



Monitor methane emissions from space

31st session of the Committee on Sustainable Energy
UNECE Sustainable Energy Week 2022

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The leader in climate data

6

Kayrros offices in Europe, the US and Asia (HQ: Paris)

10+

Satellite constellations in use

100+

Proprietary algorithms in remote sensing and data fusion

150

Kayrros team with a strong focus on science and AI

the industries we serve



Operators

Supply Chain Intelligence
Asset Monitoring
GHG Mitigation



Financial Institutions

Supply Chain Intelligence
Risk Management
ESG Due Diligence



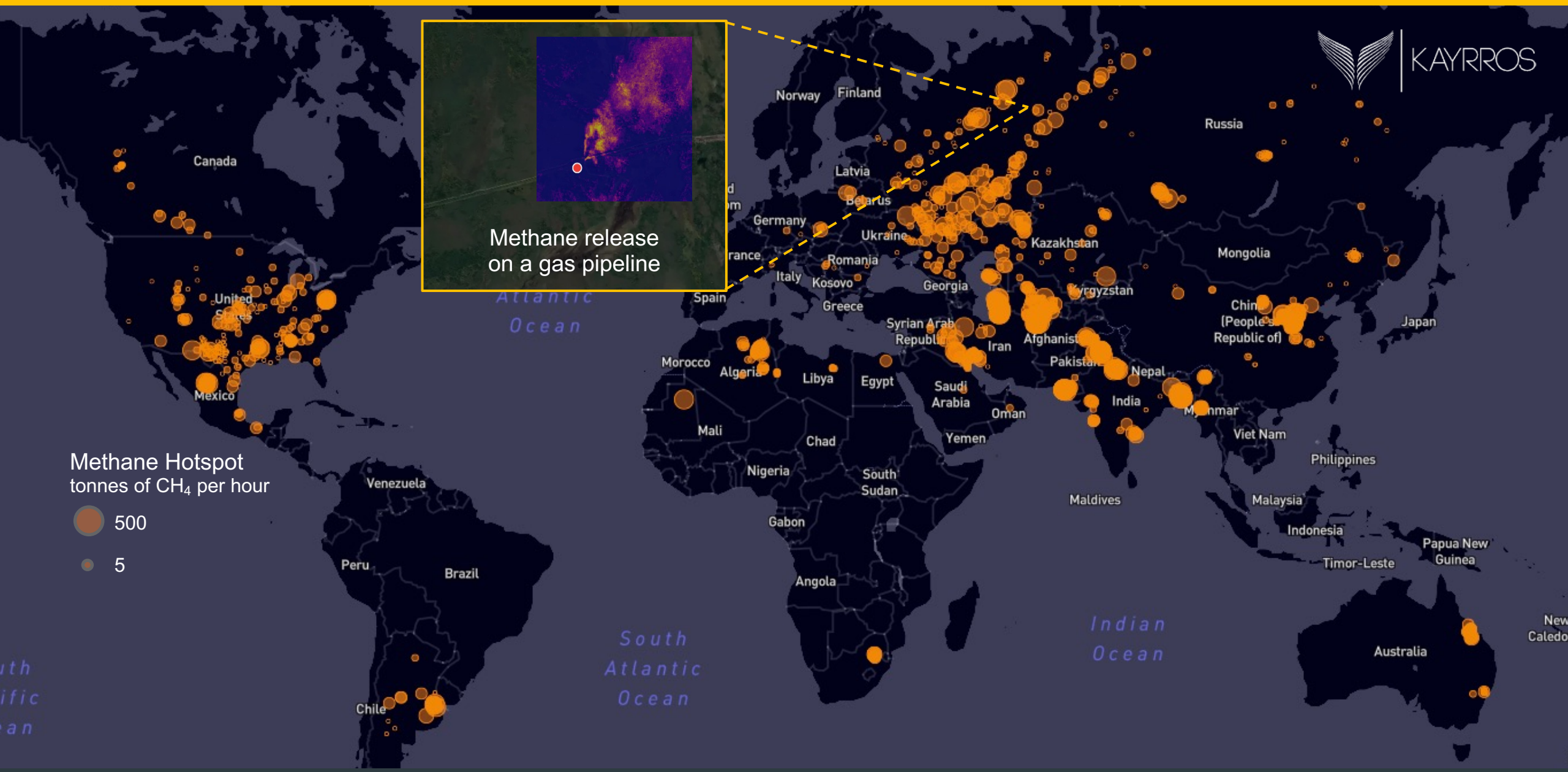
Public Sector

Land Use Management
Climate Policy
GHG Reporting

Methane super-emitters in the oil, gas & coal sector

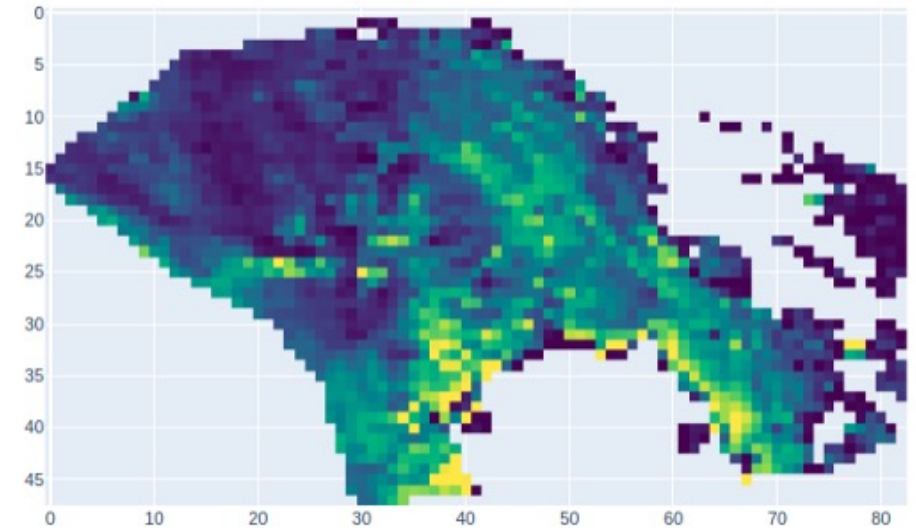
based on satellite observations since 2019

Note: satellite coverage varies between regions, and is limited to onshore areas



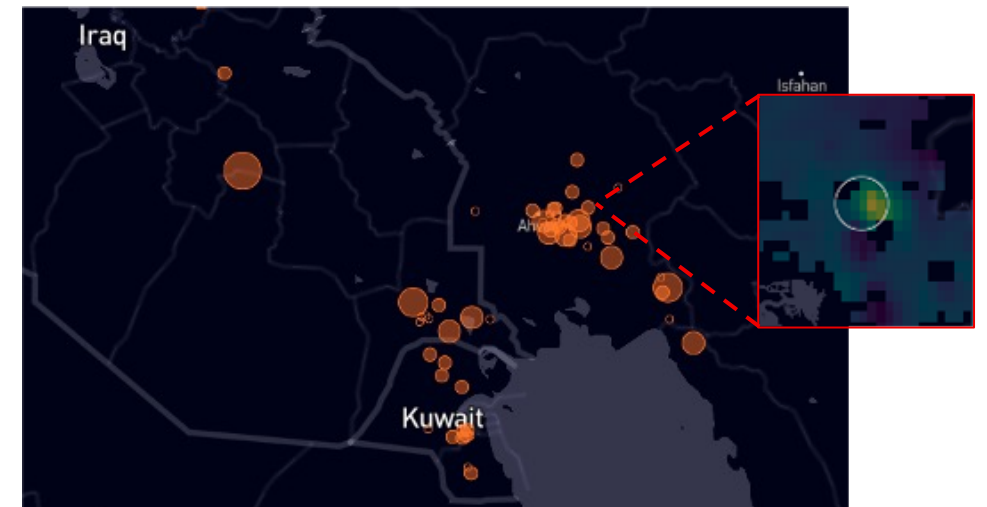
There are two methods to measure methane emissions from space

Method 1
Basin Inversion
Quantify total emissions across an entire oil & gas or coal basin



Methane concentrations in Iran-Iraq-Kuwait
2019-20 average

Method 2
Super-Emitters
Detect and quantify methane emissions from large sources

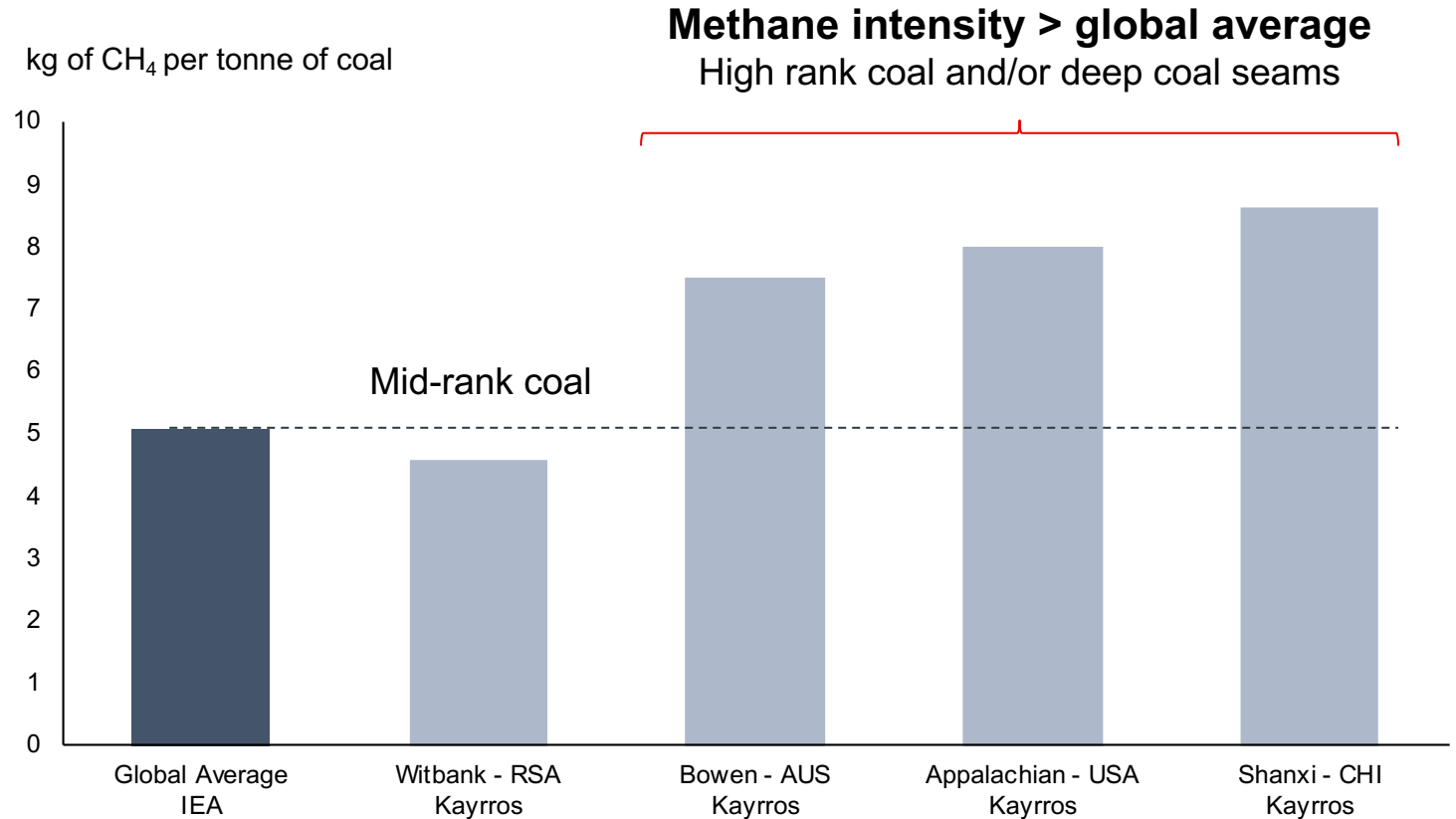


Methane hotspots in Iran-Iraq-Kuwait
January 2019 to date

Source: Kayrros analysis of Sentinel-5P data

The observed intensity of coal basins is consistent with their coal type and with IEA estimates

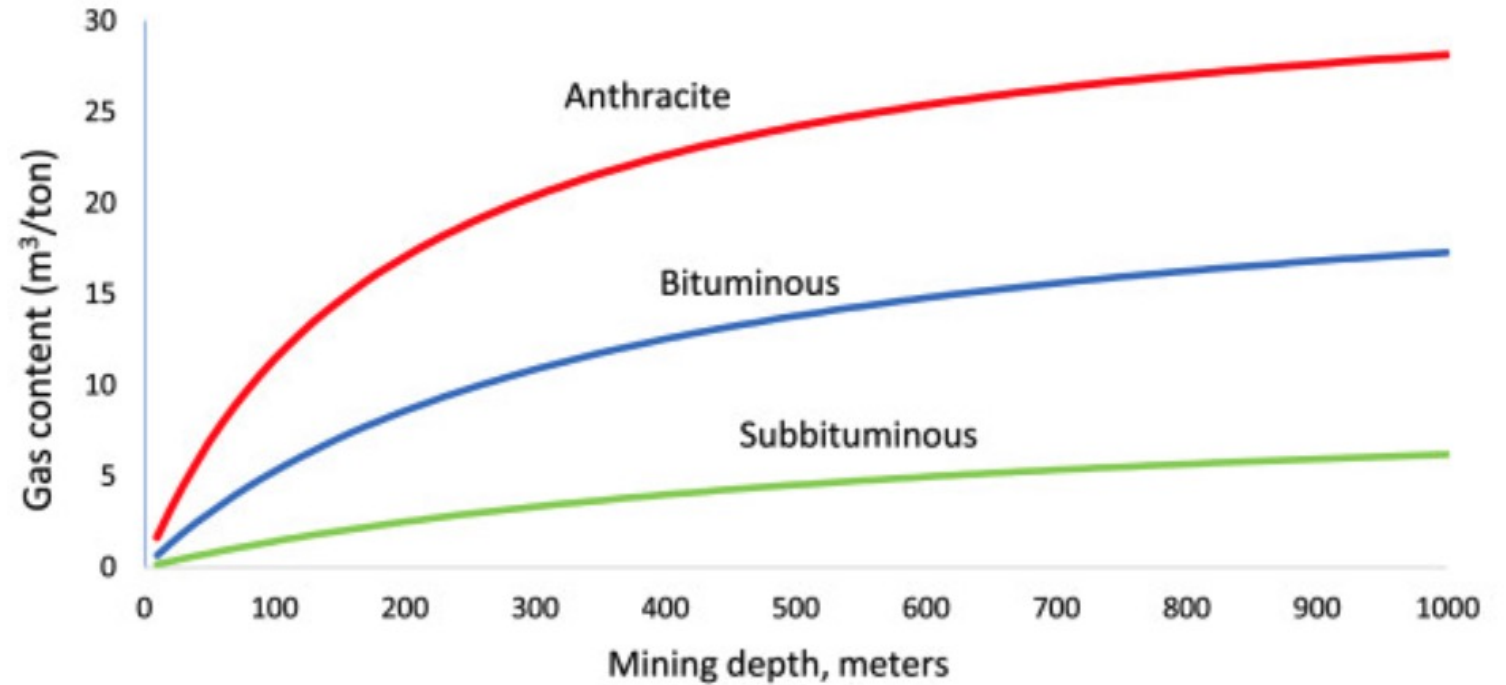
Methane intensity of coal production by basin 2020 data



Sources: IEA, Kayrros analysis of Sentinel-5P data

The methane content of coal is a function of coal type and mining depth

Methane content of coal
by coal type and mining depth



Source: Kholod et al. *Journal of Cleaner Production*, Volume 256, 2020

The scientific basis of quantifying methane emissions from space is well established



GREENHOUSE GASES

Global assessment of oil and gas methane ultra-emitters

T. Lauvaux^{1*}, C. Giron², M. Mazzolini², A. d'Aspremont^{2,3}, R. Duren^{4,5}, D. Cusworth⁶, D. Shindell^{7,8,9}, P. Ciais^{1,10}

Key results

1. ultra-emitters that can be seen with Sentinel-5P account for approximately 10% of total emissions from the oil & gas sector
2. Eliminating these ultra-emitters is a priority given the relatively low cost of mitigation

Methane emissions from coal account for a quarter of the full carbon footprint of steel

Steel Making

1 tonne of steel from a blast furnace



Direct CO₂ emissions

from the combustion of coal and limestone
1.9 tonnes CO₂

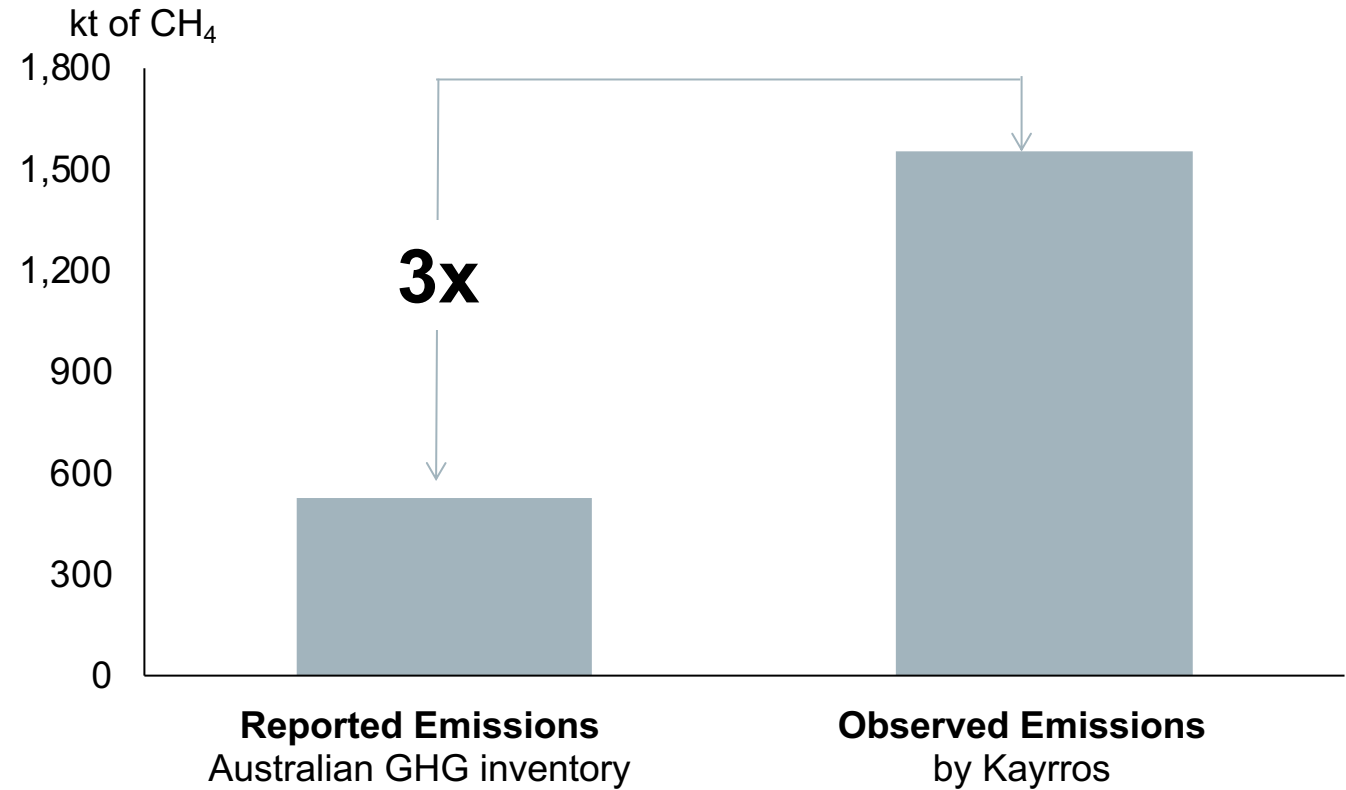
Indirect CH₄ emissions

from the production of metallurgical coal
452 kg CO₂e

$$\frac{\text{Scope 3 emissions of CH}_4}{\text{Scope 1 emissions of CO}_2} = \frac{452}{1,900} = 24\%$$

Observed emissions are higher than official inventories

Methane Emissions from Coal in the Bowen Basin

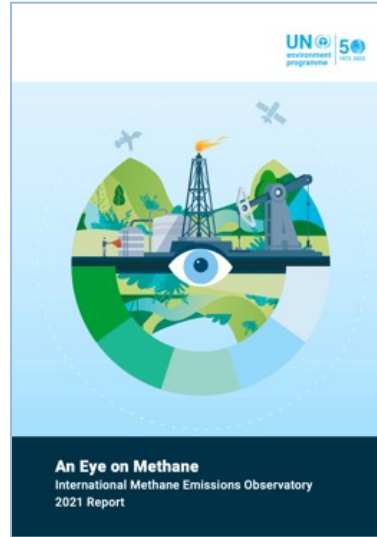


Notes:

- Reported emissions are based on the *Quarterly Update of Australia's National Greenhouse Gas Inventory : March 2021*
- Observed emissions correspond to the inversion model implemented by Kayrros and based on Sentinel-5P observations over 2020-21

Satellite monitoring is key to climate action on methane

International Methane Emissions Observatory



Global Methane Pledge



Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on methane emissions reduction in the energy sector

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