

TOPSOE WSA TECHNOLOGY

INNOVATIVE SOLUTIONS FOR SO₂
ABATEMENT – THE ROLE OF THE WSA
PROCESS IN THE PGM INDUSTRY.

TOPSOE

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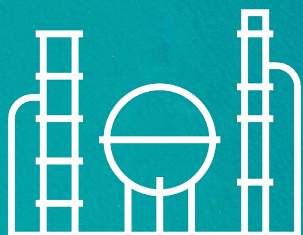


TOPSOE WSA™ – THE ROLE OF WSA PROCESS IN THE PGM INDUSTRY

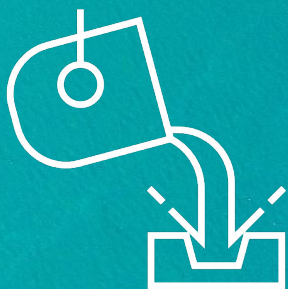
TODAY'S AGENDA



SO₂ Abatement technologies & considerations to meet emissions standards

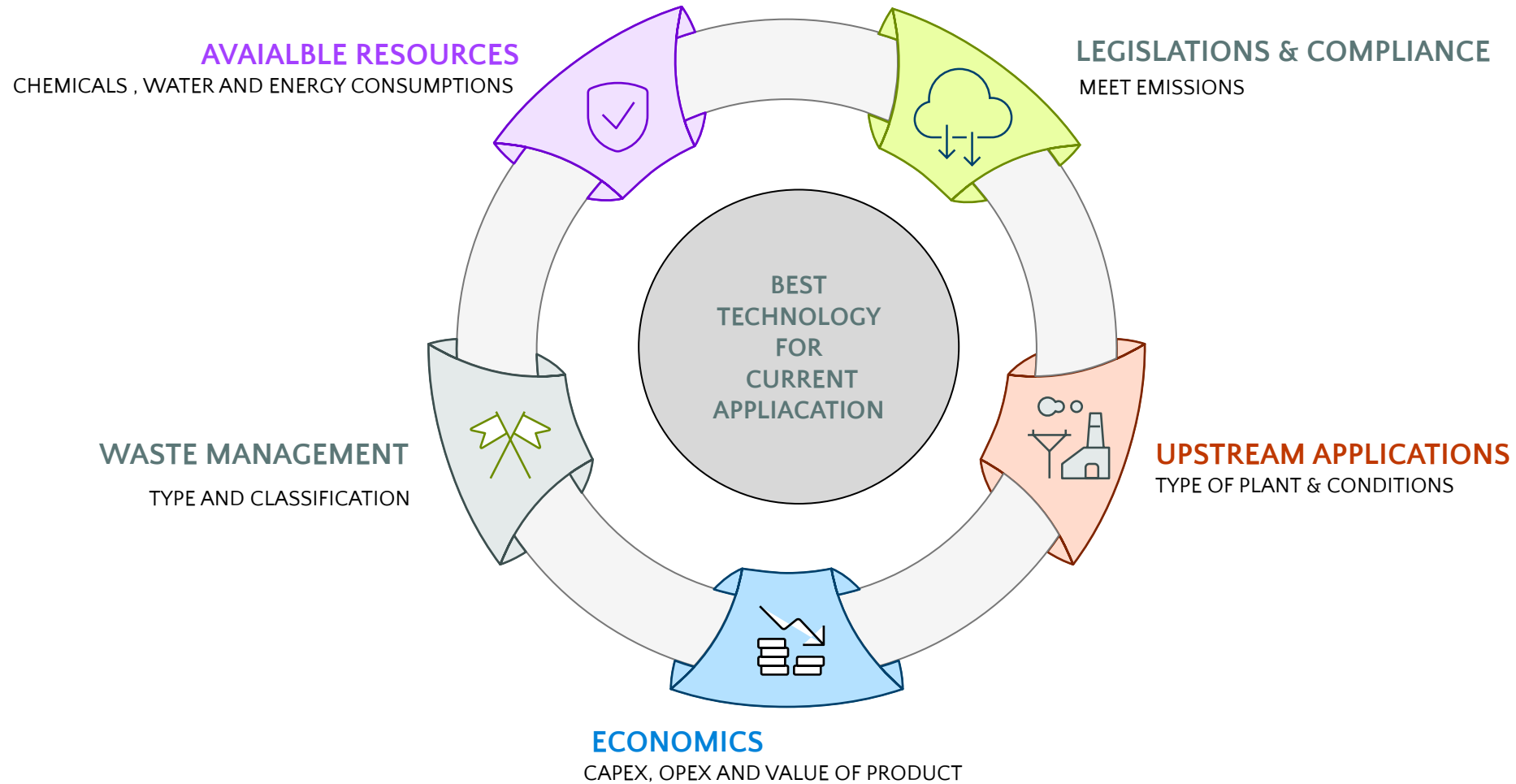


Layout of TOPSOE Wet Sulphuric Acid technology WSA for the metallurgically industry



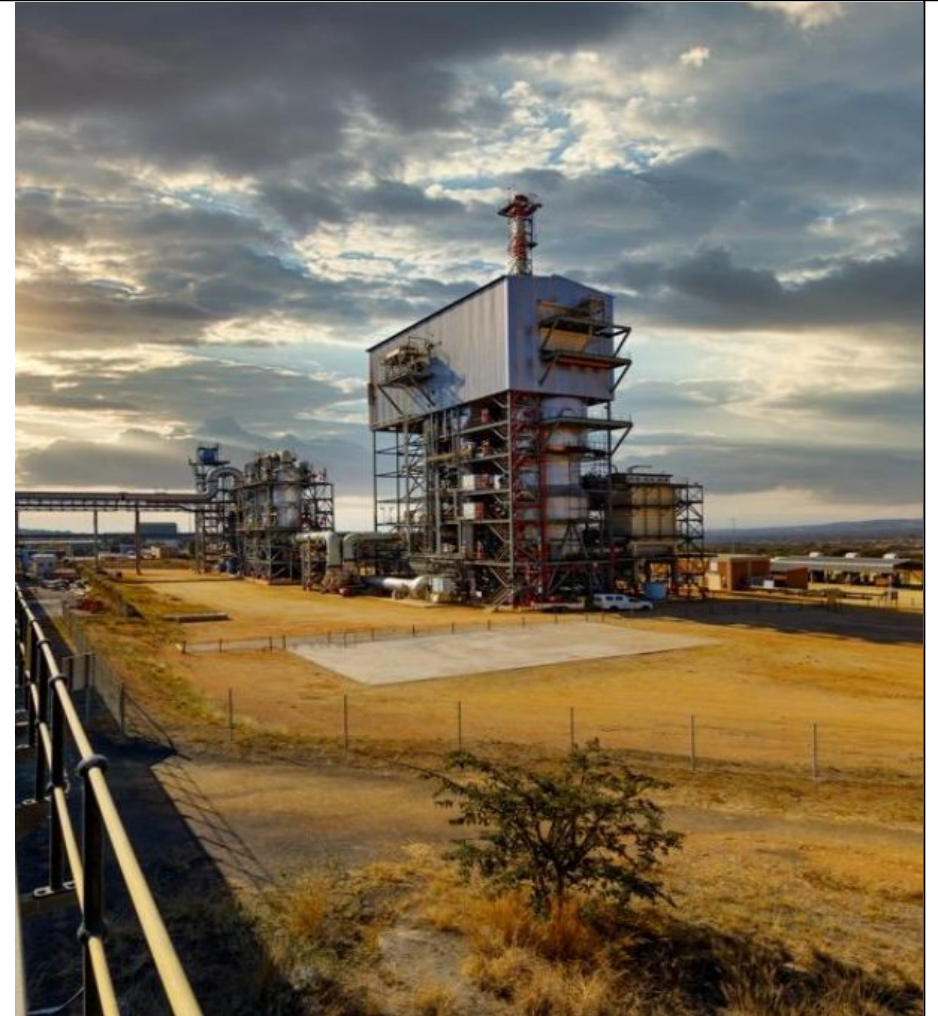
WSA Case story from PGM smelter in South Africa

CONSIDERATIONS FOR SELECTION OF THE RIGHT TECHNOLOGY FOR SO₂ ABATEMENT



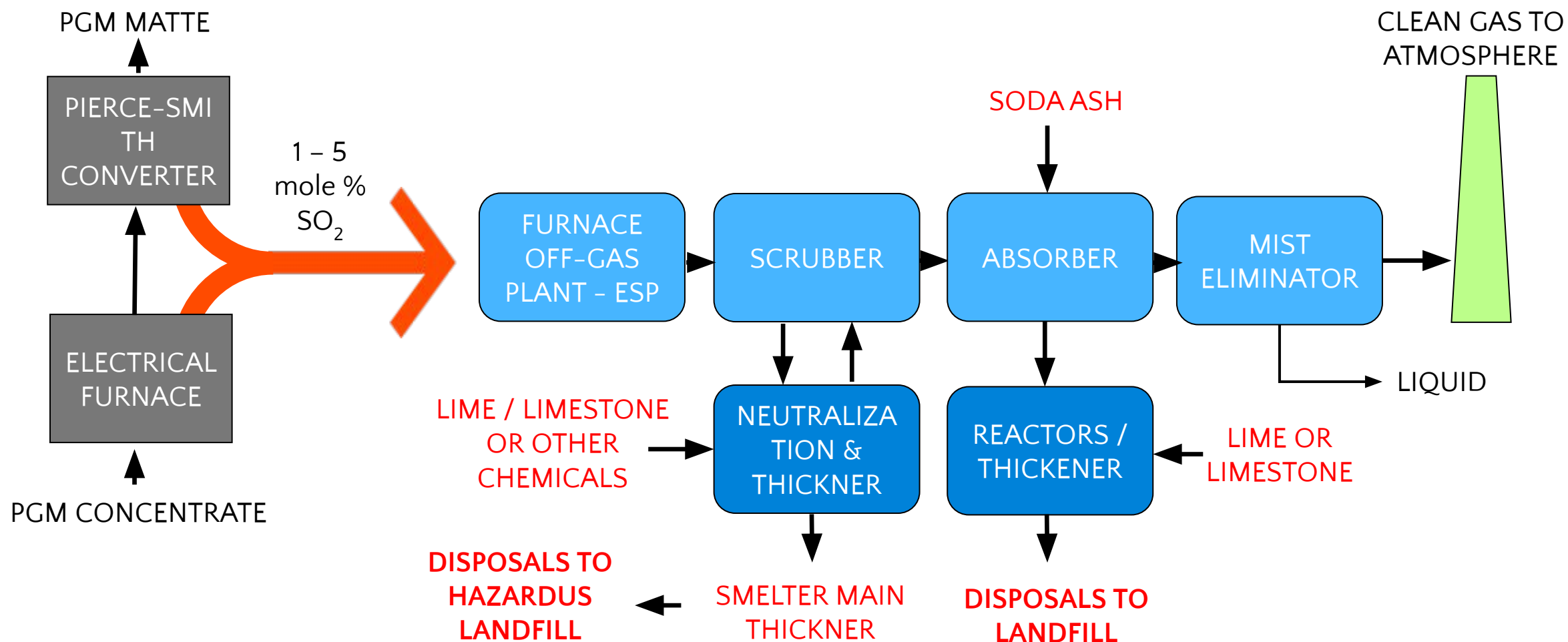
SO₂ ABATEMENT TECHNOLOGIES

- **WET SCRUBBING:**
Liquid slurries lime, limestone, or seawater to absorb SO₂
- **DRY INJECTION:**
Injecting dry sorbents into the gas stream to capture SO₂
- **SO₂ RECOVERY:**
Recovering SO₂ for reuse or further processing
- **CHEMICAL ABSORPTIONS:**
Uses various chemicals to absorb SO₂ from gas streams
- **ALKALI PROCESS:**
Utilizes alkali solutions to neutralize SO₂
- **DRY-GAS SULPHURIC ACID PROCESS**
Converts SO₂ into sulfuric acid
- **WET SULPHURIC ACID PROCESS (WSA):**
Converts SO₂ directly to sulfuric acid using a wet process

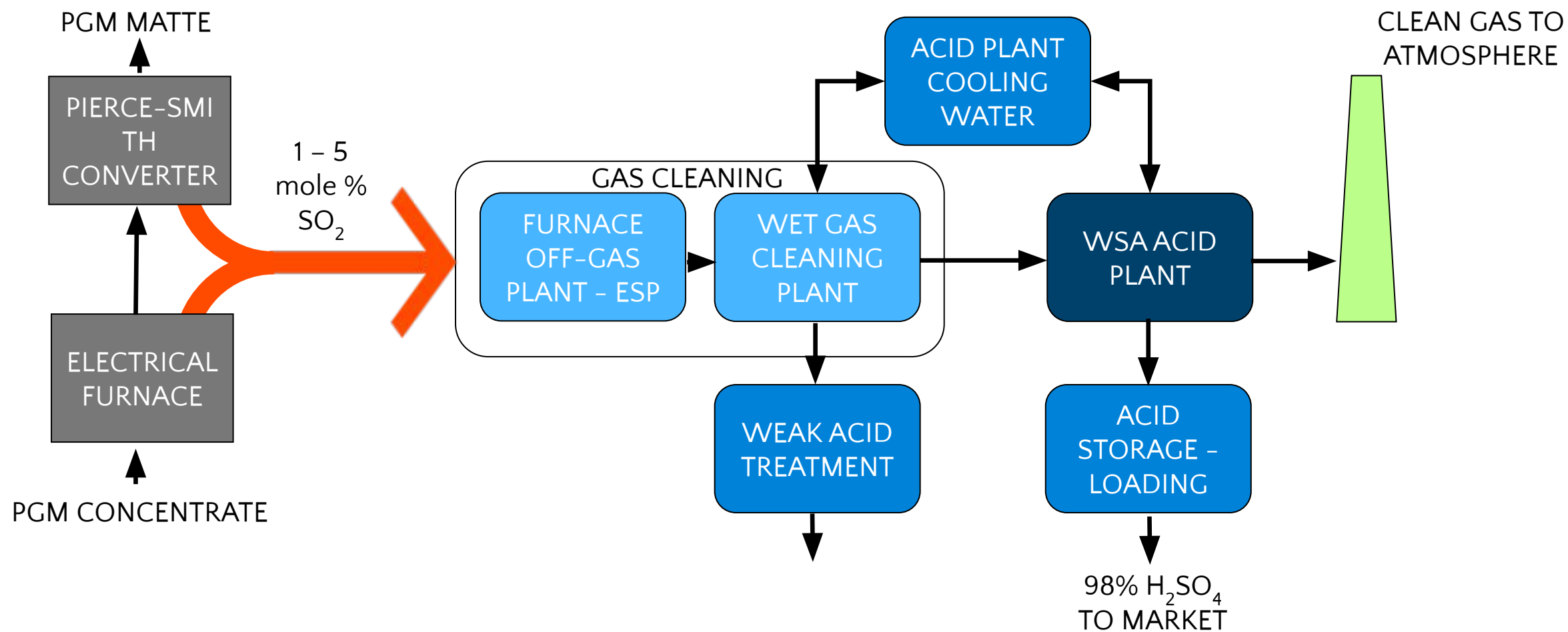


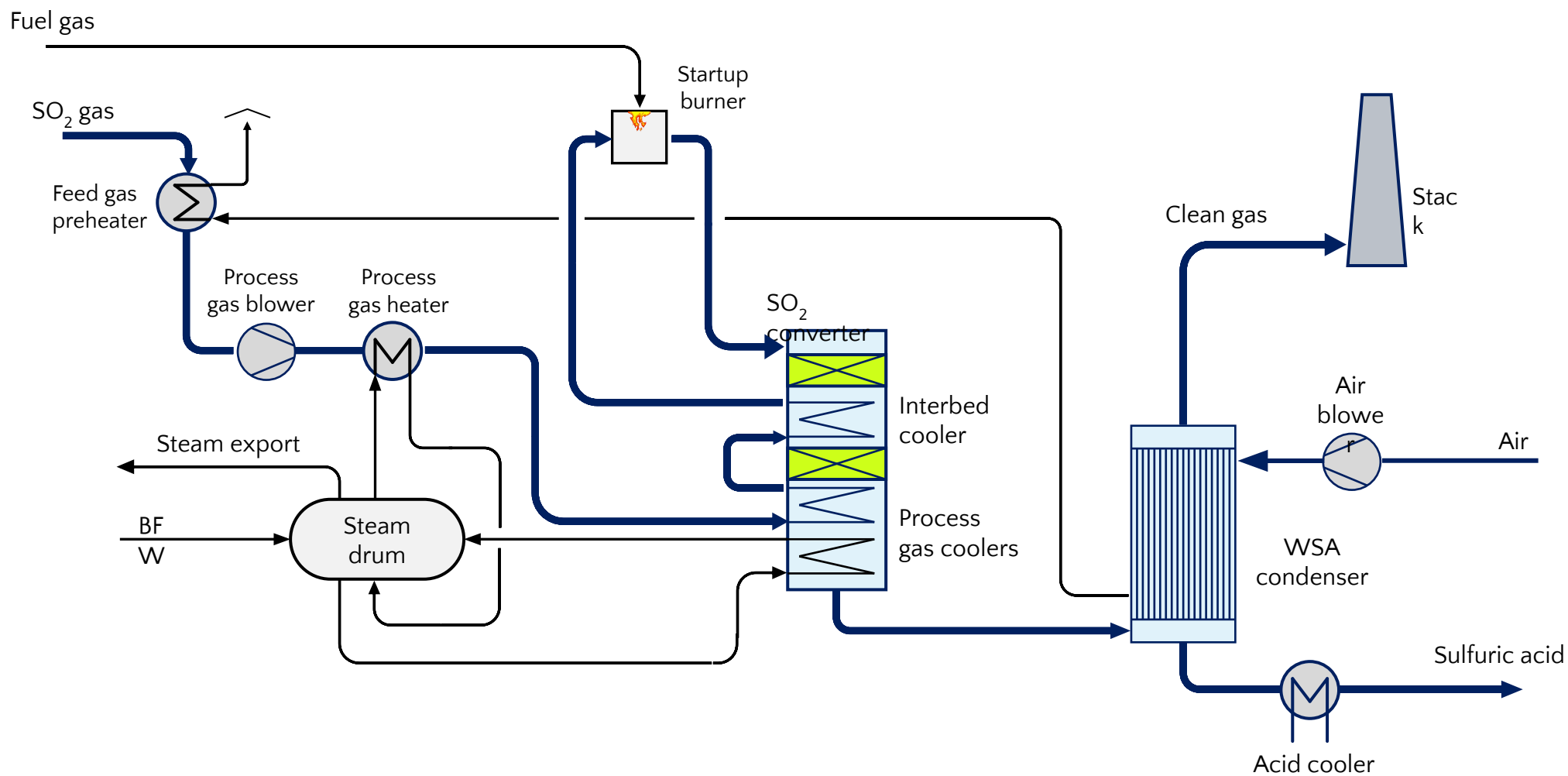
PGM SO₂ ABATEMENT PROJECT

PROCESS OVERVIEW WITH DUAL-ALKALI SCRUBBER

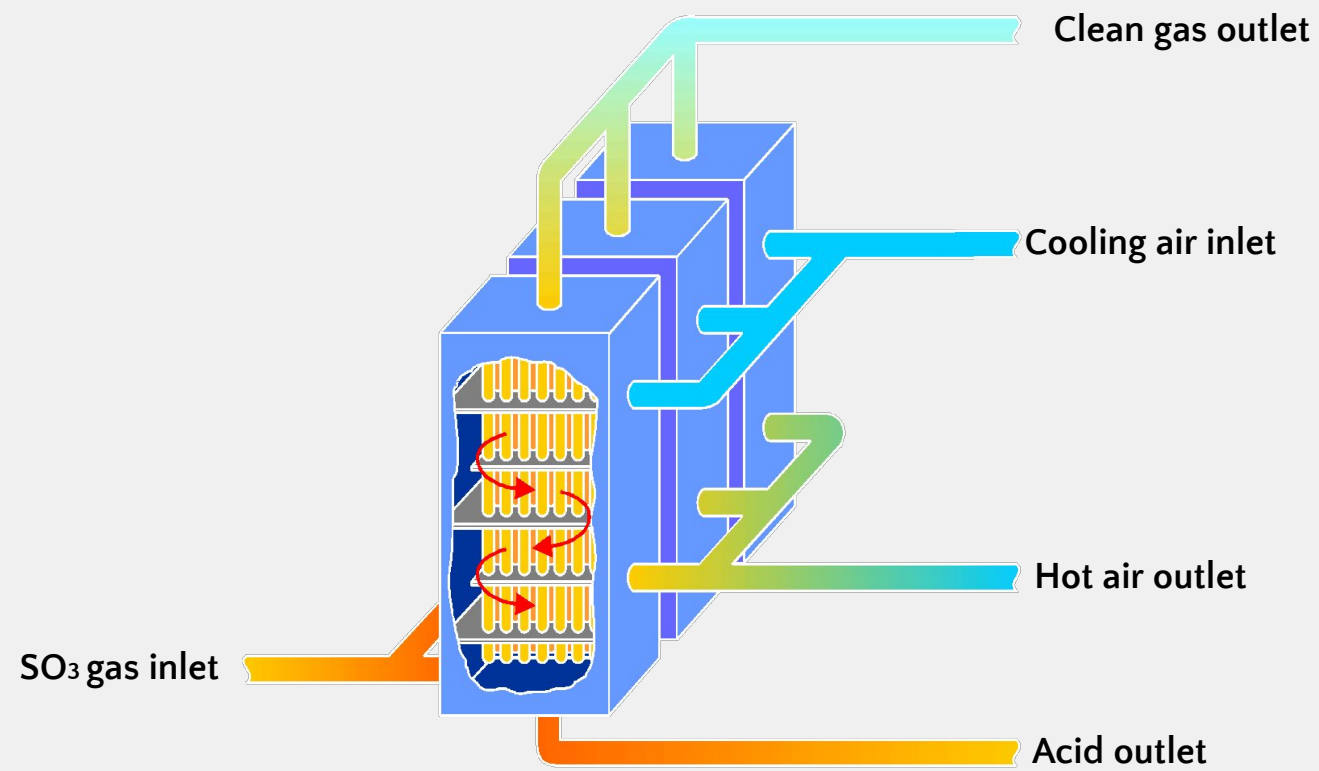
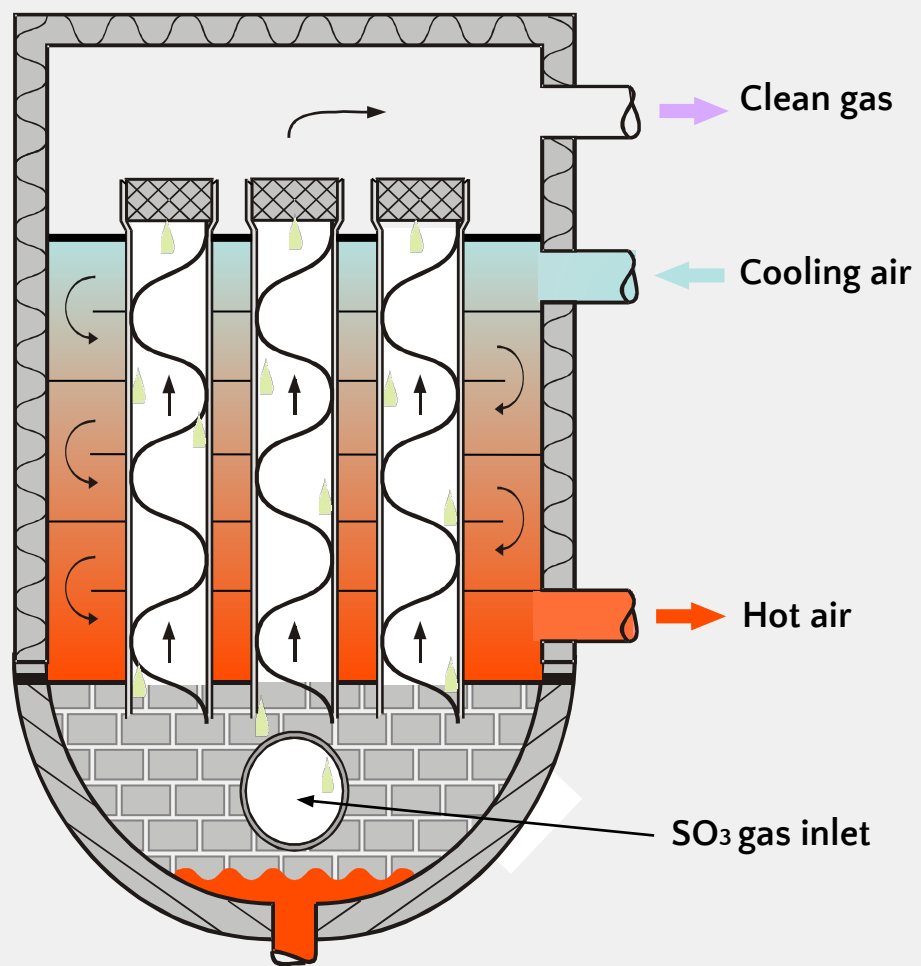


PGM SO₂ ABATEMENT PROJECT PROCESS OVERVIEW WITH WSA

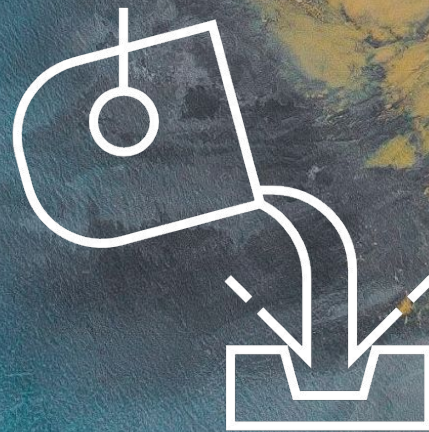


METALLURGICAL UNITWSA plant layout for SO₂ gas, hybrid gas/steam

WSA GLASS TUBE CONDENSER

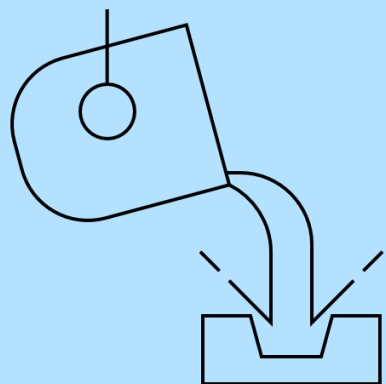


TOPSOE WSA™ – FROM PROFIT TO PROFIT CASE STORY

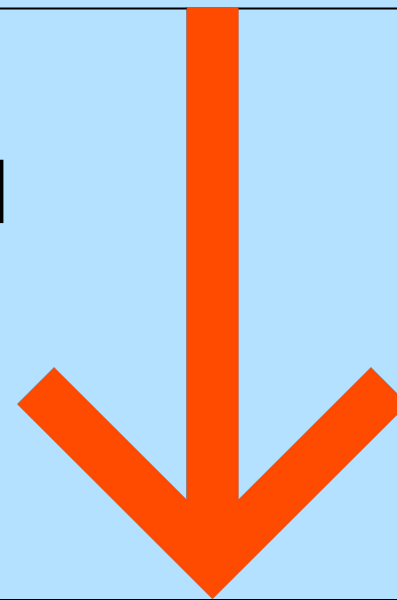


PGM SMELTER IN
SOUTH AFRICA

METALLURGICAL INDUSTRY



NO WASTE GENERATION



CUSTOMER

Location: Polokwane

Source: PGM Smelter

Feed: 1-5% SO₂ gas , AVG. 3.2%

Capacity: 44,000 Nm³/h

GOALS

- Meet emission standards in South Africa
- Salable product and minimize waste generations

TECHNOLOGIES

- 40 technologies considered - Dual Alkali scrubber
- Topsoe WSA™ Technology

COMPARING SO₂ ABATEMENT TECHNOLOGIES CAPEX & OPEX PGM SMELTER IN SOUTH AFRICA CHOOSES WSA™ TECHNOLOGY

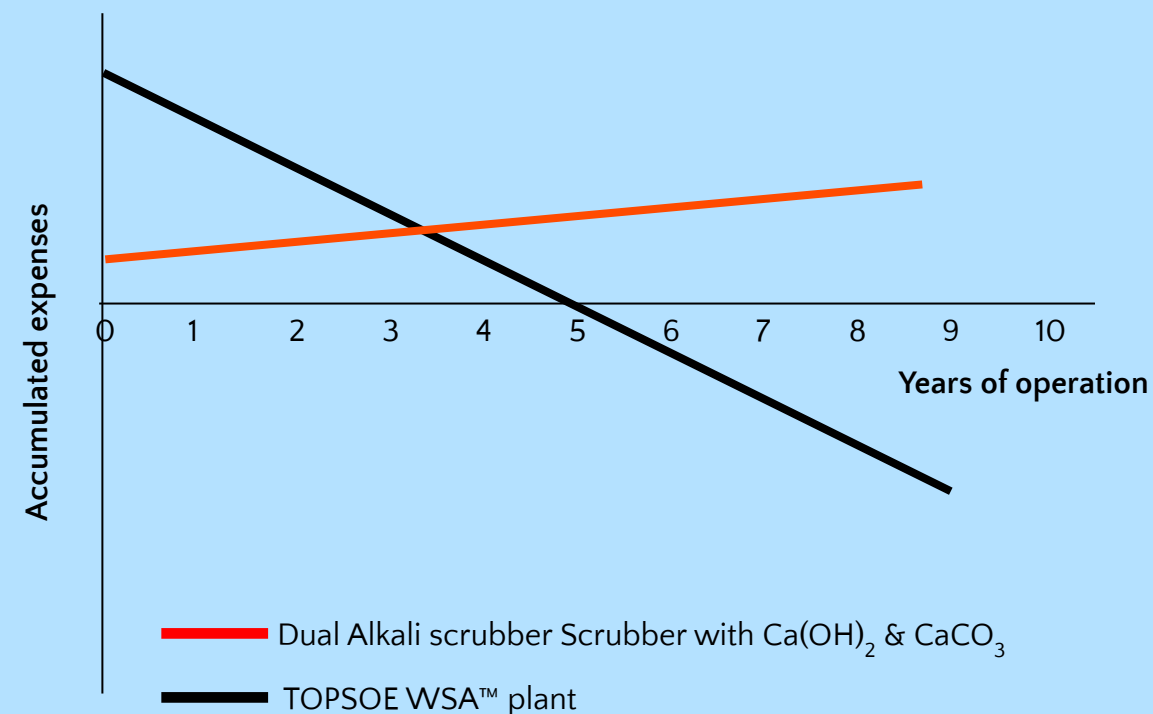
DUAL-ALKALI SCRUBBER

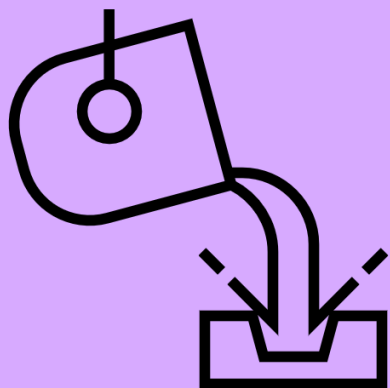
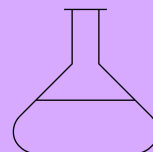
- Maintenance and operation cost
- Chemicals consumption (Lime & Soda ash)
- Disposals land fill, CaSO₃
3,000 ZAR/tons (Hazardous waste)

WSA - WET SULPHURIC ACID PLANT

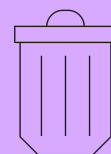
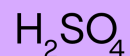
- Maintenance and operation cost
- Sales of Sulphuric acid, Sub-Sahara
- Excluding HP steam production

GAS CLEANING EXPENSES



METALLURGICAL
INDUSTRYFROM PROBLEM TO
PROFITNO CHEMICAL
CONSUMPTION

NO WASTE MANAGEMENT

INCOME FROM
SULFURIC ACID

ENVIRONMENTAL PERSPECTIVE

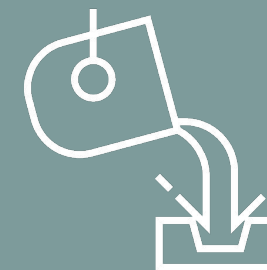
Reducing waste

Using resources more efficiently

Save on operating costs while improving
reputation and imageHelps businesses to align with the United Nations'
Sustainable Development Goals

TOPSOE WSA FACT & FIGURES

REPRESENTATION OF WAS REFERENCES

**170+**Total WSA
references**20+**Metallurgical
units**0.5 %**Lowest SO₂ inlet
conc.**10–100%**Plant
turn-down
ration**1.7 %**SO₂, autothermal
point

THANK YOU

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