

BUILDING A BOTTOM-UP METHANE EMISSION INVENTORY FOR ABANDONED UNDERGROUND COAL MINES IN INDIA

An empirical assessment of methane emissions from abandoned underground coal mines.



DONOR:
European Commission



**BENEFITTING COUNTRIES
OR REGIONS:**
India



SECTOR:
Coal



Subsector, if applicable:
Abandoned Mine Methane

STATUS: Project initiation

TIMELINE: Qualitative surveying in 2025. Measurement campaign planned for 2026.



**IMEO SCIENCE
OBJECTIVE:**

→ **Advance science studies in support of
countries targeting methane mitigation**



UNEP



KEY FINDINGS

In progress

RATIONALE

Abandoned mines are expected to become an increasingly significant methane source in the future but remain poorly understood. Inadequately sealed or unmanaged abandoned underground mines can continue to emit methane for years as residual gas slowly migrates through fractures, boreholes and permeable layers. As the pace of coal mine closures accelerates globally, sustainable and accountable mine closure practices are critical. India provides a unique setting for this study given its relatively small but diverse inventory of sites spanning different ages, geologies and closure conditions. This allows near-national coverage and systematic comparison, unlike other countries with tens of thousands of non-operational mines. The study is also enabled by collaboration and support from Indian operators such as Coal India Ltd. and Tata Steel, allowing access to site-level information and informed interpretation.



RELATED PUBLICATIONS

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CATALYZING ACTION

The study will serve as a critical stepping stone towards broader empirical efforts to quantify methane emissions from abandoned coal mines. It will guide the development of policies for sustainable mine closure and long-term mitigation.



SIGNIFICANCE FOR DECISIONMAKERS

The study is one of the first empirical assessments of methane emissions from abandoned underground coal mines. Findings will be critical to evaluate the contribution of abandoned coal mines to India's methane emissions and guide mitigation.



STUDY APPROACH/ACTIVITIES

Current national inventories often rely on default Tier 1 emission factors that do not account for site-specific variations or sealing status, potentially underestimating emissions. The study will apply a Tier 2 approach to develop improved estimates, by combining field measurements, mine assessments and comparisons with default emission factors.

First, the study will develop a comprehensive list of abandoned mines in India, along with practical information including mine closure date, production volume during the closure, and mine status, based on field visits and consultation with area managers. Then, it will obtain measurements of methane emissions on a sub-set of mines using a methanometer, followed by validation through analysis of air samples collected from each site. These measurements will be used to define emission factors for different mine closure statuses encountered in the field survey. Finally, the activity data and emission factors will be combined to estimate national emissions from abandoned underground coal mines in India.

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.