

# Air pollution factsheet

## Methane

### What is methane?

Methane (CH<sub>4</sub>) is a colourless, flammable greenhouse gas produced by various natural and human made processes. Methane is produced naturally by the decomposition of organic matter, and is formed in bogs, underground gas pockets, and in the digestive systems of animals and bacteria.

Natural gas, a mixture of methane and various other hydrocarbons, is extracted from underground reservoirs to provide fuel for much of the world, and leaks from this industry are a major source of emissions. Methane emissions from livestock and agricultural processes are also significant contributors to the global carbon budget. The current average CH<sub>4</sub> concentration in the troposphere

is approximately 2 parts-per-million. This has been steadily rising since the industrial revolution, and is projected to continue increasing due to anthropogenic emissions upsetting the balance of Earth's "carbon cycle".

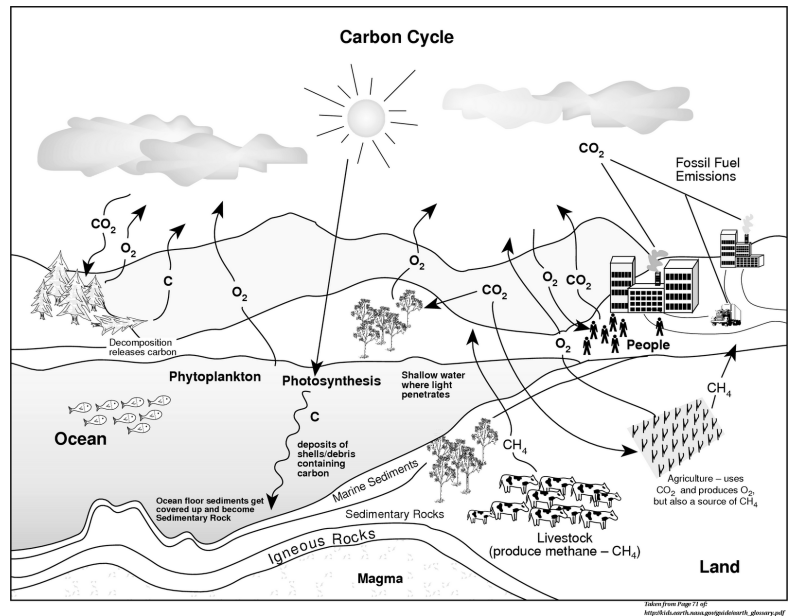


Image credited to Leigh Aultman

### Why measure it?

While methane is a natural component of Earth's atmosphere, it is also a potent greenhouse gas. Over a 20-year period, methane has 56 times the global warming potential of CO<sub>2</sub>. Though not toxic, methane is a chemically unreactive and long-lived greenhouse gas. Excessive anthropogenic methane emissions from agriculture and the fossil fuel industry therefore have a considerable impact on global warming and climate change.

A complex relationship exists between Earth's climate, the atmosphere, and the carbon locked in "sinks" such as forests and oceans. Many aspects of the carbon cycle are poorly understood, and many key sources and sinks have yet to be studied in detail. More accurate measurements of methane emissions allow climate models to be more accurate, which in turn allows predictions and policies to be more effective.

### How to measure methane.

Methane absorbs light at a characteristic wavelength in the infrared part of the spectrum. Simple absorption-based spectroscopic techniques such as Tuneable Diode Laser Absorption Spectroscopy (TD-LAS) and FTIR can be used to measure methane accurately, but lack the sensitivity required to measure CH<sub>4</sub> at parts-per-billion level precision. To achieve the level of sensitivity required for environmental measurements and atmospheric chemistry research, a more advanced technique such as ABB-LGR's Off-Axis ICOS is required.

The Off-Axis ICOS (Integrated Cavity Output Spectroscopy) technique uses diode lasers to measure CH<sub>4</sub> absorption in the IR, and features a high-finesse, multi-pass optical cavity to create an effective folded path length of several kilometres. This patented cell configuration allows for extreme sensitivity and fully resolved spectra, while avoiding unnecessary design complexity, and the need to align the optics ultra-precisely. This means that LGR Off-Axis ICOS instruments are rugged, and insensitive to temperature changes, shocks, and vibration. The optics can also be easily serviced without any special tools or training.

*ABB-LGR Off-Axis ICOS analysers are available in four configurations:*

### **Microportable**

The GLA131-CH4 microportable methane gas analyser reports measurements of methane and water vapour simultaneously in a package that is compact, crushproof and travels anywhere. Small enough to be hand-carried (even on-board aircraft) and requiring less than 27 watts, the GLA131-CH4 offers opportunities to measure methane anywhere.

- 6kg
- Internal 3-hour battery
- Ultra-fast response time and up to 10Hz measurement rate
- ABB-LGR's most portable version, designed for field use
- UAV-mounted options also available



### **Ultraportable**

Small enough to be carried on-board aircraft (TSA approved size) and requiring less than 70 watts, the UGGA offers opportunities to measure green house gases anywhere.

- 17kg
- Option to run from external batteries
- Wide range of compounds available
- Very versatile option for field or lab use



### **Rackmount**

Highly sensitive, precise, accurate, interference free and wide dynamic range analytical performance for fast, reliable and repeatable results. Simple to use, starts up in minutes, requires no field calibration, no consumables or scrubbers, can be readily field-serviced and has minimal preventative maintenance requirements.

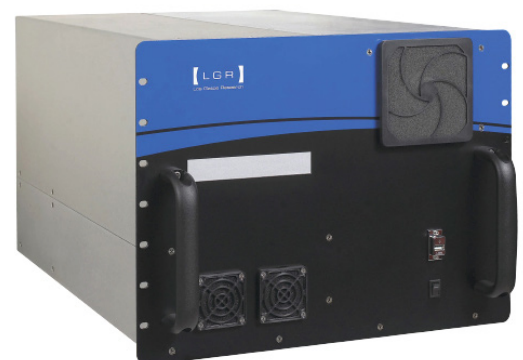
- 25kg
- Standard 19" rack-mounted chassis
- Wide range of compounds and options available
- Can be used with external pumps to enable faster response times



### **Enhanced Performance Rackmount**

The "Enhanced Performance" series incorporates proprietary internal thermal control for ultra-stable measurements with unsurpassed precision, accuracy, linearity, stability and drift.

- 40kg
- Temperature-stabilised 19" rackmounted chassis
- Maximum precision with minimal drift
- Wide range of compounds and options available
- Can be used with external pumps to enable faster response times



**Contact us for more information on how we can help you monitor methane.**

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