



SASOL

PORTFOLIO COMMITTEE ON ENVIRONMENTAL AFFAIRS

6 February 2018

Presented by Ms Wehelle Stanner



What you will hear today



- Our plants are unique and complex with a highly integrated value chain
- Recognise the importance of the environment and continue to understand and mitigate any impact through environmental programme
- We already meet most of the Minimum Emissions Standards for existing plants, and we are on track to meet most of the new plant standards by 2025 except for SO₂
- We operate in compliance with our current licence conditions
- Air quality roadmaps aim to enable compliance by 2025, except for SO₂
- While close to meeting new plant standards for SO₂ we are not able to meet it
- All commercially available technologies for the abatement of SO₂ to meet new plant standards have been evaluated, will continue to scan for new technologies
- While flue gas desulphurisation technology is proven, it would be significantly challenging to retrofit on our process on our brownfield site
- Multi year offset programme addresses sources of non industrial pollution in conjunction with our roadmaps

Sasol is a chemicals and energy company committed to South Africa



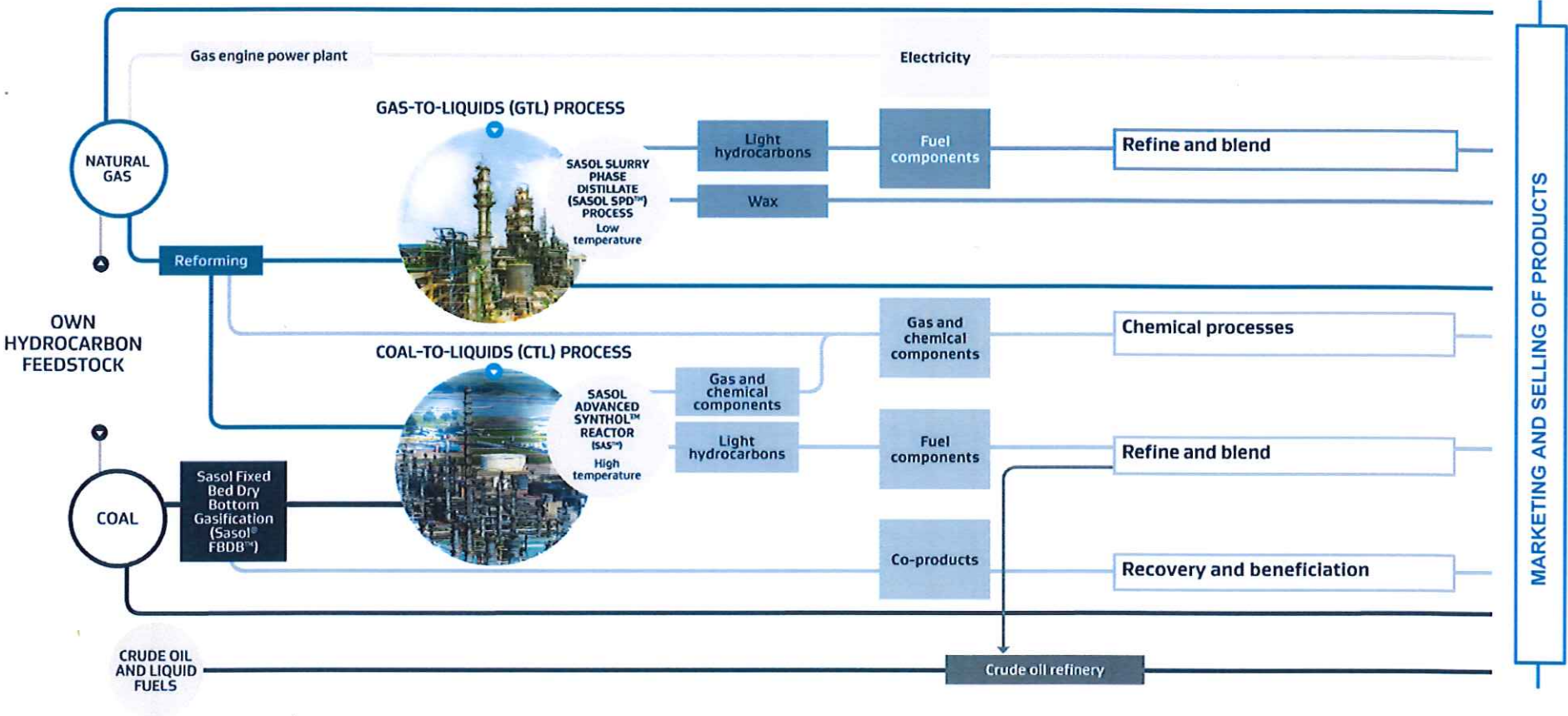
In South Africa, we contribute between 4-5% to GDP

- Employ over 26 000 people in South Africa
- One of the world's largest producers of synthetic fuels
- Secunda
 - a major petrochemical plant producing petrol and diesel, a number of chemical products and a power generation facility
 - mining operations
- Sasolburg
 - multiple chemical facilities,
 - three power generation facilities
 - a research and technology innovation and management division
 - Natref refinery, Sasol's joint venture with Total SA, the only inland crude oil refinery in South Africa
- Supply more than 25% of the country's liquid fuels, generating savings in foreign exchange from import replacement (petrol and diesel)

During the last financial year, R115 billion on capital and operational spend in our South African operations

R1,6 billion invested in skills and socio-economic development programmes globally

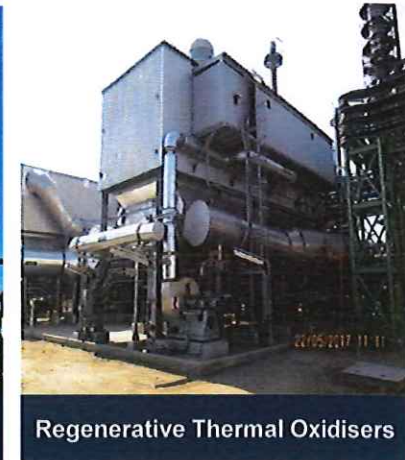
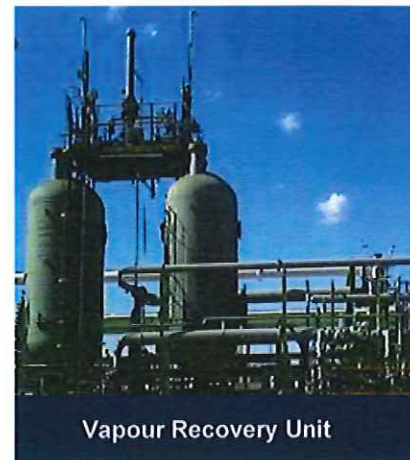
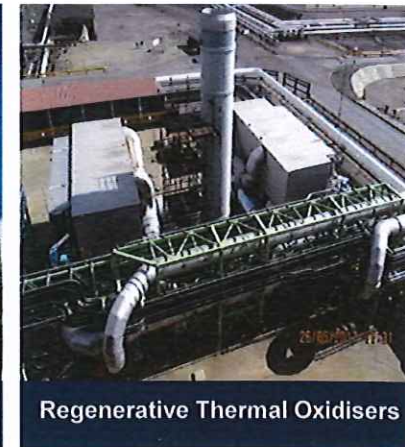
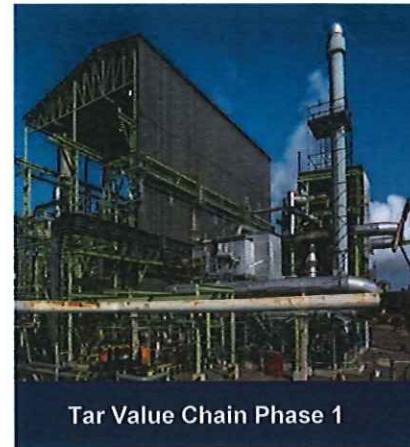
Our plants are unique and complex with a highly integrated value chain



Air quality roadmaps aim to enable compliance by 2025, except for SO₂



Projects completed to date align with our environmental roadmap commitments



Air quality roadmaps for Secunda Synfuels Operations

Compliant

Project	Status	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Vapour recovery unit [VOC]	Compliant in April 2016 ✓										
Tar value chain phase 1 [VOC]	Compliant in September 2017 ✓										
Sewage solids incinerator	Compliant before April 2017 ✓										
Pitch tanks [VOC]	Comply by April 2020										
Phenosolvan [VOC]	Comply by April 2023										
Catalytic cracker [PM]	Comply between April 2020-2025										
Storage tanks containing liquid products [VOC]	Install abatement per tank over period of 15 years										
High organic waste & bio sludge incinerators	Investigations to minimise incineration and consider more environmentally sustainable options										
H ₂ S reduction at Synfuels	Multi-pronged approach for progressive and sustainable improvements implemented										
Steam plant - PM emissions	Comply between April 2020-2025										
Steam plant – NO _x emissions	Current view is that compliance can sustainably be achieved										
Steam plant - SO _x emissions	Based on commercially available technologies for abatement of SO ₂ we will not be able to meet new plant standards.										

Further postponements required to enable execution of roadmaps (2020 – 2025)

Air quality roadmaps for Sasolburg Operations



Compliant

Project	Status	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Steam station 1: nitrogen oxide emissions & particulate matter	Current information is that that compliance may sustainably be achieved										
Steam station 2: particulate matter	Current information is that that compliance may be sustainably be achieved (potentially by April 2020)										
Steam station 2: nitrogen oxide emissions	Current information is that that compliance may be sustainably be achieved										
Thermal Oxidation plant incinerators											
Steam station 1 & Steam Station 2 SOx compliance	Based on commercially available technologies for abatement of SO ₂ we will not be able to meet new plant standards.										

Further postponements required to enable execution of roadmaps (2020 – 2025)

Air quality roadmaps for Natref



Proudly Natref

Compliant

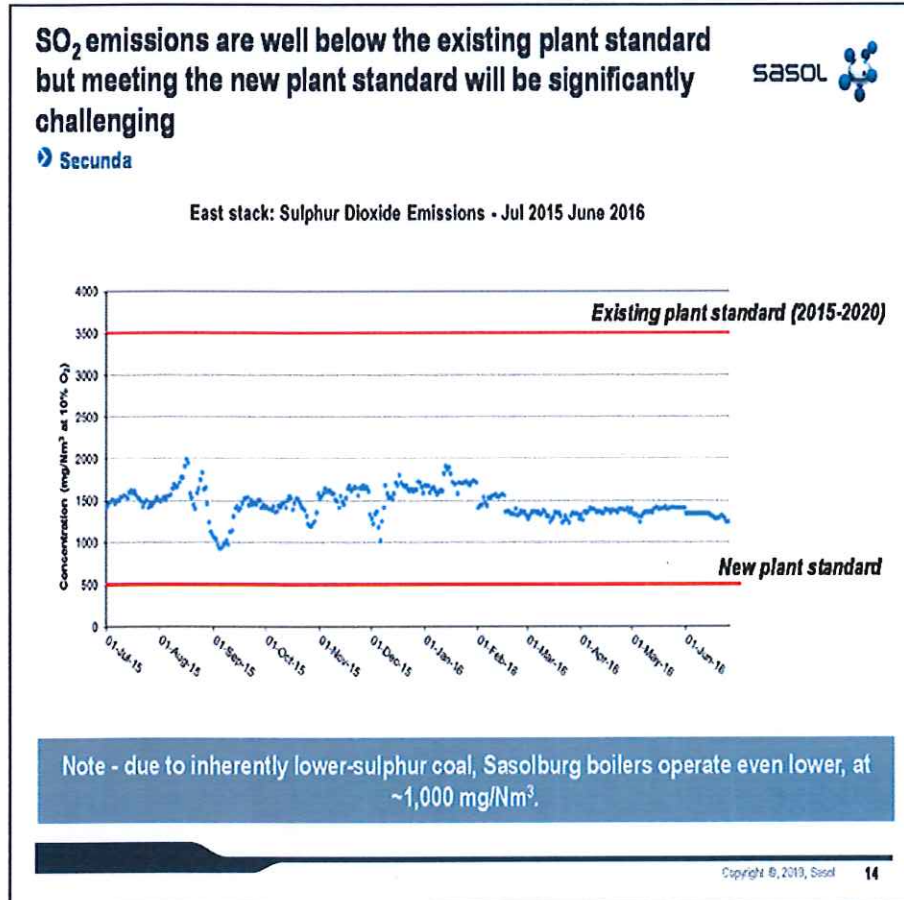
Project	Status	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Light Straight Run tanks	Applied for 1 year extension of initial compliance date to 2019 due to change in technology selection				↓					↓	
Catalytic Cracker	Postponement confirmed earlier compliance by 2022				↓					↓	
Sulphur recovery unit & sour gas recovery	Compliance will be achieved between April 2020 - 2025				↓					↓	
Various furnaces & hot oil heater	Compliance will be achieved by April 2021									↓	
Crude & Vacuum Distillation Unit furnaces	Compliance will be achieved by April 2021				↓					↓	

Further postponements required to enable execution of roadmaps (2020 – 2025)

While close to meeting new plant standards for SO₂ we are not able to meet it

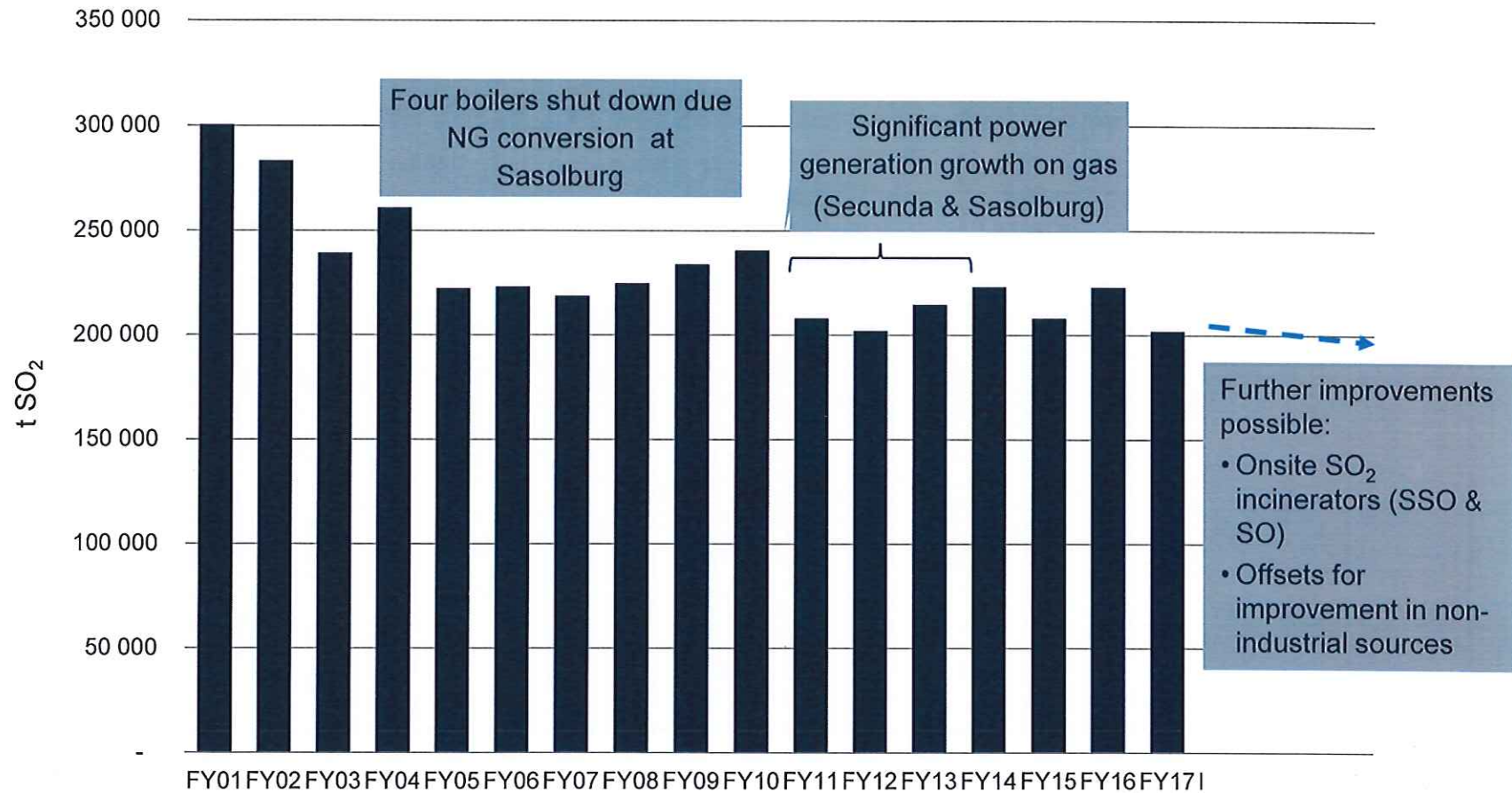


We already meet existing plant standards (2015)



- Multiple boiler configurations in Secunda and Sasolburg, located in compact space footprints, designed to provide a stable supply of process steam while also generating electricity
- In Secunda, an added complexity is that the boiler offgas is deliberately kept hot to make the much cooler Rectisol offgas more buoyant, to improve dispersion of these combined offgas streams through the main stacks
- These factors together make desulphurisation particularly challenging for us
- Normal desulphurisation plants are about as big in space footprint as the boilers themselves
- Other desulphurisation technology has a smaller space footprint, but requires cooler boiler offgases, thereby reducing buoyancy and dispersion of Rectisol offgas

Total SO₂ emissions have reduced by 33%, over last 17 years

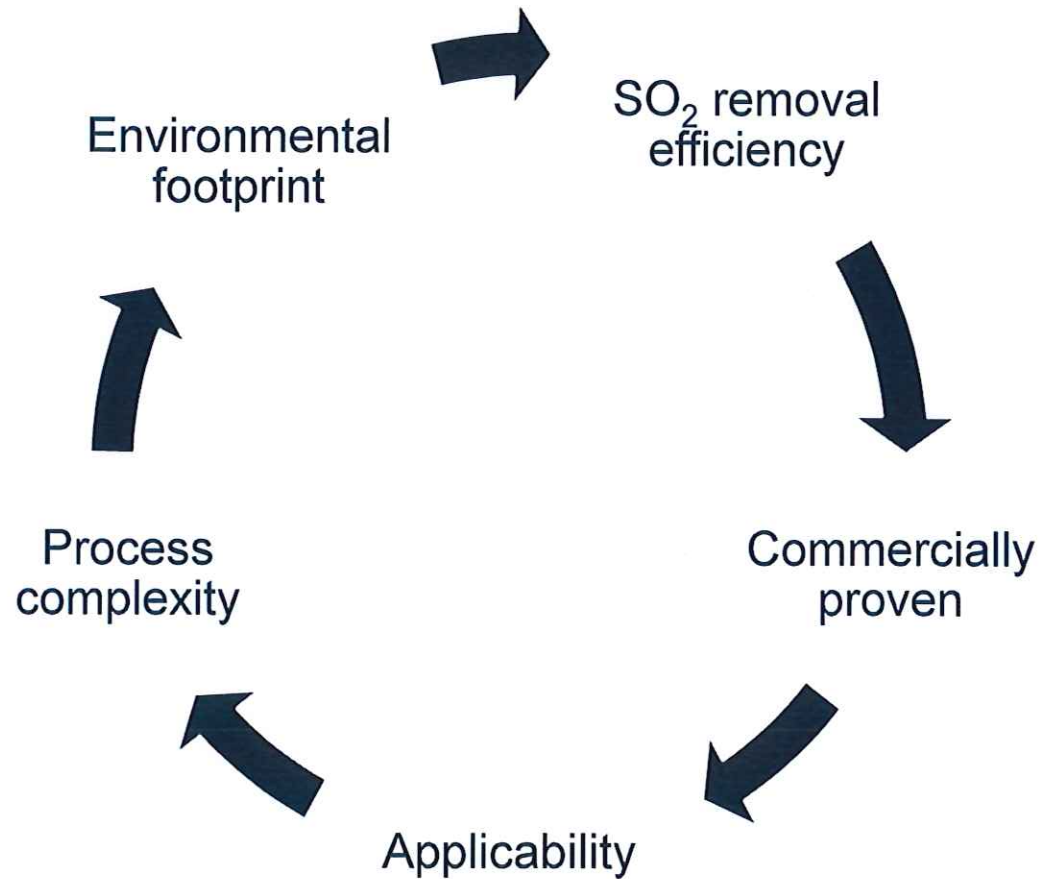


While further marginal improvements on total site SO₂ may be possible, we have not identified any implementable technology to make further dramatic reductions to meet the new plant standards

Sasol follows a rigorous process to evaluate technical solutions



Screening is based on the following criteria

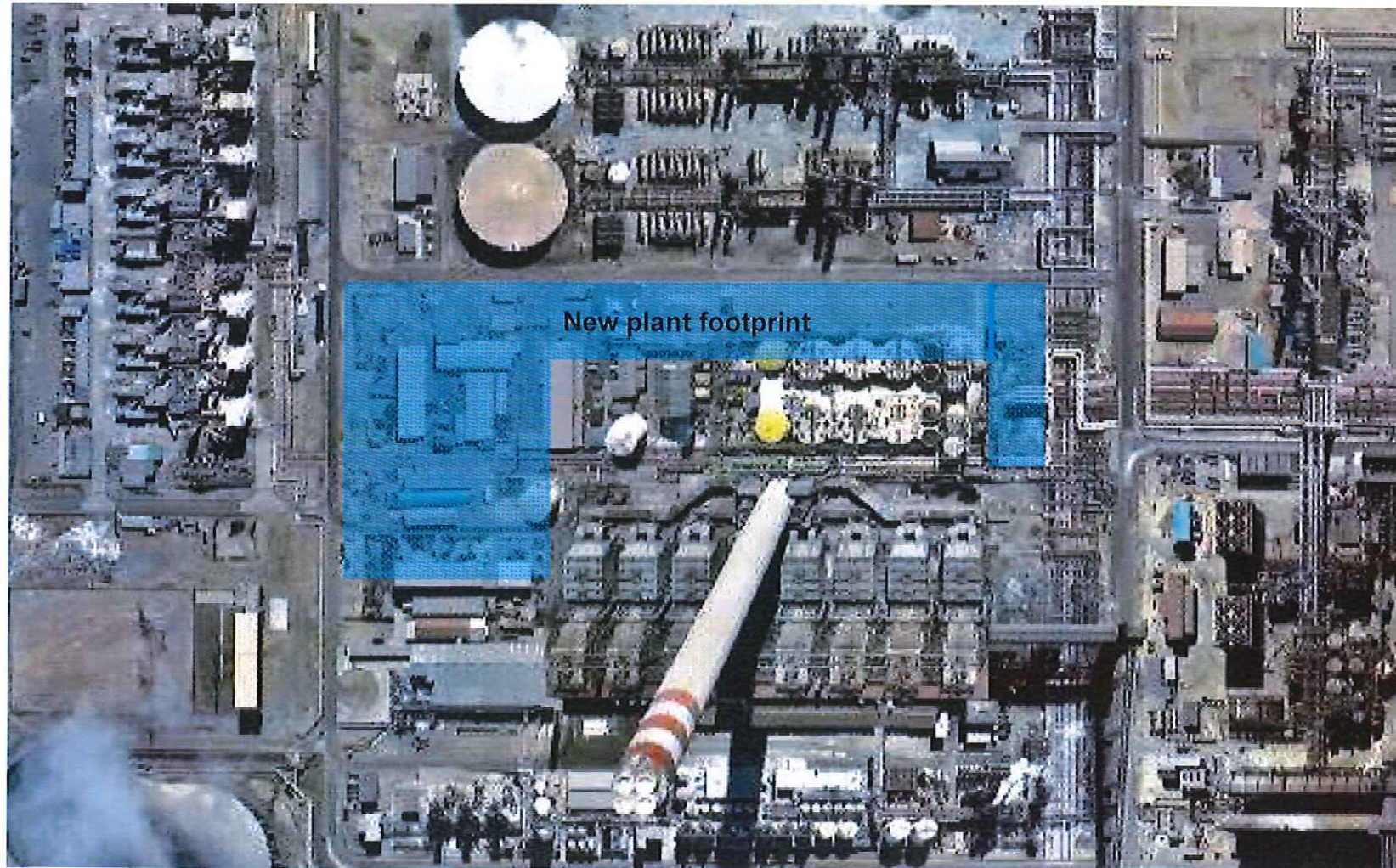


All commercially available technologies for the abatement of SO₂ to meet new plant standards have been evaluated, will continue to scan for new technologies



Abatement technology	Technology description	Challenges
Catalytic processes <ul style="list-style-type: none"> • SNOx process • BioDeSOx • SOx-NOx-ROx-BOx 	Employs a reactor with filter or baghouse with catalyst to recover sulphur in the form of concentrated commercial grade sulphuric acid or elemental sulphur	No commercial applications or not suitable for Sasol's lower sulphur content
Sorbent injection <ul style="list-style-type: none"> • LIMB Technology • Coolside Technology • Duct sorbent injection using Sorbacal high reactivity lime 	Sorbent (e.g high reactivity lime powder) is injected into either the furnace or flue gas duct before the electrostatic precipitator (ESP)	No commercial applications. Low efficiency result in high use of sorbent. Increase in particulate matter emissions due to increased loading on ESP
Flue gas desulphurisation (FGD)		
Wet FGD <ul style="list-style-type: none"> • Limestone forced oxidation • Limestone scrubber • Dual flow contact scrubber • Venturi scrubber 	Flue gas passes first through fly ash removal device, either an ESP or baghouse, and then into the SO ₂ -absorber where the gas comes in contact with a lime-water stream	Requires large amounts of water and large plot space. Negative environmental impact i.e. waste and CO ₂
Semi-dry FGD <ul style="list-style-type: none"> • Novel integrated desulphurisation • Spray dry scrubber 	Flue gas comes in contact with moistened powdered lime in a reactor and then the flue gas passes through a particulate control device	Better than wet FGD, but plot space remains a constraint. Negative environmental impacts i.e waste and CO ₂

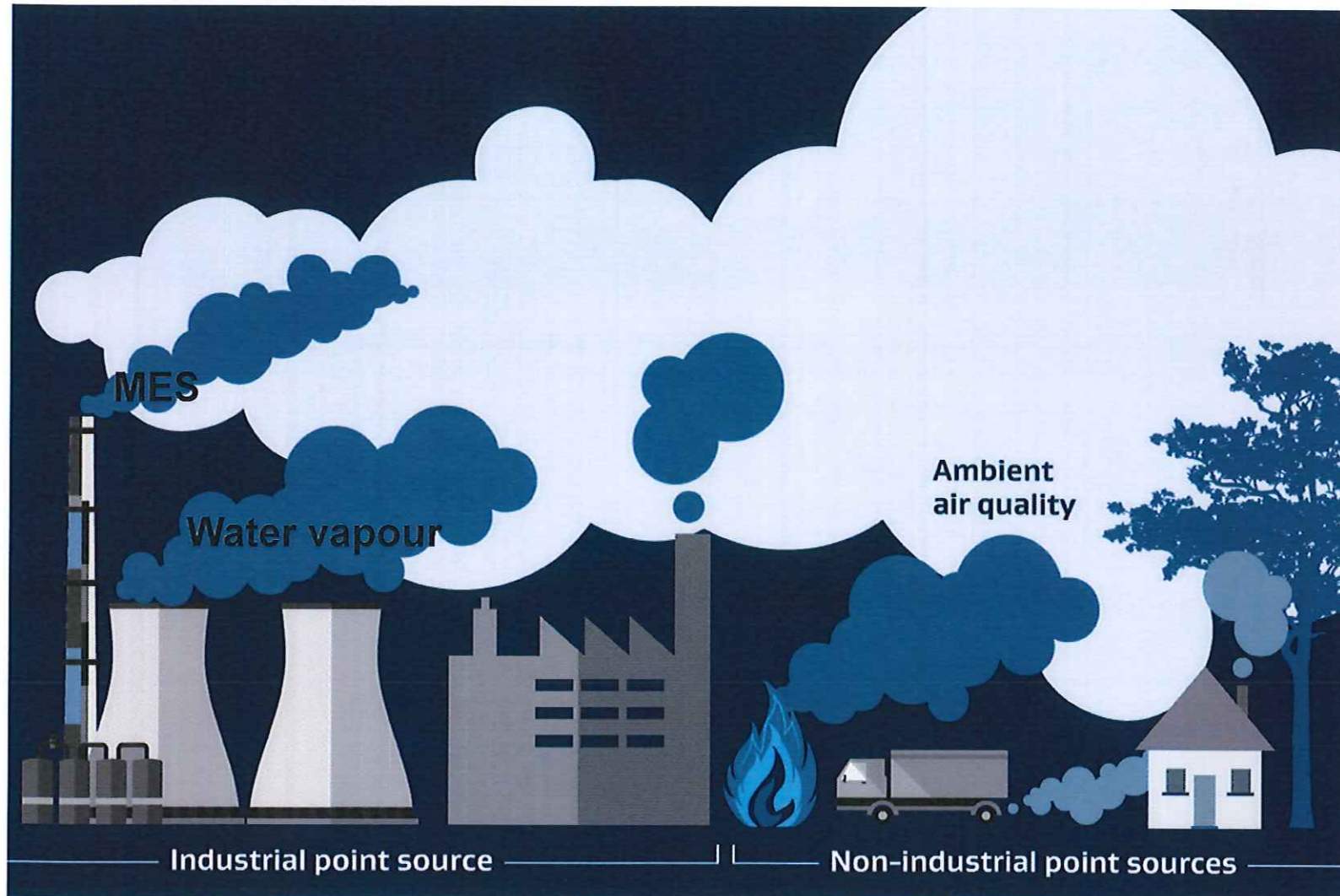
While FGD technology is proven, it would be significantly challenging to retrofit on our process on our brownfield site



Recognition that industry is a contributor



Opportunity for industry to alleviate non industrial sources through offsets



Offset programme addresses sources of non industrial pollution in conjunction with our roadmaps



	1 Pilot study, Kwadela (2013-2015)	2 Baseline campaign (2013-2015)	3 Immediate Interventions (2016-2017)	4 Short to Medium Term interventions (2018-2020)	5 Longer Term commitments (beyond 2020)
Amount invested / budgeted	~ R 1 billion				
Zamdela	n/a	Baseline campaign including social surveys in Zamdela	<ul style="list-style-type: none"> Veld fire management Waste recycling programme Non recyclable waste management Vehicle emissions testing Education campaign 	<ul style="list-style-type: none"> Creation of firefighting capacity as well as the pro-active removal of bio-mass. Ramp up of domestic waste removal sites from 60 to 100 by December 2017; Recyclable waste management programme with 4 satellite locations for collection and a central hub; Grass cutting and veld fire management; Education and awareness campaigns; Continuous monitoring 	<p>Dependent on:</p> <ul style="list-style-type: none"> Impacts of 2015-2020 programme, The results of the baseline campaign Community feedback Postponement conditions
eMbalenhle & Lebohang	In 2013 505 RDP homes insulated with ceilings or a full insulation retrofit..	<ul style="list-style-type: none"> Baseline campaign including social surveys in eMbalenhle, and components in Lebohang 	<ul style="list-style-type: none"> Veld fire management Insulation of RDP homes Piloting insulation of informal homes (shacks) Education campaign 	<ul style="list-style-type: none"> 5,500 – 6,300 RDP homes insulated in eMbalenhle and Lebohang; If insulation of informal homes (shacks) pilot proves successful, 700 shacks will be insulated during this period, otherwise an additional 400 RDP homes will be insulated Continued grass cutting and veld fire management; Education and awareness campaigns; Continuous monitoring 	<p>Dependent on:</p> <ul style="list-style-type: none"> Outcomes of 2015-2020 programme, The results of the baseline campaign Community feedback Postponement conditions

Secunda delivering on our approved offset plans



Baseline (eMbalenhle / Zamdela)	First source apportionment measurements and quality of life assessment has been completed
Lebohang, eMbalenhle (Feasibility for Roads)	Source apportionment results confirmed that the impact of dust from unsurfaced roads is minimal, therefore this option will not be considered further
Lebohang, eMbalenhle (Informal housing insulation)	Insulation of 24 serviced informal houses with polyurethane foam together with a stove swop in Lebohang has been completed. Further measurements such as the summer temperature impact measurements and indoor air quality is being conducted
eMbalenhle (Veld fire management)	Grass cutting and veld fire management activities are ongoing by the Secunda Synfuels Operations emergency management team, with their scope of activities enhanced to support greater mitigation of veld fires as part of the offset plan
Lebohang, eMbalenhle (Insulation of RDP)	The census to identify the eligible households is in progress and contracting with the households will commence in January 2018. Business activities are progressing to gear up for implementation, starting with approximately 500 to 700 houses between July 2017 and June 2018
Lebohang, eMbalenhle (Education and Awareness)	The target audience are communities of eMbalenhle and Lebohang where offsets are implemented and twenty seven (27) primary schools in Govan Mbeki Municipality. A questionnaire was compiled and will be used in the pre-assessment phase of the campaign

Sasolburg and Natref delivering on our approved offset plans



Baseline (eMbalenhle / Zamdela)	First source apportionment measurements and quality of life assessment has been completed
Zamdela I (Vehicle emissions)	20 staff members from the Fire and Traffic Departments trained. 20 vehicles were tested during a practical session and 8 failed the recommended emission levels test for the specific vehicle
Zamdela II (Veld fire management)	Rapid response vehicle handed over to the Municipality in November 2017. Vehicle being employed to actively fight fires
Zamdela III (Removal of recyclable waste)	Right of use agreements for the identified properties received. Evaluating the Norms and Standards for waste facilities that sort, shred, grind, crush, screen, chip or bale general waste. Infrastructure construction to commence within the first quarter of 2018
Zamdela IV (Domestic Waste Management)	Waste removal piloting activities within Zamdela were successful and the number of sites will be expanded to 100. 75 skips have been placed and an additional 25 skips will be placed early in 2018. Approximately 10000 tons of waste has been removed from the community
Zamdela (Education and Awareness)	An order is being placed for content development and the implementation of the education plan in schools and the broader community

Secunda

Distribution of stoves and gas heaters

Twenty-four households exchanged their coal stove with either a Kitchen King stove or an LPG stove and a gas heater.





Grass cutting and veld fire management activities | Fire breaks were prepared at Sasol conveyor belts and grass cutting was noted in Secunda town in Zone 3 and 5.



Education and awareness campaign

Training of field officers for pre-assessment door to door campaign in eMbalenhle

Ambient air quality monitoring stations at eMbalenhle and Lebohang



eMbalenhle North: Buyani primary school



Lebohang: Chief Ampie Mayisa high school



Analysers in the monitoring stations

Sasolburg and Natref



Veld fire management project



Delivery of the rapid intervention vehicle

Sasolburg and Natref



Non-recyclable waste project | Removal of illegal dumps and replacement with a skip bin (between November 2016 and November 2017 in excess of 10 500t of waste removed via skips)



Sasolburg and Natref



Vehicle emission testing project



Conclusion



- Air quality roadmaps aim to enable compliance by 2025, except for SO₂
 - Projects completed to date align with our air quality roadmap commitments
 - Postponement plans in place to enable achievement of our compliance roadmap by 2025
- While close to meeting new plant standards for SO₂ we are not able to meet it
 - Our total SO₂ emissions have reduced by 33% over a 17 year period
 - All commercially available technologies for the abatement of SO₂ to meet new plant standards have been evaluated
 - While flue gas desulphurisation technologies are proven, it would be significantly challenging to retrofit on our brownfield site
- Multi year offset programme addresses sources of non industrial pollution in conjunction with our roadmaps