

# **DRAFT NATIONAL ATMOSPHERIC EMISSION INVENTORY: FIRST NATIONAL EMISSION INVENTORY REPORT**

**Session 5.2  
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**Climate Change and Air Quality**



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Environmental Affairs  
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02 – 03 October 2017**

# Presentation Outline

- Managing Emissions in the NEMAQA
- National Atmospheric Emission Inventory System (NAEIS)
  - System Design and Architecture
  - Legislative Framework
  - Reporting Cycle – Standard Operating Procedures
- Preliminary Overview on First Reporting Cycle
  - Reporting Statistics
  - Emission Estimates Methodologies Used
  - Emissions Estimated
  - Lessons Learnt
- Looking Forward



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# Moving to Online Emissions Management in South Africa

# Emissions Management in NEMAQA

The National Environmental Management Air Quality Act (NEMAQA of 2004), makes provision for the management of air emissions through a variety of regulatory tools:

- Management of anthropogenic emissions from industrial activities through the Atmospheric Emission License (AEL) for specific listed activities, regulated by stipulating permissible emission levels of significant pollutants.
- Targeted intervention strategies in Air Quality Management Plans (AQMP), for both industrial and nonindustrial sources of emissions.
- Management of dust as prescribed in the National Dust Control Regulations
- **Measurement and reporting of atmospheric emissions, Section 12- NAEIS**



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# NAEIS Development

- National Emission Inventory System project initiated in 2013
- System was launched in 2015 Lekgotla
- First reporting was initiated in 2015 July to ensure that all users could go through the translational process.
- Regulations enacted to effect NAEIS
- First reporting officially in January 2016 for 2015 emissions
- **We present the first National Emission Inventory for South Africa**



# Emissions Inventory

- Means an **accounting** of the amount of **pollutants** discharged into the atmosphere and it contains the total emissions for one or more specific **greenhouse gases and air pollutants** originating from all sources in a certain **geographical area** and within a specified **time span**



# NAEIS Principles

Informed by local requirements and needs and international experience, design, develop, test and implement a **web-based** atmospheric **emissions monitoring and reporting system** that provides accurate, current and complete information on all significant sources of **identified atmospheric emissions, including greenhouse gas emissions**



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# National System Principles

- Simple, user friendly web-based operation
- Combination of **environmental** and **governance** platforms
- Flexibility in performing emission calculations
- Secure data system with dedicated access rights
- Expandable modular design with flexibility
- System built QA/QC processes



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# NAEIS Legislative Framework



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# Section 12 AQA (b-c), 43(l)

- **Minister must prescribe the manner in which:**
  - (b) measurements of emissions from point, non-point or mobile sources must be carried out; and
  - (c) the form in which such measurements must be reported and the organs of state to whom such measurements must be reported.

Section 43(l) – AEL holders reporting of GHGs

Group	Emission Source	Data Provider	NAEIS Reporting Requirements	Relevant Authority
<b>A</b>	Listed activity published in terms of Section 21(1) of the Act.	Any person that undertakes a listed activity in terms of Section 21(1) of the Act.	Emission reports must be made in the format required for NAEIS and should be in accordance with the atmospheric emission license or provisional atmospheric emission license.	Licensing authority.
<b>B</b>	Controlled emitter declared in terms of Section 23(1) of the Act.	<p>Any person that undertakes a listed activity in terms of Section 21(1) of the Act and uses an appliance or conducts an activity which has been declared a controlled emitter in terms of Section 23(1) of the Act.</p> <p>Any relevant air quality officer receiving emission reports as contemplated under notice made in terms of section 23 of the Act.</p>	Any information that is required to be reported in terms of the notice published in the <i>Gazette</i> in terms of Section 23 of the Act.	The relevant air quality officer as contemplated under the notice made in terms of Section 23 of the Act.
<b>C</b>	Mines.	Any person, that holds a mining right or permit in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Emission reports must be made in the format required for NAEIS.	Relevant air quality officer.
<b>D</b>	Facilities identified in accordance with the applicable municipal by-law.	Any person that operates facilities which generate criteria pollutants, and has been identified in accordance with the applicable municipal by-law.	Emission reports must be made in the format required for NAEIS.	Relevant air quality officer.



# NAEIS Reporting Cycle

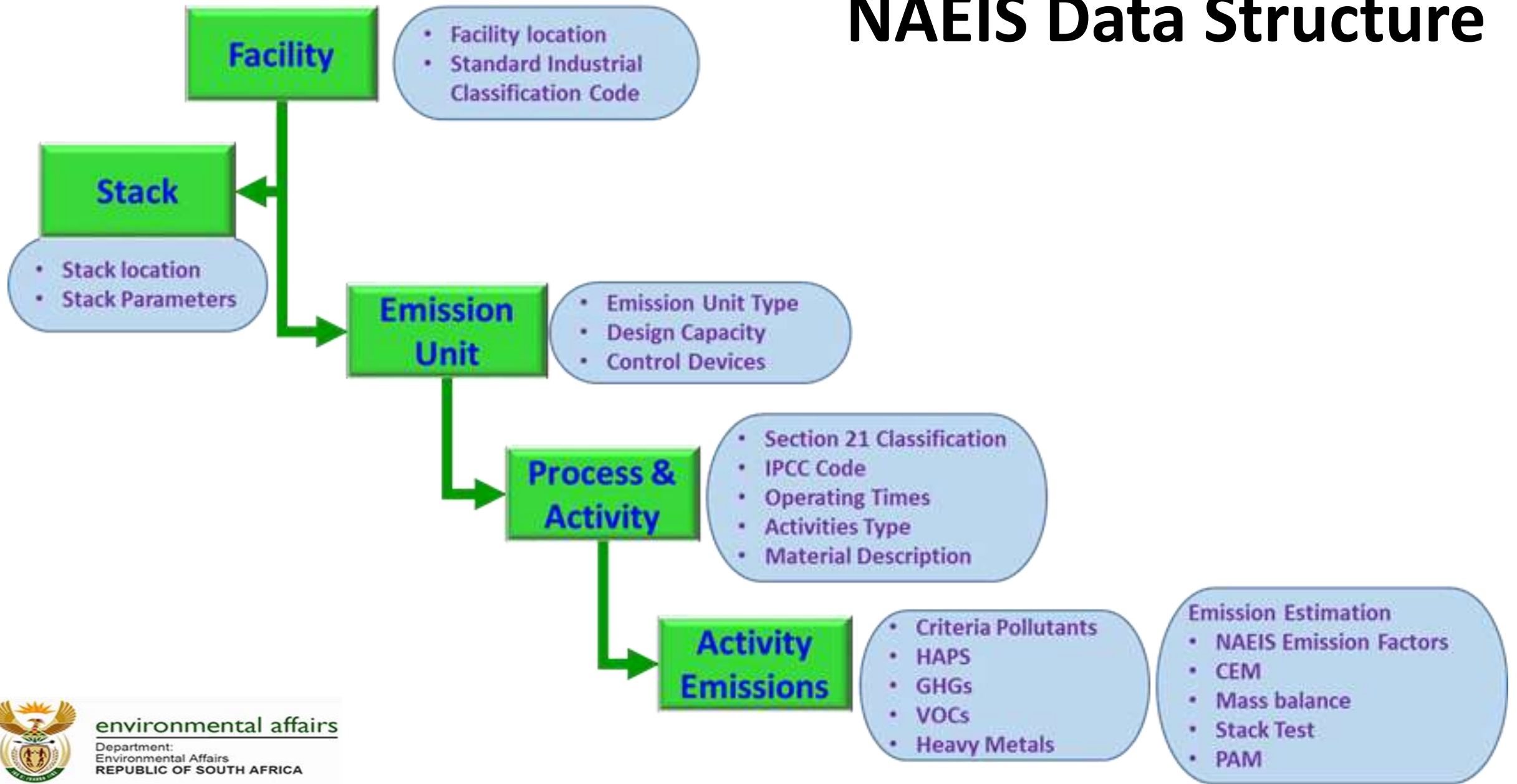


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# NAEIS Data Structure



# Emission Basis and Calculation

- **Emission Calculation Basis:**

- CEM
- Landfill Model
- **NAEIS Emission Factor (default)**
- Mass Balance
- PEM
- Stack Test
- Tank Model
- Facility Emission Factor
- **IPCC EF (default for GHG)**
- Other

- **NAEIS Emission Factor (based on US EPA Method 19)**

$$E = FC * EF * e^A * (1 - CE)$$

Where E = Emission, FC = Fuel Consumed, EF = Emission Factor, A = Exponent Amount, and CE = Control Efficiency



# Preliminary Overview on First Reporting Cycle



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## Welcome to South African Atmospheric Emission Licensing and Inventory Portal (SAAELIP)

SAAELIP is an online portal for the management of Atmospheric Emission Licences (AEL) as well as the estimation and reporting of atmospheric emission inventories terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004). SAAELIP provides a seamless integration between the management of Atmospheric Emission Licences and the reporting of atmospheric emissions into the National Atmospheric Emission Inventory System (NAEIS).

### Atmospheric Emission Licences

#### AEL Authorities - License



For All Atmospheric Emission Licensing Authorities SAAELIP provides the ability to:

- Process and issue Atmospheric Emission Licence applications online
- Schedule licensing related inspections and track inspection results
- Manage online compliance reporting
- Facilitate communication with the AEL holders on the status of the emission inventory annual reports

[>> login](#)

### NAEIS

#### AEL Authorities - Emission



For All Atmospheric Emission Licensing Authorities NAEIS provides the ability to:

- Manage online reporting of emission inventories as mandated under the National Atmospheric Emission Reporting Regulations Gazette No 38633 of 2015
- Track the status of an emission report

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#### Industry & Consultants - License



For Industry and Consultants

- Apply and submit an Atmospheric Emission Licence online
- Track the status of an application
- Submit emission compliance reports online
- Track historical versions of all applications and emissions reports

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#### Industry & Consultants - Emission



For Industry and Consultants

- Submit and manage emission inventory reports online
- Track the status of an emission report
- Track historical emission inventory reports

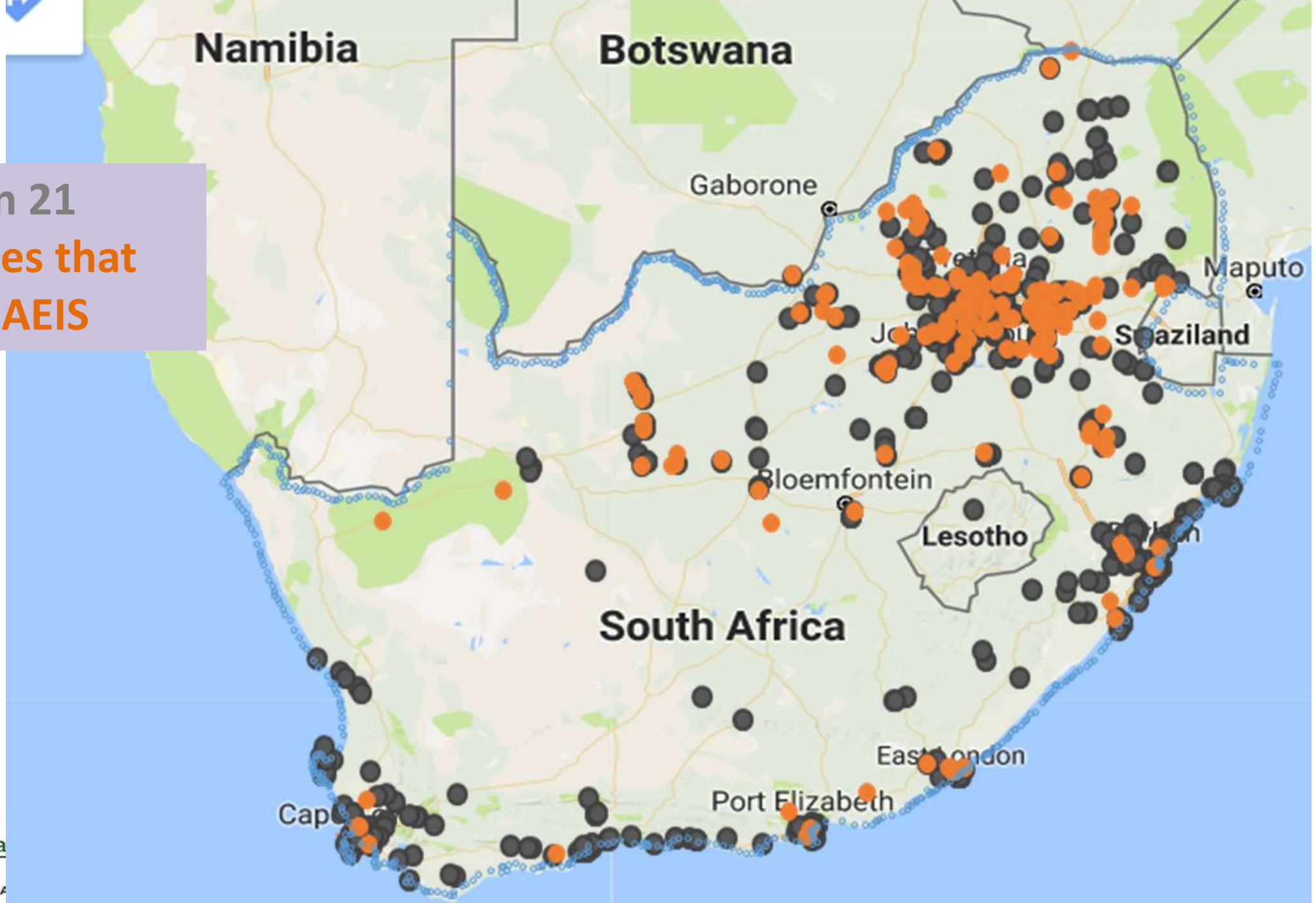
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# National Reporting Cycle 2016

- **1041** facilities enotified by **15 December 2015** (system open for reporting)
- Reporting by **31 March 2016**, **2015** emissions
- All authorities provide assistance to data holders
- Additional NAEIS training by DEA
- Emissions inventory presented here as **was reported**

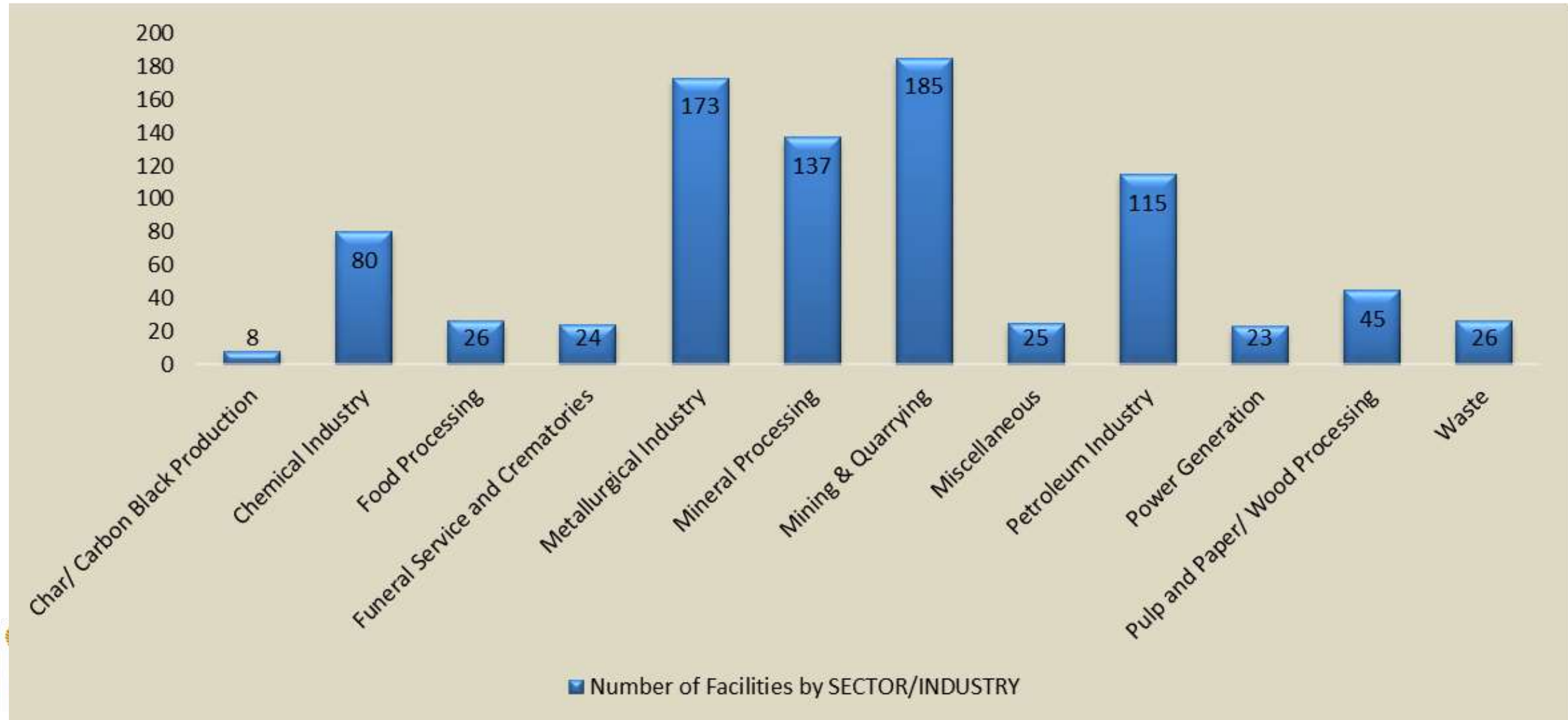


Grey – Section 21  
Orange – Mines that  
reported to NAEIS

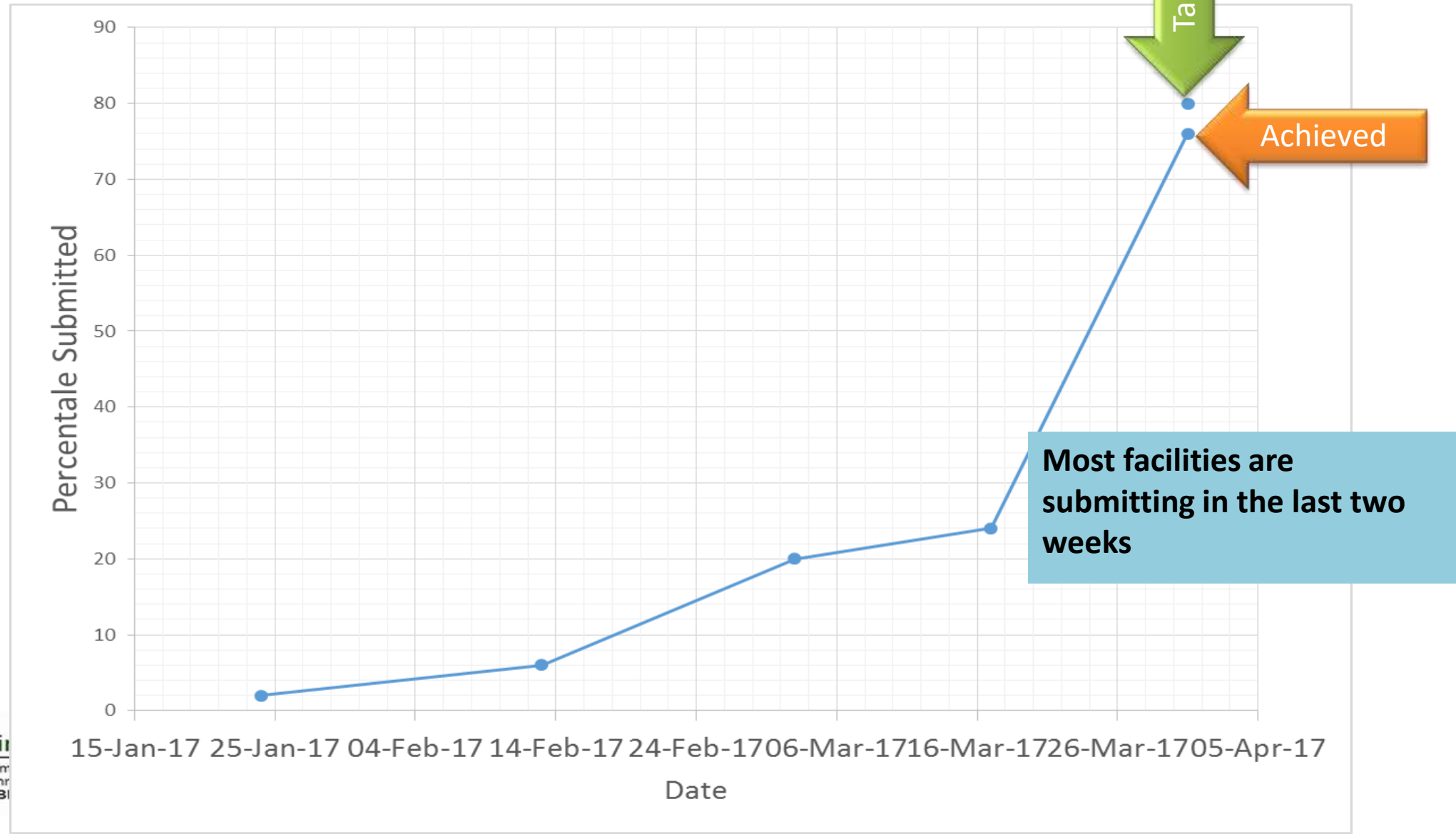


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# Economic Sectors Reporting to NAEIS

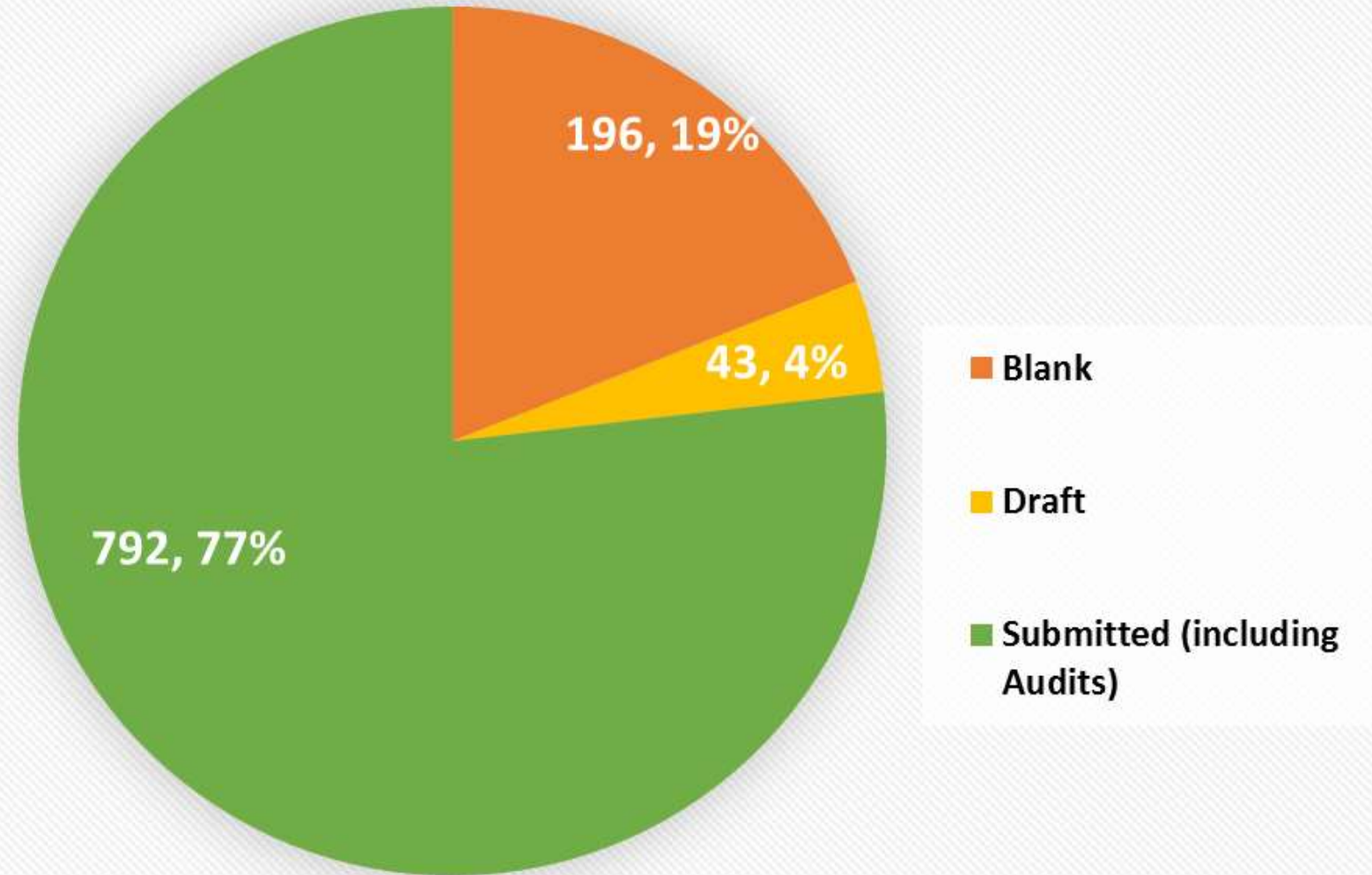


# EI Reporting Trend

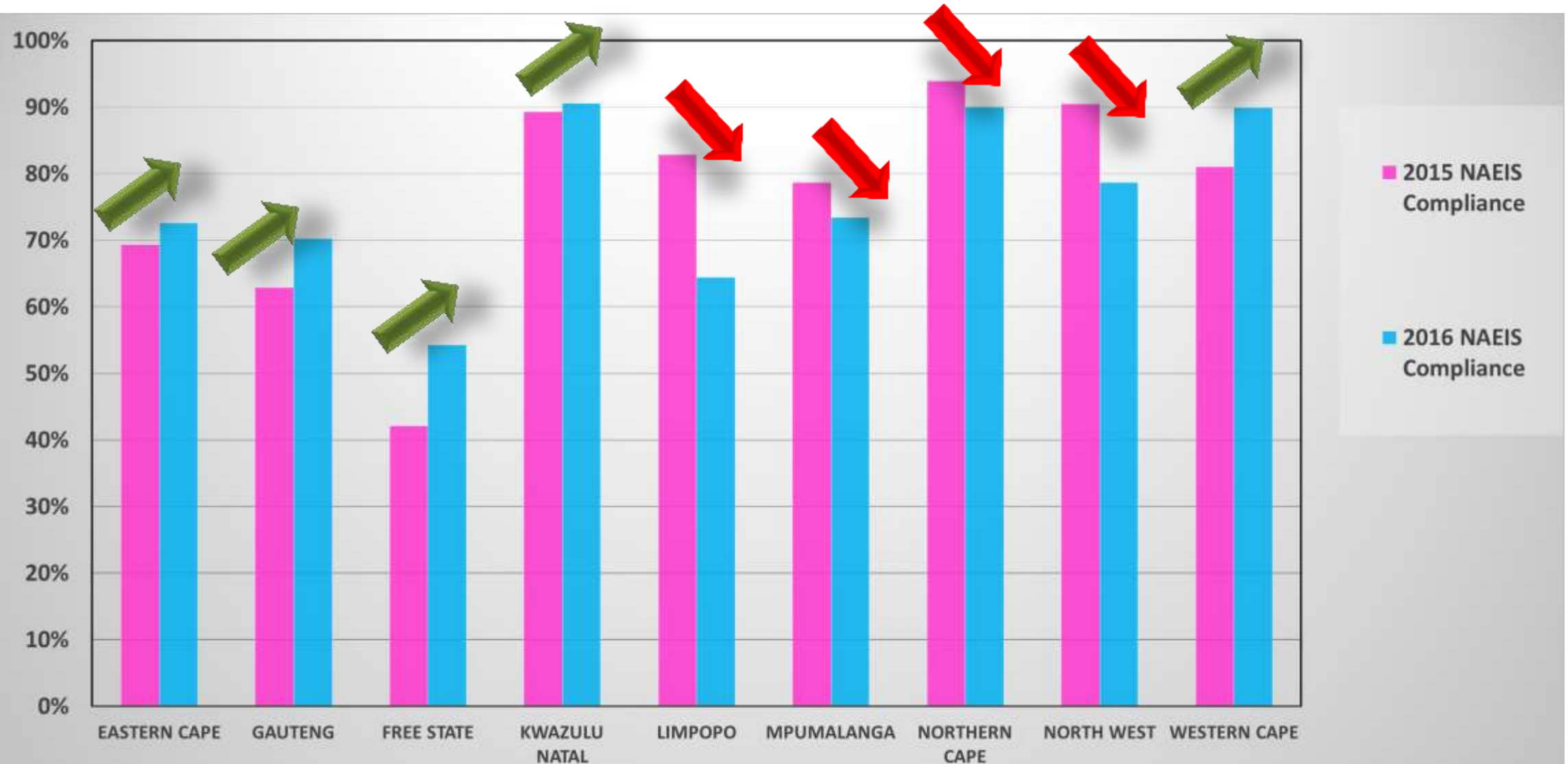




# National Overall Statistics



# National Reporting Statistics 2015 and 2016 Emissions



# Emissions Distribution by Province



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# National Emission Inventory Profile: Major Pollutants

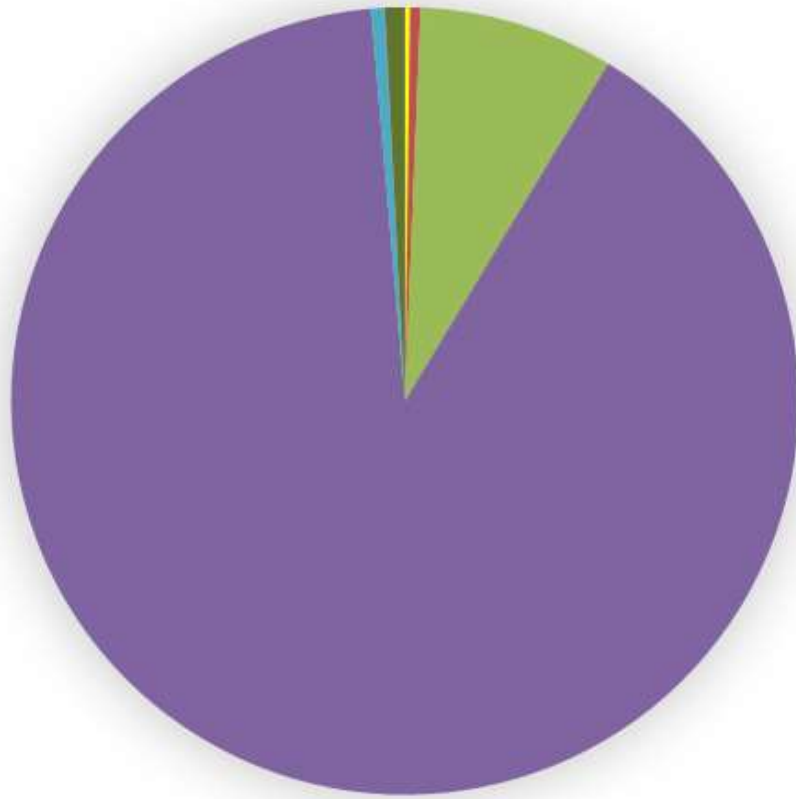
Province	PM10	PM2.5	Pb	SO2	NOX	NO2	NO	TSP	CO	VOC	C6H6	NH3	H2S	Hg
Gauteng	4.2845E+07	8.0493E+06	6.3630E+05	4.1606E+08	4.8161E+07	1.7046E+06	1.4722E+05	5.4164E+06	3.2223E+08	1.1953E+07	2.9111E+03	6.6256E+05	2.9634E+04	8.2067E+00
KwaZulu-Natal	6.6966E+07	1.8512E+06	6.9087E+04	3.3945E+07	1.4766E+07	3.4569E+06	1.9204E+04	7.4819E+06	1.8122E+08	9.9576E+07	3.9145E+05	1.5995E+05	3.9727E+02	3.7610E+03
Limpopo	8.3679E+06	5.6537E+06	5.9751E+03	4.0466E+08	6.9123E+07	6.5343E+07	4.1762E+06	1.2587E+07	4.3942E+06	2.4751E+05	1.2151E+03	4.3786E+03	6.3072E+02	7.7600E+00
Mpumalanga	1.7959E+08	9.8584E+07	2.4782E+07	1.4498E+09	8.8024E+08	7.3554E+08	3.5256E+05	2.3531E+08	2.7472E+07	1.0835E+07	1.0164E+02	1.2565E+05	5.3535E+07	5.2641E+01
North West	4.4669E+07	5.2596E+05	5.5945E+04	2.0676E+07	7.0517E+06	4.3850E+06	2.0071E+06	1.2220E+07	2.6365E+06	3.2081E+05	1.2477E+03	7.1840E+05		1.0402E+01
Eastern Cape	4.5543E+05	1.1188E+05	2.6024E+04	7.1392E+06	1.9038E+06	1.0026E+03	4.2941E+03	2.9905E+06	4.3110E+05	1.9425E+07	5.2555E+03	4.3810E+01	1.5300E+04	7.1497E-01
Free State	2.2257E+07	1.3165E+07	1.4963E+05	1.8313E+08	1.1574E+08	1.4952E+05	1.7791E+08	3.5954E+07	4.4347E+06	2.9855E+05	1.7742E+03	6.7563E+04		4.0160E+00
Northern Cape	3.3701E+07	2.2320E+07	8.8480E+01	2.8856E+05	4.0295E+05	1.8946E+04	4.4834E+02	6.1587E+07	7.9416E+04	2.5671E+04	4.4080E+01			1.0730E+01
Western Cape	1.8108E+06	3.7816E+05	1.5382E+04	1.3651E+07	1.6318E+07	6.6900E+06	2.3927E+03	8.6683E+05	3.9290E+07	3.0212E+06	5.0460E+02	1.4106E+05	6.4109E+03	2.2551E+01
National Total (kg)	4.0066E+08	1.5064E+08	2.5740E+07	2.5293E+09	1.1537E+09	8.1729E+08	1.8462E+08	3.7441E+08	5.8219E+08	1.4570E+08	4.0451E+05	1.8796E+06	5.3588E+07	3.8781E+03



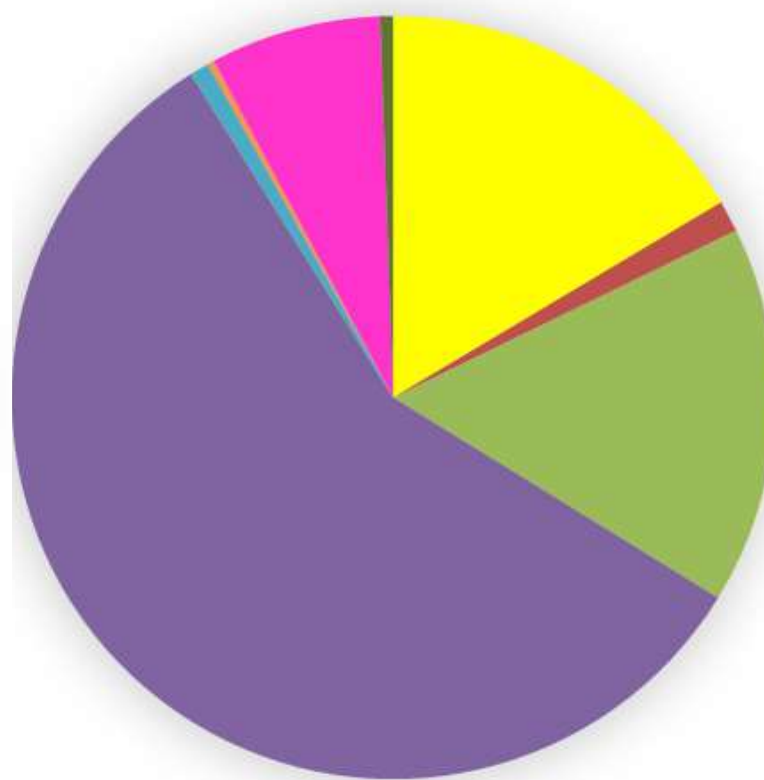
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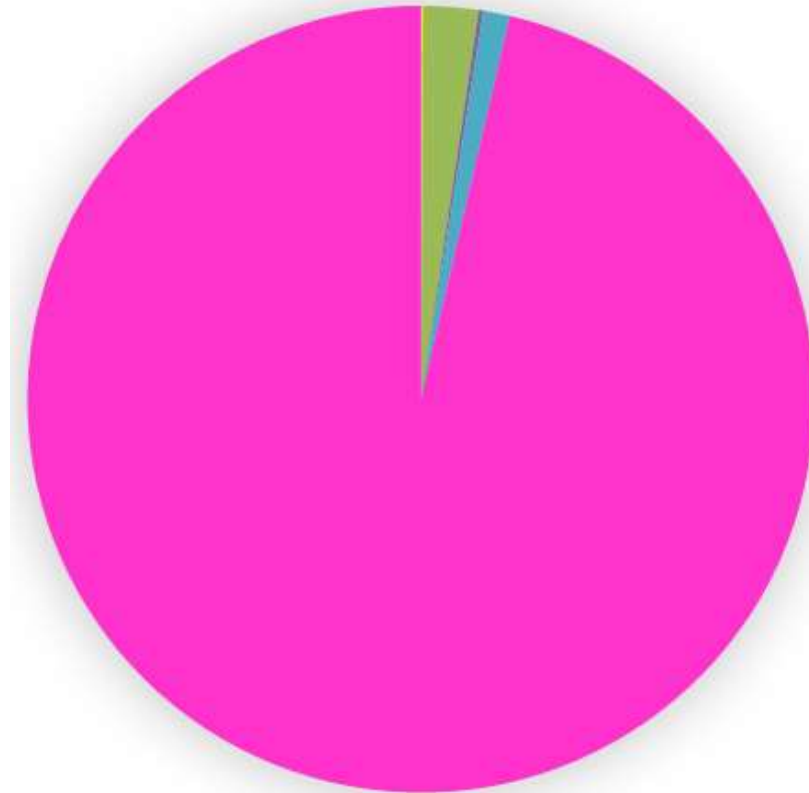
NO2



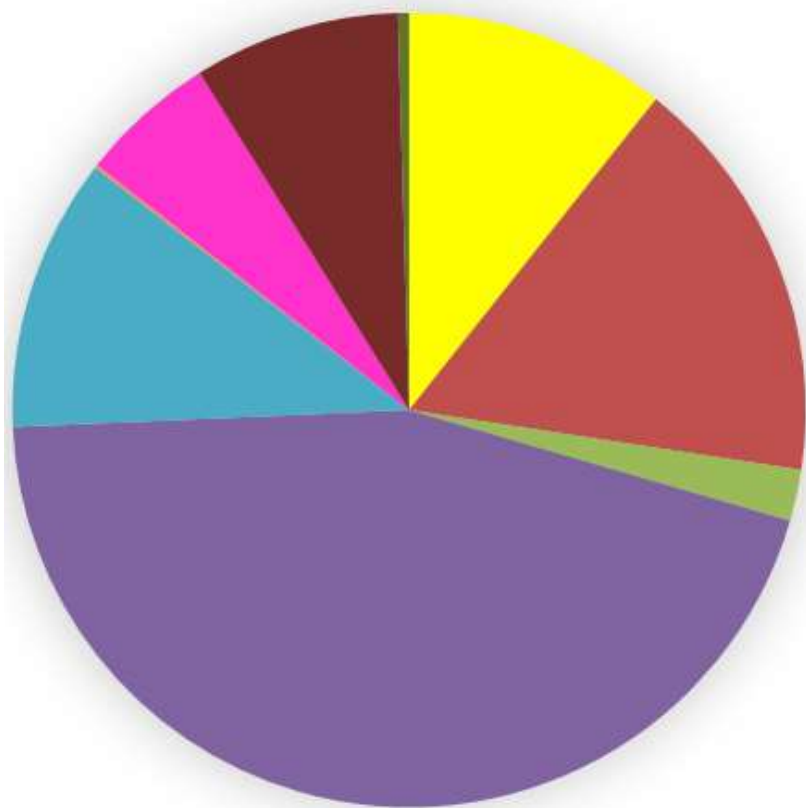
SO2



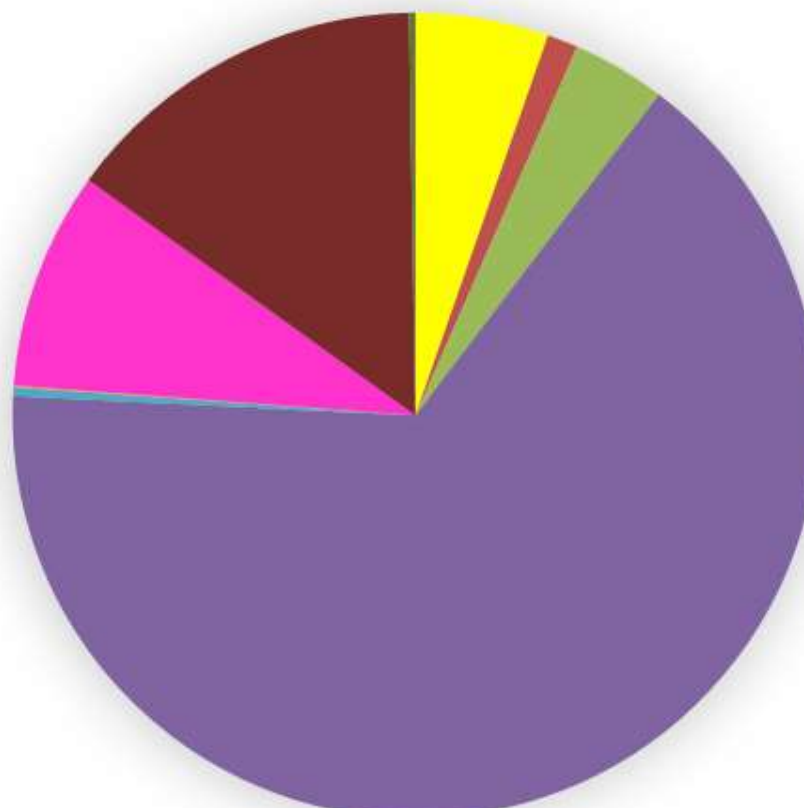
NO



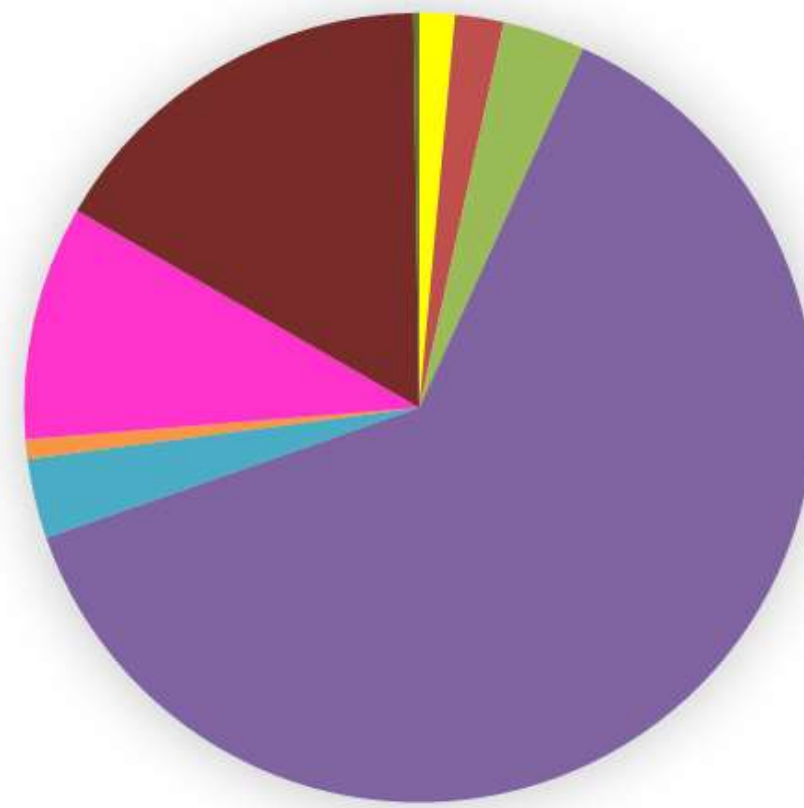
PM10



PM2.5



TSP



■ Gauteng

■ KwaZulu-Natal

■ Limpopo

■ Mpumalanga

■ North West

■ Eastern Cape

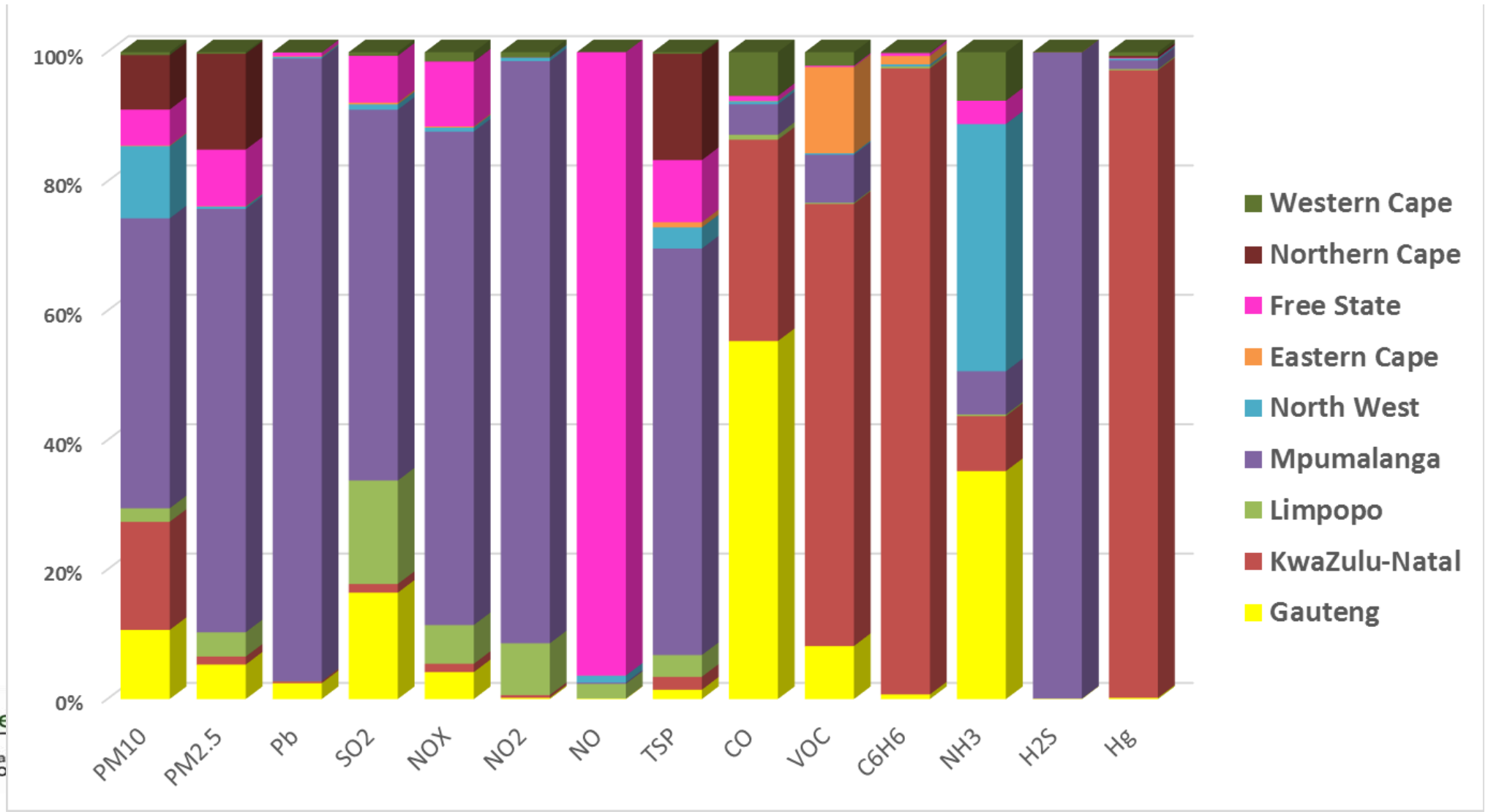
■ Free State

■ Northern Cape

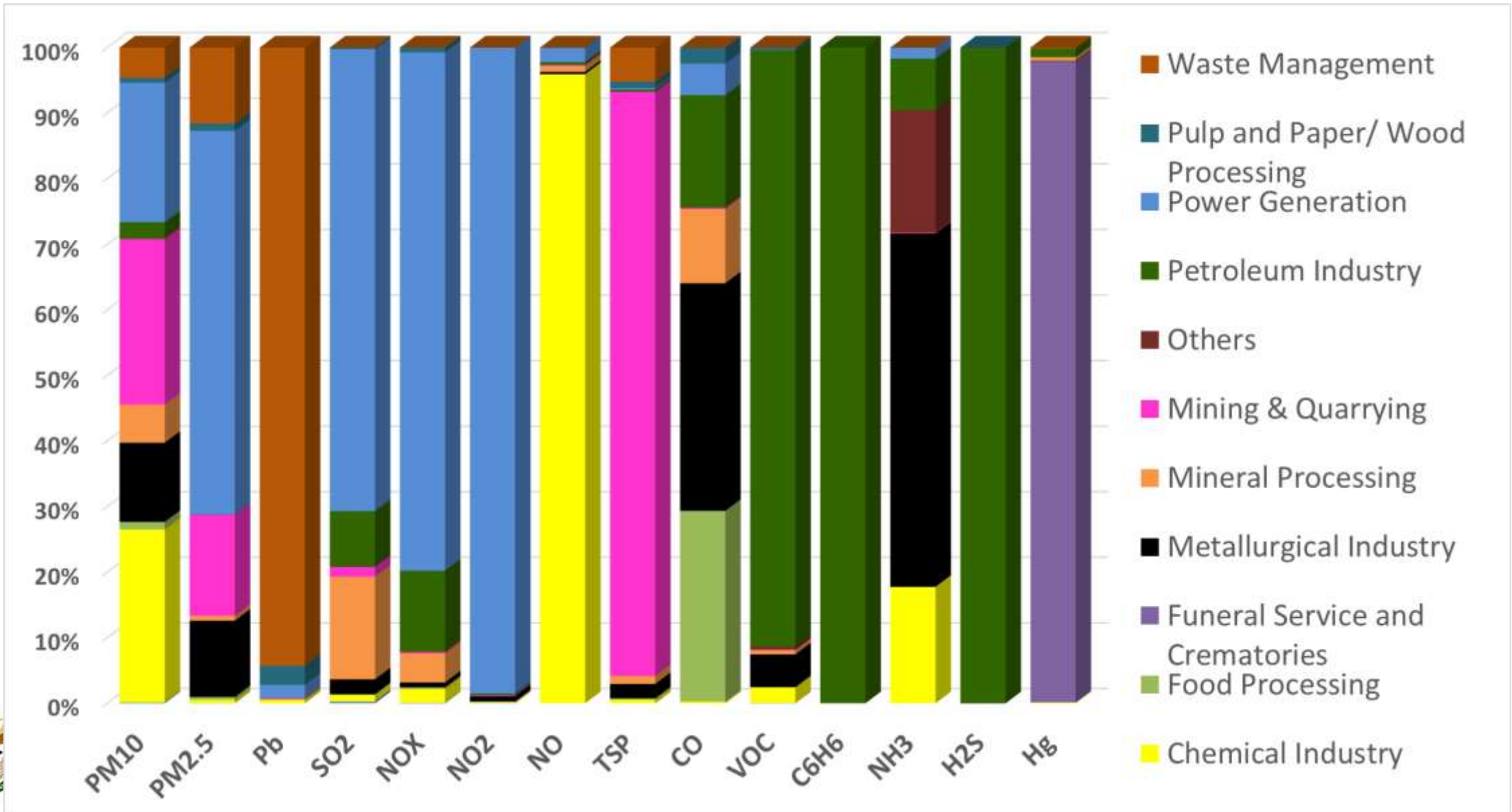
■ Western Cape



# Provincial Contributions to Total Emissions



# Emission Contributions by Economic Sectors





# Lessons Learnt

# Lessons Learnt

Reporting Group	Completeness Shortfalls
Section 21	<ul style="list-style-type: none"><li>• Not all facilities identified as NAEIS data holders reported to the system.<ul style="list-style-type: none"><li>○ Section 21 facilities – the registered facilities were based on the AELA databases and some of these databases were incomplete. In addition, <b>there are listed activities operating without licences.</b></li></ul></li><li>• Reporting of emission inventories for pollutants which they have MES for, instead of reporting all criteria pollutants e.g., a combustion facility EI report excluding carbon monoxide.</li><li>• Reporting of MES instead of total emissions. This was particularly true for those data holders who did not receive training, hence were confusing the reporting of EMISSIONS INVENTORY with the reporting of MES.</li><li>• <b>Reporting only those processes with MES, hence excluding intermediary processes, as well as fugitive emissions.</b> This was one of the major shortfalls noted in the reports completeness, as facilities have in most cases never quantified fugitive emissions from their processes.</li></ul>





# Lessons Learnt

Reporting Group	Completeness Shortfalls
Section 23	<ul style="list-style-type: none"><li>• Very few small boiler sources were reported to NAEIS.</li><li>• Section 23 mobile asphalt plants did not report.</li></ul>
Mine and Quarries	<ul style="list-style-type: none"><li>• A small percentage of the Mine and Quarry Sector reported to NAEIS (around 10%). Considering the contribution of the mining sector to the particulate matter, this omission means the national inventory PM source strength is grossly underestimated nationally.</li></ul>



# Lessons Learnt

Reporting Group	NAEIS Shortfalls
Section 21 Section 23 Mine and Quarries	<ul style="list-style-type: none"><li>• NAEIS Emission factors are based on the US EPA, IPCC and other international databases</li><li>• Currently there are no country emission factors</li><li>• Compliance monitoring reports and dedicated experiments are sources of EFs</li><li>• Quality of the compliance report is <b>FUNDAMENTALLY IMPORTANT</b></li><li>• <b>Consider a continuous process for updating NAEIS EF database</b></li></ul>



Observations		Comments
Bottom-up EI for the country	😊	TCCCA Principles
EI reports not complete	😐	Guidance on minimum reporting requirements
77% reporting compliance	😊 <b>S21</b> 😞 <b>M&amp;Q, S23</b>	Improve enforcement to NAEIS reporting (both industrial process facilities and mining operations)
Accuracy and transparency in reporting	😞	<b>Improve capacity of data holders to ensure better understanding of their facility processes</b>
EI completeness at a national level	😐	Long term plan to develop non-industrial emission inventories

# Looking Forward

- AELA have undertaken QA/QC reviews of reports to establish a credible baseline
- A national emission inventory profile – need to conduct comparisons with global inventories
- Continuous improvement of EI – improving facility completeness and non-industrial sector
- 2<sup>nd</sup> reporting cycle completed 31 March 2017.
  - Improvement in reporting
  - Included Expert Review in all reports
- **Taking the EI from the State of Air Report for non-industrial sources as the baseline**



# Thank You