GLENCORE

Fact Sheet
Methane Emissions

What is methane?

Methane is a naturally occurring gas that is found in the earth's atmosphere.

A flammable hydrocarbon, it is a principal component of natural gas.

Methane's lifetime in the atmosphere is shorter than carbon dioxide (CO_2) but it is more efficient at trapping heat.

For this reason, the Greenhouse Gas impact of methane is greater than that of carbon dioxide.

Where does it occur?

Methane is emitted from natural processes, industry, agriculture, and waste management activities.

It can be emitted during the production and transport of coal, natural gas and oil.

Domestic livestock (cattle, pigs, sheep, and also goats) produce methane as part of their digestive processes and this is a significant component of Australia's methane emissions.

Why does coal mining generate methane emissions?

All coal seams contain some level of gas.

These gases are released when coal is mined in either open cut and underground operations, although the amount of methane is dependent on a number of factors, including coal seam depth and the amount of carbon within the coal being mined.

In general, underground mining releases more methane than open cut mining because the gas content of deeper-lying coal seams is higher.

In open cut operations, methane escapes from freshly-exposed coal faces, overburden and strata that can be fractured or distressed as a result of blasting activities.

How do coal mines manage methane emissions?

Management of gas is a major safety requirement for underground coal mining.

Current best practice for gas management involves draining the gas from the seam before underground mining occurs.

This assists in reducing a mine's greenhouse gas (GHG) emissions by allowing the capture and destruction of methane.

Over the last 10 years, Glencore's Australian coal business has reduced GHG emissions by over 28MT CO_2-e through flaring or generating electricity from the gas captured from its underground operations.

We will continue to consider and implement gas abatement opportunities in line with our global decarbonisation pathway where it is considered reasonable and feasible to do so.

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What is Glencore's decarbonisation pathway?

Glencore has committed to a decarbonisation pathway across its global mining business and seeks to achieve net zero total CO_2-e emissions by 2050.

Glencore will continue to responsibly operate its portfolio of mines and projects until they reach the end of their economic lives while delivering on Glencore's ambition to reduce its total emissions in line with its decarbonisation pathway.

In the short and medium term, Glencore is targeting a 15% emission reduction by 2026 and a 50% reduction in emissions by 2035 across its global mining business.

This includes:

- Scope 1 emissions that are the direct result of our activities, such as fugitive methane emissions from our mines or the consumption of diesel fuel in heavy mobile equipment.
- Scope 2 emissions are indirect emissions generated by the electricity purchased to power our businesses.
- Scope 3 emissions, are all other indirect emissions linked to our operations including the consumption of our product.

All of our Australian mining operations and future projects have been factored into our emissions reduction targets.

How does gas drainage work?

There are two phases of gas drainage in underground mining operations.

First, gas is extracted from the coal seam before mining begins in each longwall panel (known as pre-drainage).

This involves drilling horizontal holes within the coal seam to be drained from either within the underground mine workings (underground inseam – UIS) or from the surface (surface to inseam – SIS)

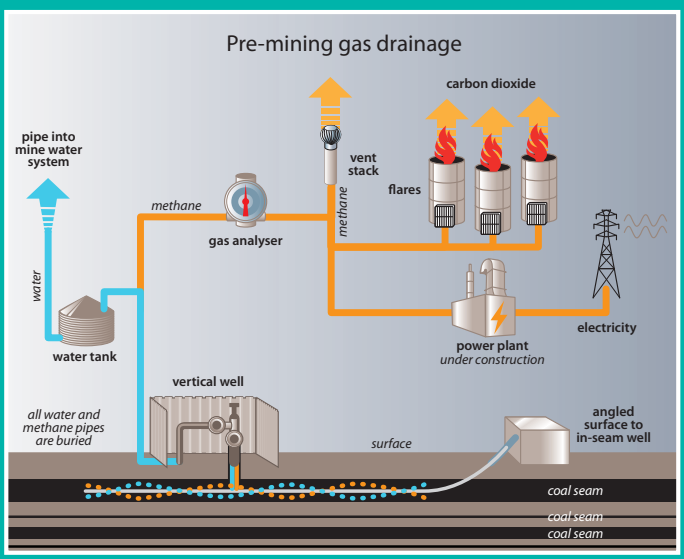
Gas flows out of the coal seam under natural pressure through these bore holes into a pipeline collection system.

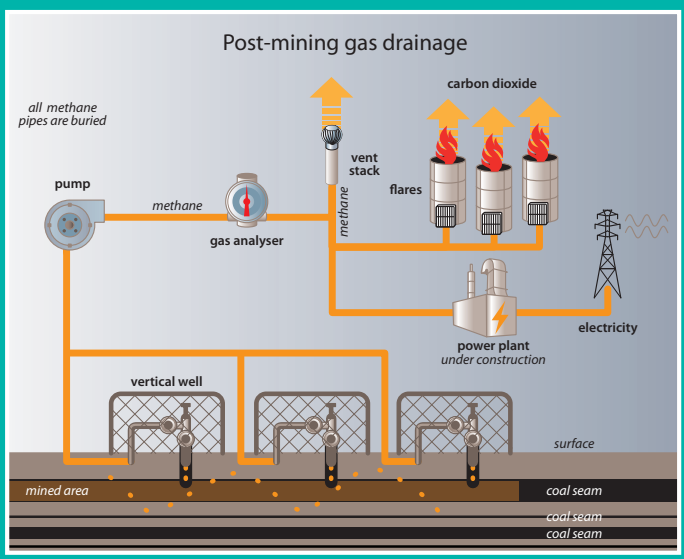
The second phase is called post-drainage where vertical and/or horizontal boreholes are drilled into the longwall workings before mining so that drainage can take place after the coal has been mined.

The gas is removed under suction to prevent it entering the nearby mine workings, where it can cause a safety issue.

The gas captured at both first and second phases is either flared – or, in the case of our Oaky Creek, Integra and Bulga operations, sent to specially-designed power plants that use the methane to generate electricity.

Both the flaring and gas generating processes reduce GHG emissions by converting methane to carbon dioxide and water through combustion.





What are we doing to reduce emissions?

Each of our operations continues to look at ways to reduce emissions.

This includes:

- Investment in flaring or specially-designed power generation plants for methane captured at underground mining operations;
- Minimising the amount of flaring and maximising transport of gas to power generation plants;
- Limiting the length of material haulage routes (where feasible) at our open cut operations to minimise transport distances and associated fuel consumption;
- Selecting equipment and vehicles that have high energy efficiency; and
- Scheduling activities so that equipment and vehicle operation is optimised.

Glencore also continues to work on research projects that investigate better measurement, capture and mitigation of methane emissions from underground mines.

Over the past 20 years, this has been done in partnership with the Australian Coal Industry's Research Program (ACARP), the CSIRO, the University of NSW and the University of Queensland.

Management at underground sites

Each of our underground operations where gas drainage activities are required commit substantial capital and operational expenditure in developing and operating methane management and abatement systems.

Our Oaky Creek complex in central Queensland has an extensive gas management network in place.

In 2021 alone, the site spent $50 million on maintenance, drilling, and pipe networks to transport the gas to a power generator owned and operated by EDL.

Since re-starting operations at Integra Underground in the NSW Upper Hunter region in 2017, the site has invested almost $5million on infrastructure and almost $60million to date on active management of gas.

Similar to Oaky Creek, Integra transports methane to a nearby power generator owned and operated by EDL.

While Bulga Underground is no longer in operation, the gas drainage system at the Upper Hunter site remains in place and the methane extracted powers a 9MW generator owned and operated by site.

More than $31million has been spent on infrastructure and active gas management since mining ended in 2018 as the site continues work that not only reduces emissions but also significantly reduces the energy purchased from the electricity grid.

Reporting and monitoring

We report GHG emissions under the **Australian National Greenhouse and Energy Reporting** (NGERS) legislative framework.

This framework establishes rules for emissions reporting in Australia and includes a detailed Measurement Determination, a statutory instrument that provides methods, criteria and measurement standards for major industries to calculate GHG emissions and energy data.

The Measurement Determination is updated annually by the Australian Government to reflect improvements in emission estimation methods. It specifies the methodology for measuring emissions from coal mines, and is supported by a statutory guideline that relates specifically to coal mining.

There is a range of emerging technologies for the detection of fugitive methane emissions, such as methane sensors mounted on satellites, aircraft and drones.

These technologies are developing and gaining improved resolution, but still have a high degree of uncertainty in estimating instantaneous emission rates, particularly for diffuse emission sources.

Due to the emerging nature of such technologies and the instantaneous, discontinuous nature of measurements, they are not appropriate methods to estimate annually-reported emissions.

The Australian Government has examined the use of satellite technologies within the March 2021 and September 2021 Quarterly Updates of Australia's National Greenhouse Gas Inventories.

In these publications, Government has considered it premature to use such technologies to directly estimate annual emission inventories, and has advised that caution needs to be taken when comparing instantaneous satellite methane emission estimates with NGER-reported annual emission inventories.