, etc.	July 2019	Recovery of 50 tCO_2/day at 320 days a year. Approximately: 15 000 tCO_2/annum.	CO_2	[redacted]					
				CH_4	[redacted]					
TOTAL EMISSIONS REDUCTION IN SCOPE 1 (DIRECT EMISSIONS)					[redacted]					
MITIGATION MEASURES REDUCING SCOPE 2 EMISSIONS (INDIRECT EMISSIONS)										
VSD to reduce electricity consumption	Install variable speed drives to reduce electricity consumption on equipment that is not 100% utilized.	January 2017 to December 2017	Eskom published emission factor: 1.01 tCO_2/MWh Saving of average 6 MW in 2017 and 4 MW more as from in 2018. (6 x 24 x 365 x 1.01) (2017) (10 x 24 x 365 x 1.01) (2018 onwards)	CO_2	[redacted]					
Utilizing Process gases for power generation	Install boilers to produce steam to be utilized on the exisitng waste heat recovery power station.	January 2018	12 MW power generation for 70% utilisation per year using the Eskom published emission factor: 1.01 tCO_2/MWh.	CO_2	[redacted]					
TOTAL EMISSIONS REDUCTION IN SCOPE 2 (INDIRECT EMISSIONS)					[redacted]					
GRAND TOTAL EMISSIONS REDUCTION IN SCOPE 1 + 2 (DIRECT + INDIRECT EMISSIONS)					[redacted]					351619

Note: although the above table reflects emissions savings till 2021, the actual Pollution Prevention Plan covers the period up to December 2020.

Table 3: Template for annual reporting on mitigation interventions for years 1 to 5 (showing examples of mitigation interventions and emission reduction achievements)

Mitigation measures	Affected GHG	Anticipated emission reduction (tonnes CO_2e)					Actual emission reduction achieved (tonnes CO_2e)						Description of deviations from the approved pollution prevention plan and remedial actions put into place.
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5	Total actual reductions (Y1-Y5)	
N_2O abatement	N_2O												
Refurbishment and upgrade of 2 coal boilers	CO_2												
	CH_4												
	N2O												
Total													

Note: only relevant for audit purposes.