



# Overview of South Africa's Energy Sector Inventory

*Peer-to-Peer Exchange*

*As part of implementing the CBIT project of South Africa*

Pretoria

11 March 2024

*Presented by:*

*Rumbidzai Damita Mhunduru*



forestry, fisheries  
& the environment

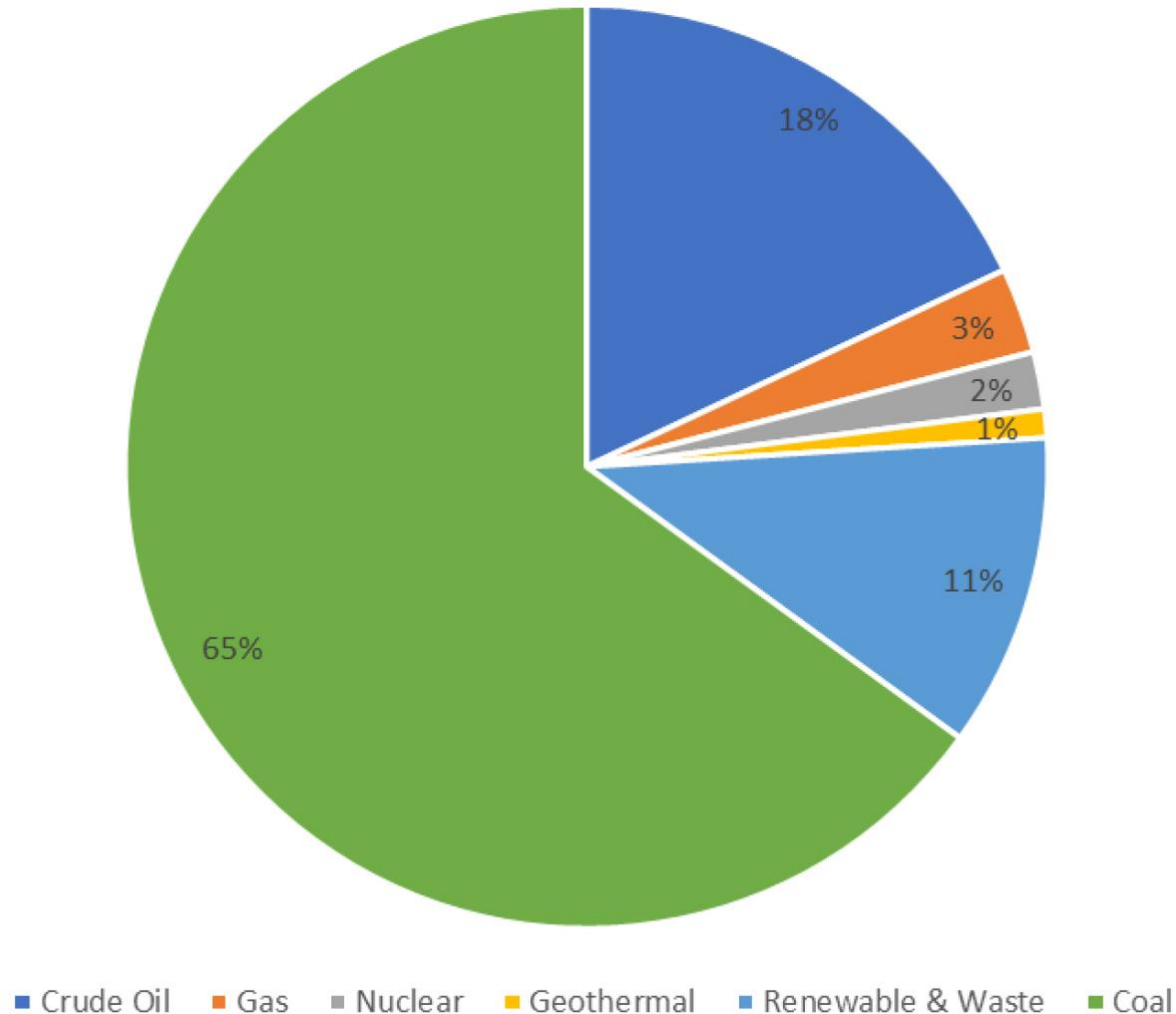
Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# South Africa's Total Primary Energy Supply - 2018



15 % of GDP

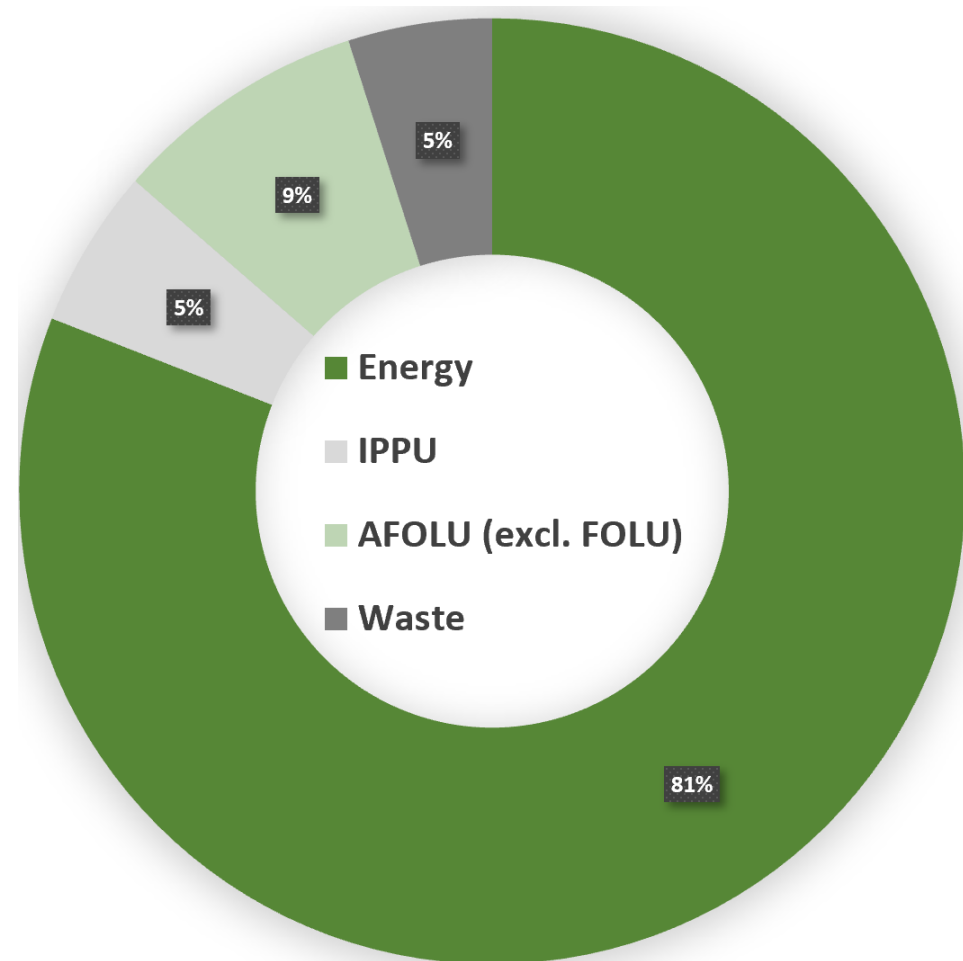


forestry, fisheries  
& the environment

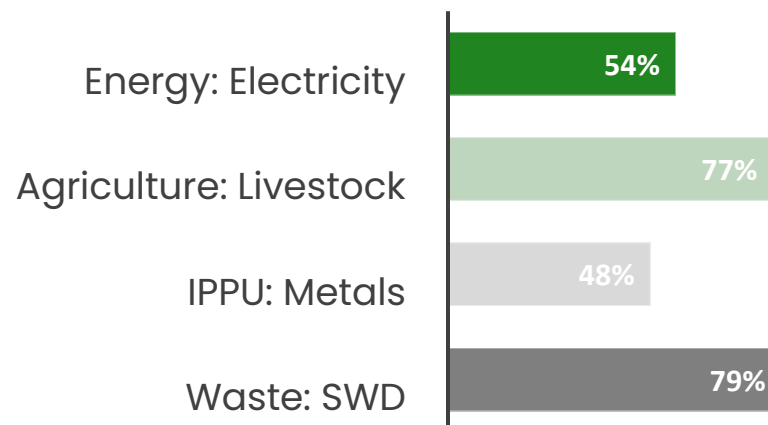
Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# 2020 Energy Sector Emissions



## Major Activities Per Sector



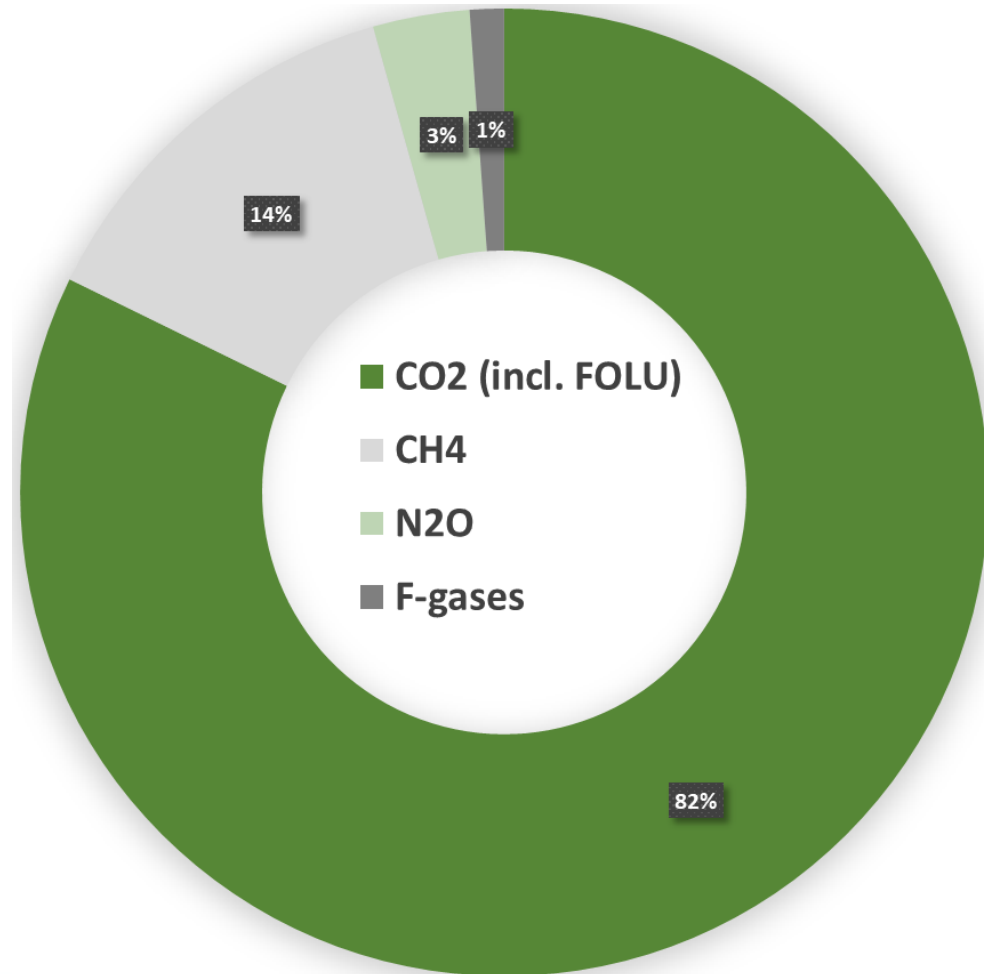
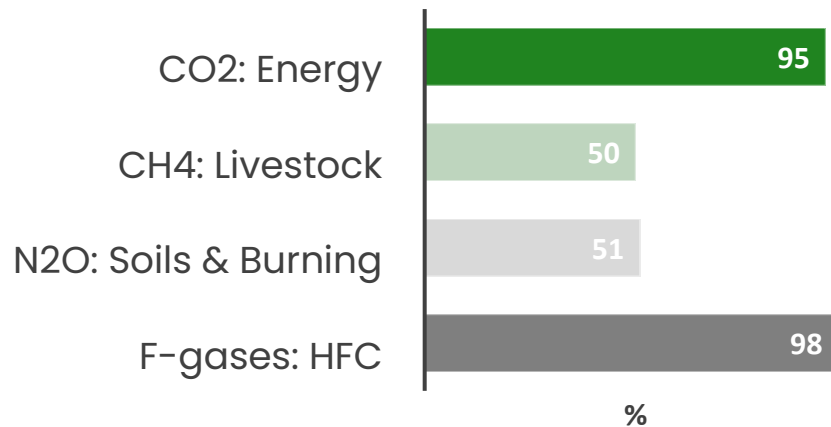
forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# 2020 Energy Sector Emissions

Major Contributors Per Gas



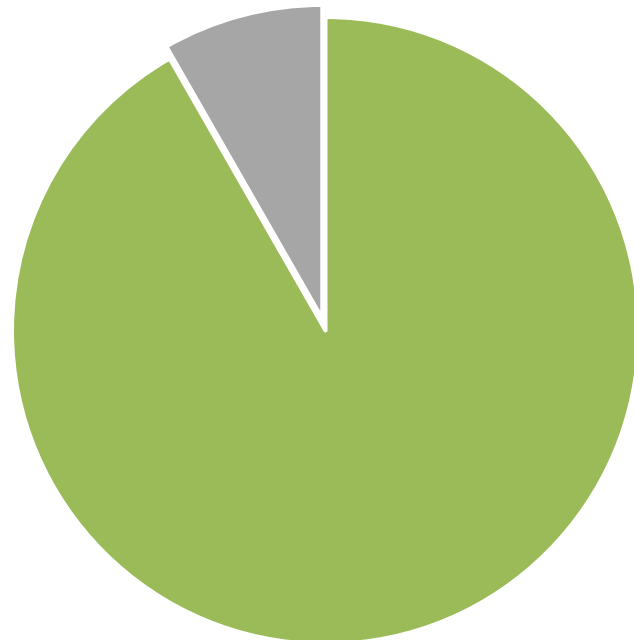
forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA

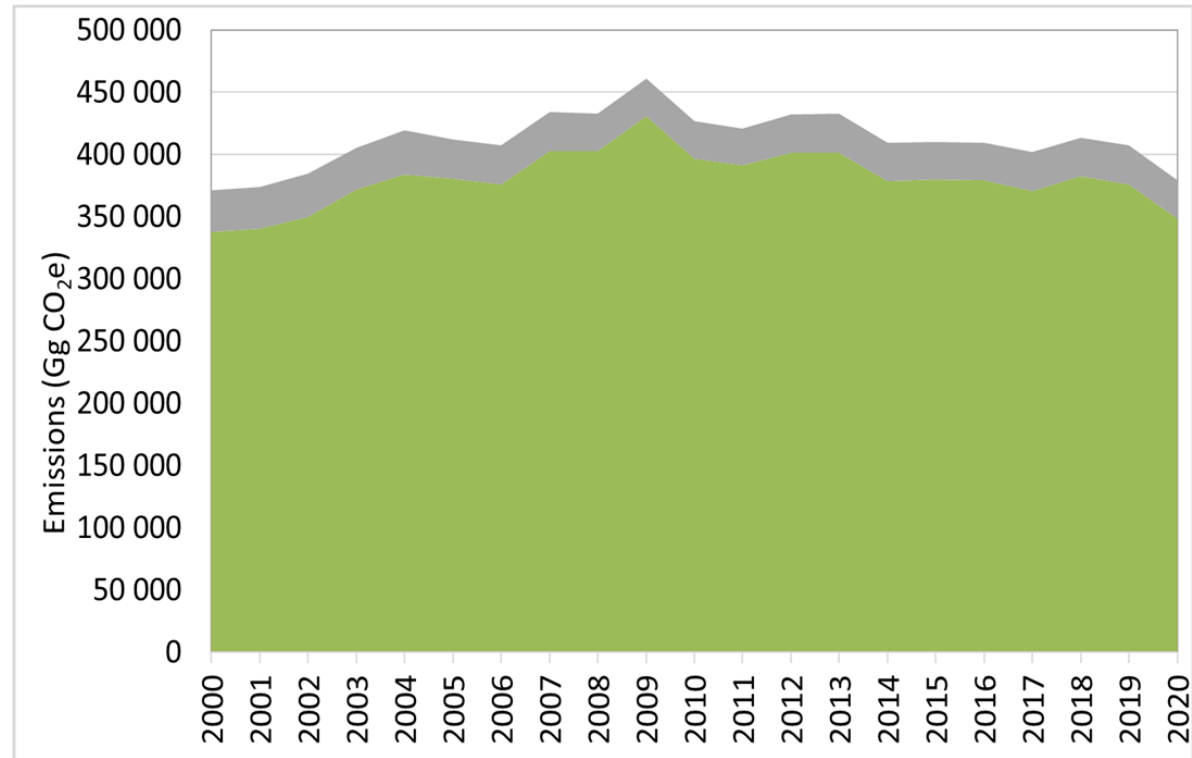


# 2020 Energy Sector Emissions

2020 Emissions (GgCO<sub>2</sub>e)



■ Fuel Combustion   ■ Fugitive Emissions



■ Fuel Combustion   ■ Fugitive Emissions

Overall Trend: 2000 - 2020: +2.2%

Fuel Combustion: 2000 - 2020: +3.1%

Fugitive Emissions: 2000 - 2020: -6.4%



forestry, fisheries  
& the environment

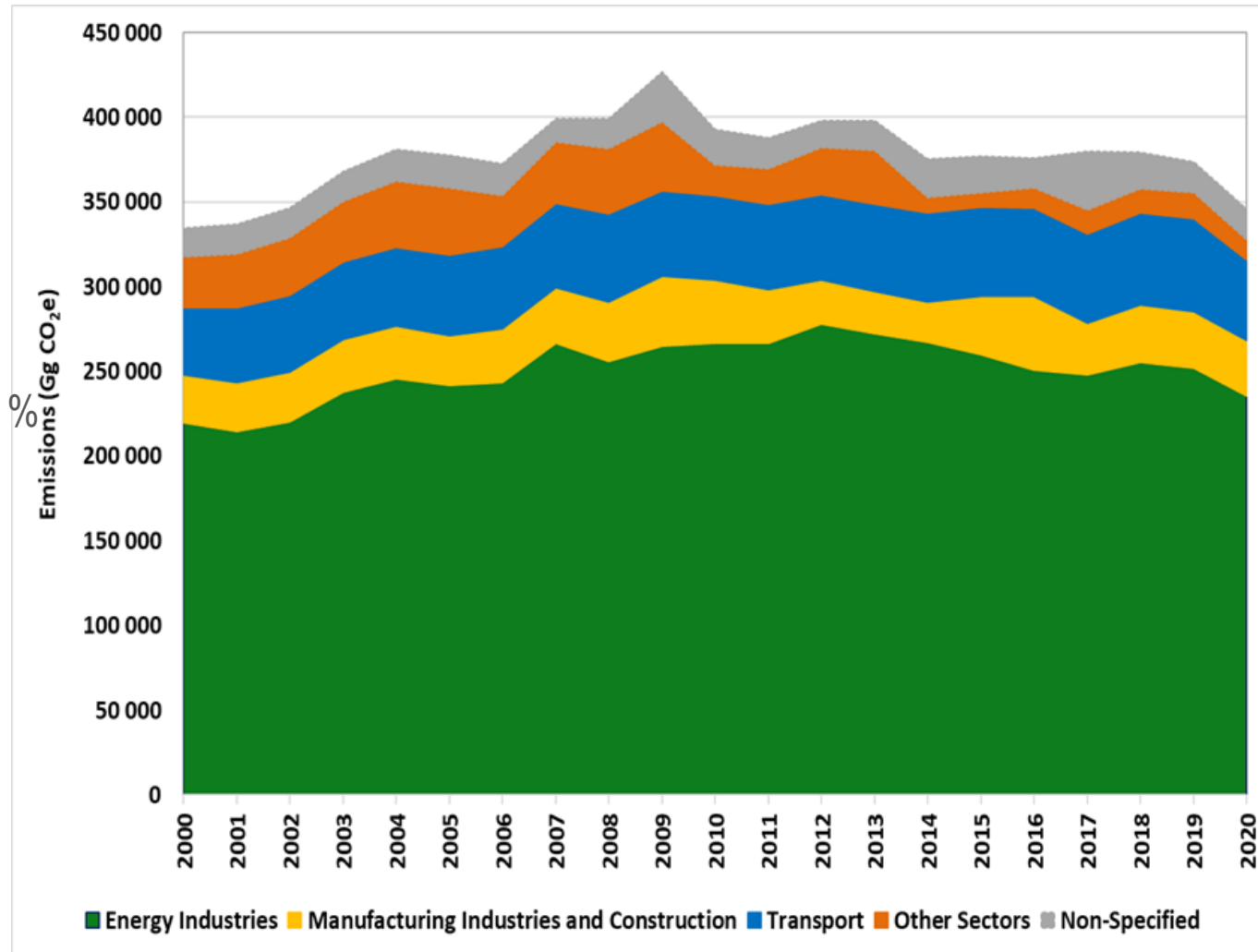
Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# 2020 Energy Sector Emissions

## Fuel Combustion Activities

- Major: Energy Industries 68 %
- Major: Transport 14 %
- Minor: Other sectors 4%
- Minor: Non-specified 5%

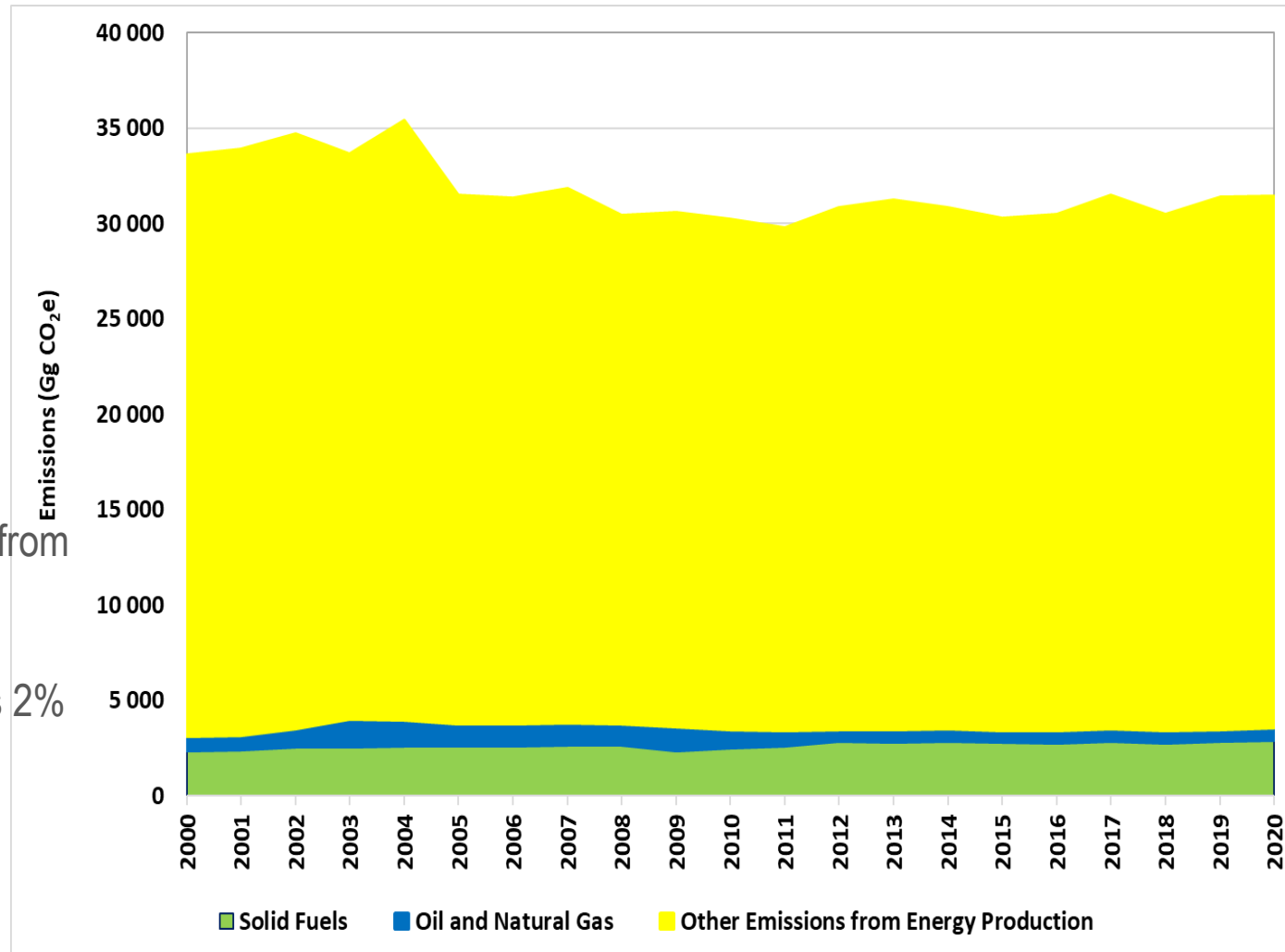


forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# 2020 Energy Sector Emissions



## Fugitive Emissions

- Major: Other Emissions from Energy production 89 %
- Minor: Solid Fuels 9%
- Minor: Oil & Natural Gas 2%



forestry, fisheries  
& the environment

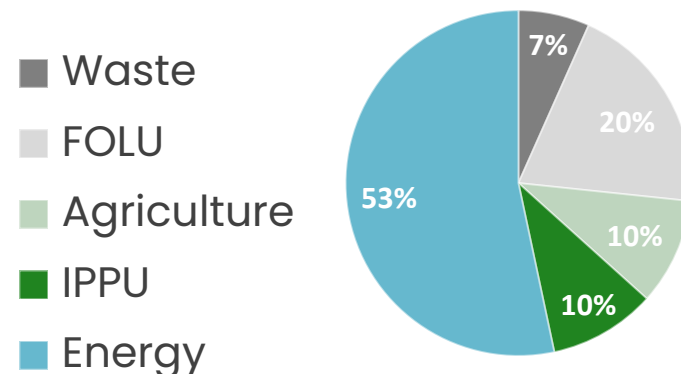
Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# Key Categories – 2020 Energy Inventory

IPCC code	IPCC Category	GHG	Criteria
1A1a	Electricity and Heat Production (solid)	CO <sub>2</sub>	L, T
1A1a	Electricity and Heat Production (liquid)	CO <sub>2</sub>	L, T
1A1b	Petroleum Refining (gas)	CO <sub>2</sub>	L, T
1A1c	Manufacture of Solid Fuels and Other Energy Industries (liquid)	CO <sub>2</sub>	L, T
1A2	Manufacturing Industries and Construction (solid)	CO <sub>2</sub>	L, T
1A2	Manufacturing Industries and Construction (liquid)	CO <sub>2</sub>	L, T
1A2	Manufacturing Industries and Construction (gas)	CO <sub>2</sub>	L, T
1A3b	Road Transport (liquid)	CO <sub>2</sub>	L, T
1A3d	Water-Borne Navigation (liquid)	CO <sub>2</sub>	T

Sector Contributions to Top Key Categories



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA





# Methodology – 2020 Energy Sector Inventory

Sector	Method applied	Emission factor
1A1 Energy Industries	T1, T2, T3	DF, CS
1A2 Manufacturing Industries & Construction	T1, T2	DF, CS
1A3 Transport	T1	DF, CS
1A4 Other Sectors	T1, T2	DF, CS
1A5 Other	T1, T2	DF, CS
1B1 Solid Fuels	T2	CS
1B2 Oil & Natural Gas	T3	CS
1B3 Other Emissions from Energy Production	T3	CS



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA

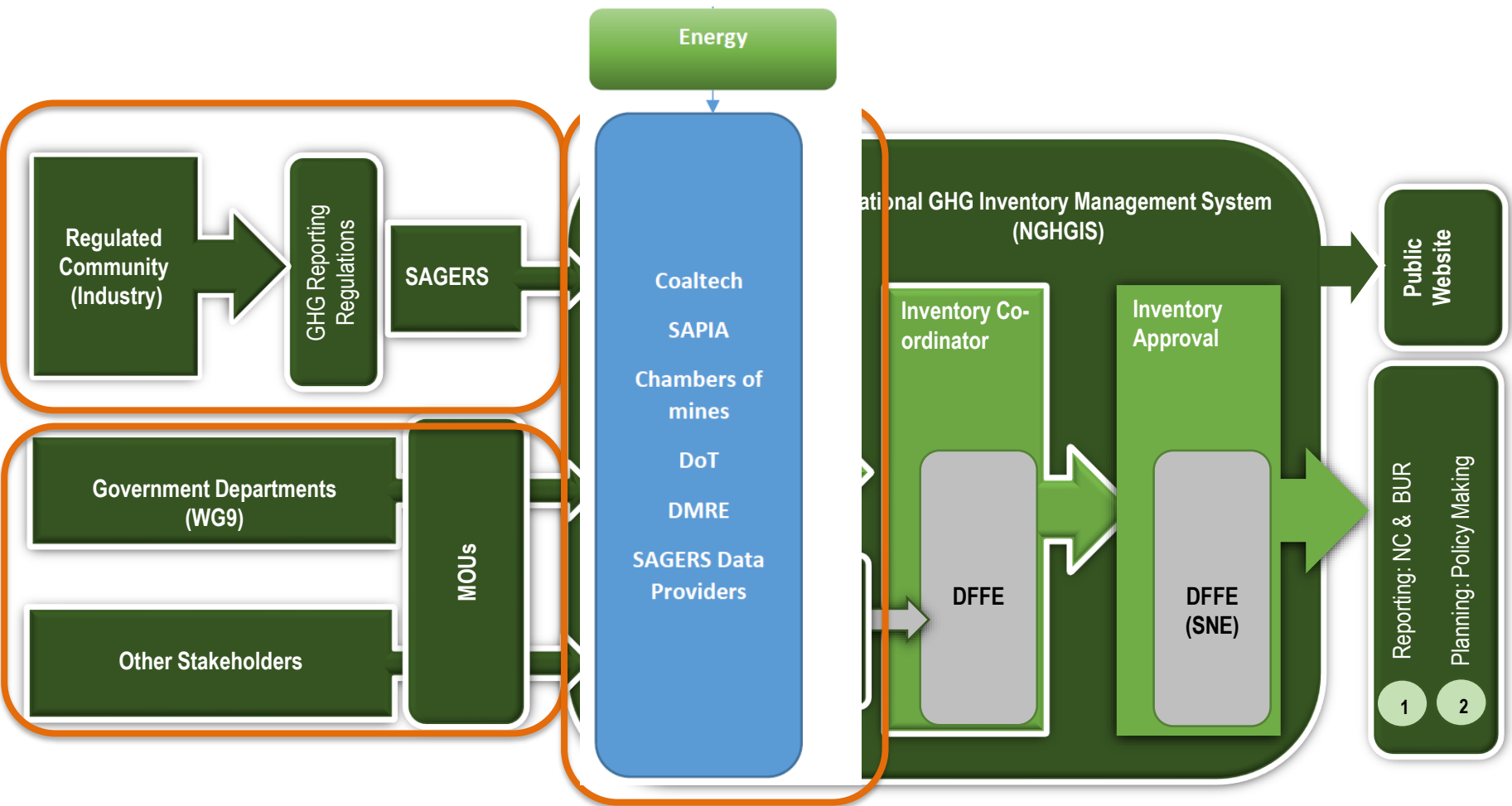


# Completeness – 2020 Energy Sector Inventory

Key	IPCC Category	Activity
NE	1B2	CO <sub>2</sub> and CH <sub>4</sub> fugitive emissions from oil and natural gas operations
	1B1b	CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O from spontaneous combustion of coal seams
	1B1ai2	CH <sub>4</sub> emissions from abandoned mines
	1C	CO <sub>2</sub> transport & Storage
	All sectors	NO <sub>x</sub> , CO, NMVOC emissions
	All sectors	SO <sub>2</sub> emissions
IE	1A1aii	CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from Combined Heat and Power (CHP) combustion systems
	1A3eii	CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from off-road vehicles and other machinery



# Data Collection and Sources – 2020 Energy Sector Inventory



# Data Collection and Sources – 2020 Energy Sector Inventory

## Fuel Combustion

### GHG Reporting Programme:

- Fuel combustion data
- Tier 3 emissions data

### Other/Studies/Models:

- Fuel Consumption Study
- DMRE Energy Balance

## Fugitive Emissions

### GHG Reporting Programme:

- Production data
- Tier 3 emissions data

### Other/Studies/Models:

- SAMI
- FAO

## CO<sub>2</sub> transport & storage

NE – Not Estimated



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# QA/QC – 2020 Energy Sector Inventory

QA/QC Principle	Check
Principle which this check adheres to (see box above). Multiple options may be selected.	Title of the check to be undertaken.
Accuracy	Activity data source
Accuracy	Correct units
Accuracy	Unit carry through
Accuracy	Method validity
Accuracy	Calculations check
Accuracy	Uncertainties
Accuracy	Double counting
Accuracy	Correct GWP
Accuracy	Notation keys
Accuracy	Calorific values
Accuracy	Oxidation factors
Accuracy	Carbon content
Accuracy, Comparability, Completeness, Consistency	Non-energy use of fuels
Accuracy, Comparability, Completeness, Consistency	Iron and Steel CO2
Accuracy, Completeness, Consistency, Transparency	Trend check
Accuracy, Transparency	Emission factor applicability
Accuracy, Transparency, Consistency, Completeness	Recalculations
Completeness, Comparability	Sub-category completeness
Consistency	Time series consistency
Transparency	Documentation
Transparency, Completeness, Consistency, Accuracy	Colour coding
Accuracy, Comparability	Cross check data
Accuracy	Spot checks
Transparency, Consistency	Data source referencing
Transparency	Links to source data
Transparency	Raw primary data
Accuracy	QA review



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# Energy Sector GHG Inventory Improvement Plan

## *Outstanding Tasks*

	PRIORITY	REASON
Fuel combustion data for the further disaggregation of 1A2	Medium	Accuracy
More activity data on non-energy fuel use	Low	Accuracy
Emissions from spontaneous combustion of coal seams	Low	Completeness
CH <sub>4</sub> emissions from abandoned mines	Low	Completeness
Investigation on pipeline transport	Low	Completeness
Investigate ground activities at airports and harbours	Low	Accuracy
Update of the VKT study, including segregation of on-road/off-road	Medium	Accuracy
Segregation of military energy use	Low	Accuracy
Incorporate emissions from biogas	Low	Completeness
CO <sub>2</sub> transport and storage	Low	Completeness



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# Energy Sector GHG Inventory Improvement Plan

## *Improvements Completed*

	PRIORITY	REASON
CO <sub>2</sub> and CH <sub>4</sub> fugitive emissions from oil and natural gas operations	Medium	Completeness
Fugitive emissions from coke production to be reported separately from 2C process emissions	Low	Transparency
Develop EFs, carbon content of fuels and NCVs of liquid fuels	High	Key category, Accuracy
Develop EFs, carbon content of fuels and NCVs of solid fuels – <i>In progress</i>	High	Key category, Accuracy



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA



# THANK YOU!

GHG Reporting Team  
Climate Change Mitigation and Specialist Monitoring Services  
Department of Forestry, Fisheries and the Environment  
Republic of South Africa  
Tel: 012 399 9161/9238/8780/9162  
Website: <http://www.dffe.gov.za>  
[GHGreporting@dffe.gov.za](mailto:GHGreporting@dffe.gov.za)

Address: The Environment House, 473 Steve Biko Road, Arcadia, Pretoria, 0083

Thank You