



# Recommendations on coal mine methane for Indonesia's Second NDC

Recommendations for the Ministry of Environment and Forestry on national policies on coal mine methane reporting and mitigation as part of the Second Nationally Determined Contributions (SNDC) which will be submitted to UNFCCC before COP 29.

---

Published date: 30 August 2024

Submitted by: Dody Setiawan

Contact: [dody@ember-climate.org](mailto:dody@ember-climate.org)

## About Ember

Ember is an independent energy think tank that aims to accelerate the clean energy transition with data and policy. It creates targeted data insights to advance policies that urgently shift the world to a clean, electrified energy future.

---

# Strengthening commitment to address coal mine methane in the second NDC

Indonesia is currently developing the Second Nationally Determined Contribution (SNDC) which will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC). Ember appreciates the Ministry of Environment and Forestry (MoEF)'s efforts to gather suggestions and inputs from various stakeholders in the preparation of this Second NDC. Based on the public consultation held by the MoEF on August 20, 2024, Ember has prepared several recommendations, specifically related to coal mine methane (CMM) emissions.

In 2021, the Government of Indonesia signed the Global Methane Pledge (GMP), a global agreement to reduce methane emissions by at least 30% by 2030. Methane is a greenhouse gas with a global warming potential up to 30 times higher than carbon dioxide. Indonesia, as one of the largest coal producers in the world, releases substantial amounts of methane from the coal mining industry.

Thorough estimation and reporting is required to formulate effective strategies and policies to address methane emissions. Here are several inputs for the formulation of the Second NDC, Biennial Transparency Report (BTR) as well as other relevant documents:

1. Recalculate coal mine methane emissions
2. Incorporate additional emissions from underground coal mines
3. Develop region-specific emission factors for coal mine methane
4. Commit to integrating direct measurement in underground coal mines
5. Commit to enforcing company-led emission reporting of coal mine methane
6. Implementation of methane mitigation across surface and underground coal mines
7. Limit coal expansion to ensure sustainability of the industry and prepare for a future just transition

---

# 1. Recalculate coal mine methane emissions using an “average” emission factor

---

The Second NDC will use 2019 emission data as the baseline. Considering the substantial increase in knowledge and guidance available in the latest IPCC report (AR6), we would encourage this data to be reassessed, using the most up to date methodological approach. This will be critical to avoid incomplete reporting and ensure our emissions baselines are an accurate starting point for government decision making.

According to the third Biennial Update Report (BUR), Indonesia reported coal mine methane (CMM) emissions of 128 kilotons CH<sub>4</sub> in 2019. However, Ember's analysis shows that this estimate was based on emission factors and coal production data that is either out of date or no longer considered best practice.

The estimate of coal mine methane within the third BUR, uses an emission factor of 0.3 m<sup>3</sup>/ton of coal to calculate methane emissions from coal mines. Under the IPCC guidance for estimating coal mine methane, this would be considered a “low emission factor” that should only be utilised in mines shallower than 25 metres. In the case where the depth of a coal mine is unknown, the IPCC recommends using an “average” global emission factor of 1.2 m<sup>3</sup>/ton.

In Ember's recent assessment of Indonesia's coal mines, we recommend the use of an “average” global emission factor. Currently there are more than 400 coal mines with diverse characteristics. Unfortunately, coal mine depth and production of each coal mine is not yet available. As a reference, [Kaltim Prima Coal](#) mines are up to 64 m deep.

If the BUR assessment in 2019 was undertaken utilising this improved emission factor, the estimated total fugitive methane emissions of the coal sector would have increased from 128 kt CH<sub>4</sub> to 537 kt CH<sub>4</sub>.

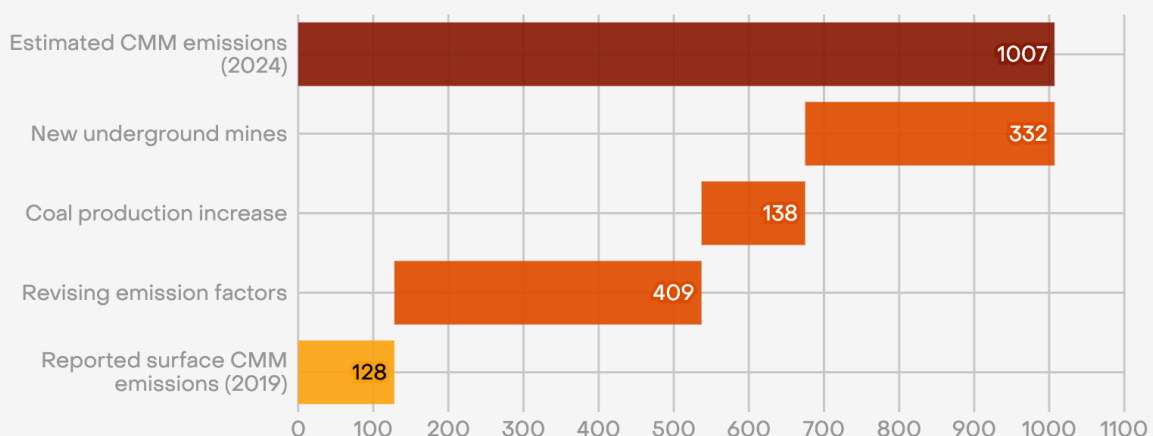
## 2. Incorporate the additional emissions of underground mining

Coal mine methane emissions were estimated based on national coal sales data, not coal production. Additionally, the production of underground coal mines is not yet considered.

While Ember recognises that over 95% of Indonesia’s coal mining production is conducted as surface mining, The Ministry of Energy and Mineral Resources (ESDM) notes that there are [15 underground mining companies](#) in Indonesia. While the total number of underground mines is publicly unclear, underground coal mines are estimated by the IPCC to have an average methane intensity that is up to 25 times higher than surface coal mines. This significant increase in emissions intensity could have a material impact on overall coal mine methane emissions.

### Indonesia should use appropriate emission factors and include underground coal mines in CMM emission estimates

CMM emissions (kt CH4)



---

In Ember's report, we highlighted that the [largest underground coal mine in Indonesia](#), is currently operating with a production capacity of 20 million tons per year, at a depth of 650 metres. This would make it a globally significant underground mine, with the potential of releasing significant amounts of methane.

If operating at full capacity and without mitigation efforts, this mine alone could produce up to 332 kilotons CH<sub>4</sub> emissions.

### 3. Develop region-specific emission factors for coal mine methane to improve the overall accuracy of national estimates

---

Indonesia currently uses the IPCC Tier 1 method for calculating coal mine methane emissions, with global emission factors, as mentioned above.

These emission factors need to be upgraded in general, but there is also the opportunity to develop and incorporate a more nuanced set of regional emission factors that would better address the regional diversities of coal mining in Sumatra and Kalimantan.

The Government has planned to develop country-specific emission factors for the energy sector's methane emissions. The IPCC recommends developing region-specific emission factors based on coal characteristics (Tier 2). Region-specific emission factors have been implemented in other countries such as the [United States](#), [Australia](#), [Russia](#), and [China](#).

---

## 4. Commit to integrating direct measurement of Underground coal mines

---

For underground coal mines specifically, the government should mandate direct measurement. Methane emissions from underground coal mines are significantly higher than from open-pit mines. Furthermore, methane gas from coal mines poses operational risks for mine workers.

Since 2009, several underground coal mine accidents have resulted in [over 50 fatalities](#).

Direct measurement of methane is expected to reduce the risk of accidents caused by methane gas. Additionally, the data obtained can be used to prepare for the implementation of coal mine methane mitigation projects.

## 5. Commit to enforcing company-led emission reporting of coal mine methane

---

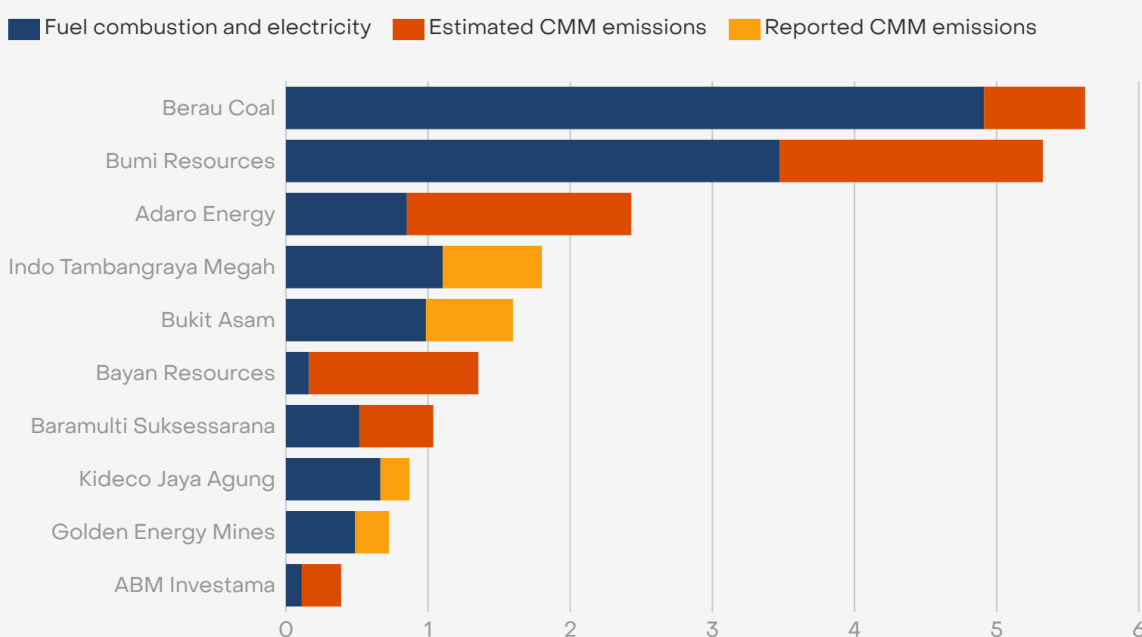
The preparation of greenhouse gas inventories is regulated under [Presidential Regulation No. 98/2021](#) concerning Carbon Economic Value. The Ministry of Energy and Mineral Resources (ESDM) has also regulated the preparation of GHG inventories for the energy sector according to [Ministerial Regulation No. 22/2019](#). However, GHG emission reporting has not yet been integrated into the licensing process.

Ember's research shows that [6 out of 10 of the largest coal companies](#) in Indonesia do not report coal mine methane emissions in their sustainability reports. Yet, methane emissions are one of the contributors to GHG emissions in the coal mining sector.

GHG emission reporting needs to be integrated into the business licensing process. For example, in addition to the AMDAL (Environmental Impact Assessment) document, GHG emission reporting should be an additional requirement in the process of submitting the RKAB (work and budget plan) for coal production to the Ministry of Energy.

### Six out of ten big coal companies did not report coal mine methane, a significant contributor to coal mining emissions

Indonesian coal company emissions in 2023 (million tonnes of carbon dioxide equivalent)



Source: Company's sustainability reports and Ember analysis · Coal mine methane (CMM) emissions are estimated using IPCC method for fugitive emission from surface coal mining with average emission factor of 1.2 m<sup>3</sup> CH<sub>4</sub>/t and methane's global warming potential of 29.8.



## 6. Implement coal mine methane mitigation, across surface and underground mines

Ember appreciates the Indonesian Government's step to include fugitive emission reduction actions from coal mines in the Second NDC. This is a critical step to enable the opportunity for industry action and government led regulation to mitigate coal mine methane.

For surface and underground coal mines, pre-mine drainage is a critical first step. This involves dewatering and capturing methane gas ahead of conducting mining at the coal

face. It has a more than 20 year history of successful power generation in underground and surface coal mines in Australia, Poland, China and the US, as this gas is often rich enough for power generation. It has also been successfully tested at [Coronado's Curragh mine](#) for fueling trucks.

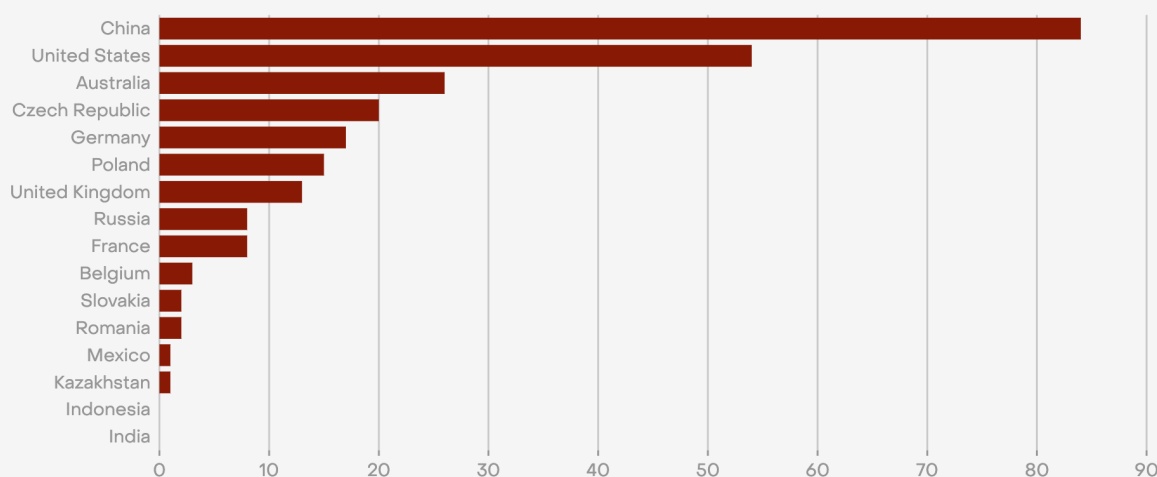
Additionally, methane drainage can reduce the risk of work accidents caused by methane gas in underground mines.

Specifically for underground coal mines, methane mitigation can also be achieved by capturing Ventilation Air Methane (VAM). VAM mitigation has been commonly implemented in the US and China, using Regenerative Thermal Oxidiser technology.

Indonesia should begin an investigation into developing regulatory guidance and incentives for CMM mitigation. CMM mitigation projects can be supported through carbon trading mechanisms, which are currently being implemented in the electricity sub-sector.

### China and United States have the highest number of operational coal mine methane mitigation projects

Number of operational coal mine methane mitigation projects



Source: Global Methane Initiative, 2024



---

## 7. Limit coal expansion to ensure the sustainability of the industry and prepare for a future just transition

---

The Ministry of ESDM has outlined Indonesia's [long-term coal outlook](#), where coal production is expected to remain stable until 2035 before declining to 250 million tons by 2060. Global energy transition and current and future import restrictions in major importing countries, especially India and China, will be major factors in the long-term global reduction of coal demand.

With a total coal production quota of 922 million tons in 2024, Indonesian coal producers can meet both domestic and export market needs. Opening new mining areas or increasing production quotas could increase the risk of stranded assets and put pressure on coal prices.

The central and regional governments should begin focusing on economic transformation in coal-producing regions. The government needs to start preparing a just transition pathway in these regions. The development of the transition pathway should involve all relevant stakeholders, including local communities, industries and non-governmental organisations.

The government could learn from other coal producing regions in other countries, which already undertook economic transformation. In general, alternative industries for coal regions include development of renewable energy projects as well as critical mineral downstream industries which support energy transition.

Our research indicates that renewable energy projects in Indonesian coal-producing regions could create [nearly 100,000 jobs](#) and open investment opportunities of over USD 9 billion.

## Supporting Information

This policy response was submitted to the Ministry of Environment and Forestry (MoEF) as Indonesia's NDC focal point, following public consultation on the development of the Second NDC on 20 August 2024.