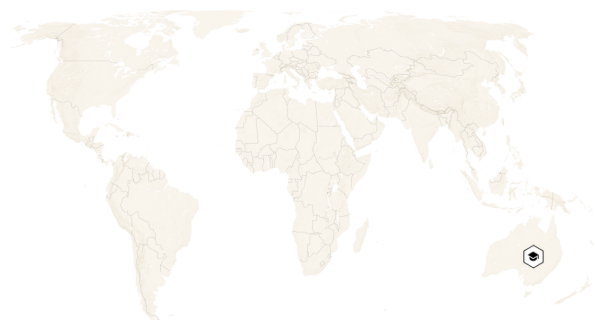


AUSTRALIA OPEN-CUT COAL MINE CONTROLLED RELEASE STUDY

Testing the ability of atmospheric-based methods to quantify methane emissions from open-cut coal mines.



DONOR:
Australia



**BENEFITTING COUNTRIES
OR REGIONS:**
**Australia and other countries with
open-cut mines**



SECTOR:
Coal



Subsector, if applicable:
-

STATUS: **Project Initiation**

TIMELINE: **Controlled release experiments in 2026 and 2027**



**IMEO SCIENCE
OBJECTIVE:**

→ **Validation of measurement-based
approaches**



KEY FINDINGS

In progress

RATIONALE

Coal mines are a major source of methane emissions and represent a significant climate opportunity. In 2025, the coal sector released around 39 million tonnes of methane, making it the energy sector's second-largest methane emitter. But globally, emissions from coal mines remain poorly monitored and reported, with most reporting relying on generic emission factors, which often fail to capture the wide range of emissions from open-cut mines.

Roughly 40 per cent of global coal production originates from surface operations, the majority of which are open cut, but emissions from these coal mines are difficult to measure. Controlled release studies test a range of methane measurement technologies in real-world conditions. Most efforts have been directed toward point sources and the oil and gas sector. This study will be the first of its kind to test measurement approaches in an open-cut coal mine setting. The study is expected to help all countries better understand, estimate and manage open-cut coal mine methane emissions.



RELATED PUBLICATIONS

In progress



SIGNIFICANCE FOR DECISIONMAKERS

For policymakers: Reliable data are essential for understanding the magnitude and variability of emissions from any source, including surface coal mines. Testing the effectiveness of atmospheric quantification methods is essential if they are to be used as verification or validation tools to help check the quality of emission inventory data. Such quality checks ensure that mitigation strategies are grounded in transparent, reproducible evidence. Controlled release experiments enable objective assessment of detection probability, quantification uncertainty and environmental constraints across different measurement platforms.

For industry: Coal mines represent a significant climate opportunity, particularly for the steel industry, which uses metallurgical coal in blast furnace production. Methane from metallurgical coal adds substantially to the climate footprint of steel yet may be mitigated at relatively low cost. Improved quantification will allow producers, steelmakers and supply chain actors to better assess methane intensity and identify targeted mitigation opportunities.



STUDY APPROACH/ACTIVITIES

The study, also known as SIMFLEX-Coal Australia, will engineer and deploy a modular, transportable controlled release array that simulates methane emissions representative of Australian open-cut coal operations. Three controlled release campaigns will be conducted, inviting participation from commercial vendors and academic researchers. Pre-campaign site characterization and methane modeling will inform realistic release scenarios. Measurement approaches to be evaluated include ground-based sensors, vehicle-mounted systems, unmanned aerial systems, crewed aircraft mass-balance flights and satellite platforms. Under blind conditions (without knowledge of release rates), participants will quantify a range of controlled methane releases. Each campaign will quantify detection performance, measurement bias, precision and environmental constraints.



CATALYZING ACTION

The study is designed as a collaborative research and development initiative, focused on advancing methane measurement science for the coal sector. Outputs will include validated data sets, detection-probability curves and quantification error analyses. By providing an open scientific reference for performance evaluation, the study will help technology developers improve measurement systems, support transparent global methane accounting and inform mitigation across coal-producing regions. By building local technical capacity while also engaging international measurement teams, the study will contribute to stronger, science-based methane management in the coal and steel supply chain worldwide.

OTHER SUPPORTERS/STAKEHOLDERS

Principal Investigator: **St. Francis Xavier University and Stanford University**

The UN Environment Programme's International Methane Emissions Observatory (IMEO) exists to provide open, reliable, and actionable data to the individuals with the agency to reduce methane emissions. IMEO does this by integrating and reconciling data across sources, including its global methane science studies. IMEO supports measurement and research studies around the world to close the knowledge gap on methane emissions and provide policy-relevant insights to decisionmakers.