



# Coal Mine Methane

An opportunity to mitigate methane emissions, generate cleaner energy and drive revenue through carbon finance.

Methane (CH<sub>4</sub>) is a hydrocarbon, the primary constituent of natural gas and is a potent greenhouse gas (GHG). Current atmospheric concentration levels of methane are more than double the known natural range over the last 650,000 years<sup>1</sup>.

Methane is 21 times more effective at trapping heat than carbon dioxide (CO<sub>2</sub>), so although global emissions are small by comparison, its effect on global warming is significant, accounting for about 14% of global GHG emissions.

Major sources of methane:

Man-made (60%) = coal mining, landfills, agriculture, oil & gas

Natural (40%) = wetlands, permafrost, gas hydrates, termites

The mining of coal, a major global source of fuel, releases methane into the atmosphere. It can be an explosive and poisonous hazard in underground mines so must always be removed.

Coal Mine Methane (CMM) accounts for 8% of total global man-made methane emissions. By 2020, it is estimated that this will equate to about 150 million tons of carbon dioxide equivalent (tCO<sub>2</sub>e)<sup>2</sup>.

There are two main categories of CMM:

1) Drainage Gas: extracted before and during coal mining with methane gas concentrations of 25 - 50%

2) Ventilation air methane (VAM): large quantities of air vented from mine shafts contain minute amounts of methane (less 1%). This constitutes nearly 50% of all CMM emissions.

As CMM is significantly more potent than CO<sub>2</sub> and can be used as a cleaner energy source, substantial beneficial opportunities exist in the capture and utilization of methane.

Coal mine operators regularly drain and ventilate their underground sites of poisonous and hazardous methane. A properly planned and well executed methane capture and utilisation project will not interfere with the existing mining process.

## Green Holdings

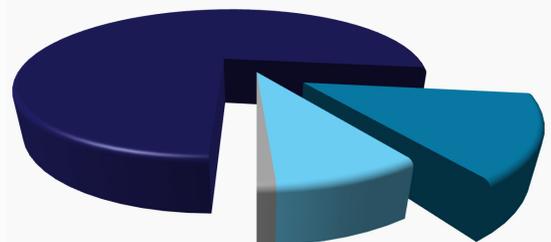
- develops all the CDM components of projects
- uses proven technologies and existing methodologies
- engineering and financial structuring expertise to implement projects with minimal impact to project host

## Benefits

- Reduce GHG emissions
- Utilize a valuable, cleaner source of energy
- Generate Revenue

## Global Man-made GHG Emissions - 2004

methane 14%  
nitrous oxide 8%  
carbon dioxide 77%  
high global warming potential gases 1%

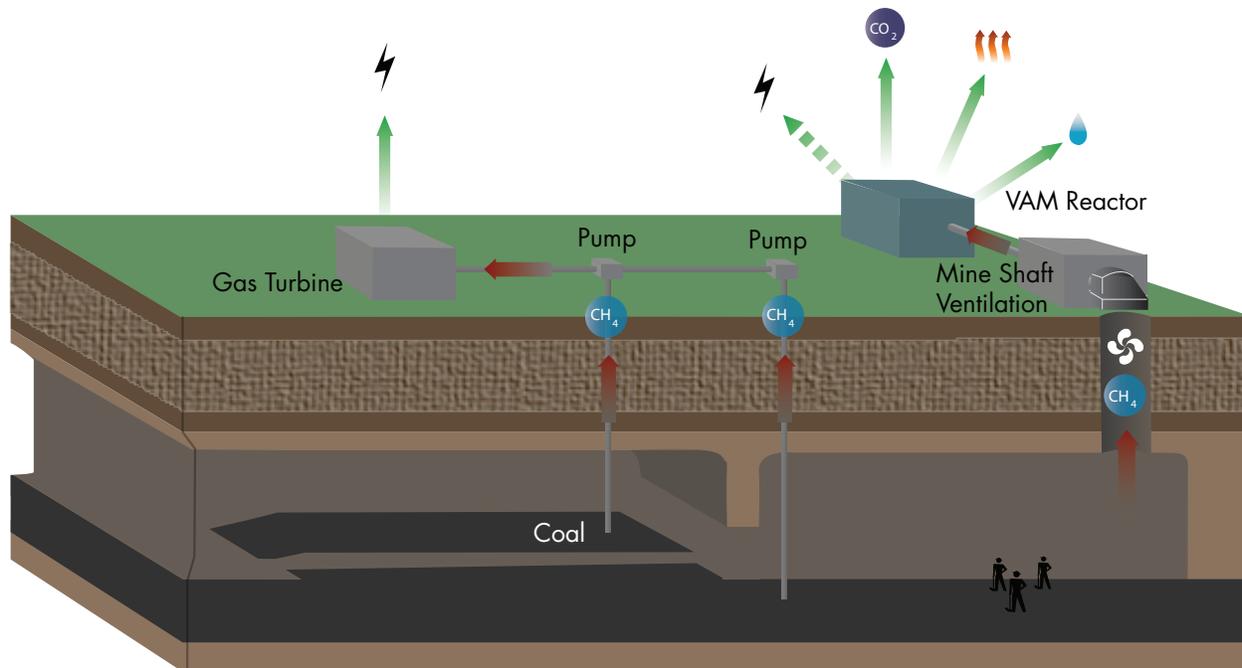


Source: IPCC Fourth Assessment Report: Climate Change 2007

<sup>1</sup> IPCC Fourth Assessment Report: Climate Change 2007

<sup>2</sup> Methane to Markets Partnership

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**Two example methods of mitigation and utilization are:**

1. VAM Reactor – oxidizes VAM to produce water, CO<sub>2</sub> & heat
2. Feed drainage methane into a gas turbine to produce electricity

## Background

The Kyoto Protocol created flexible mechanisms allowing participating industrial nations to meet their GHG emissions reduction commitments by funding projects in developing countries under the Clean Development Mechanism (CDM), and in other industrialised nations through Joint Implementation (JI).

Green Holdings utilizes technical and financial engineering expertise along with its comprehensive understanding of the carbon markets and currencies to reduce greenhouse gas emissions.

**Converting existing liabilities into long-term revenue generating assets.**