

# METHANE MADNESS

G. M. Pillai

Most of what we call 'Natural Gas' is comprised primarily of methane ( $\text{CH}_4$ ). Methane, in its pure form, is a clear, odourless gas produced by decomposition of organic material. There was a time when developed countries used to hold developing nations like India and China responsible for global warming, because of the methane emitted from cowdung and paddy fields. But that chorus has stopped long ago and the tide seems to have turned. The President of the United States recently made an appeal to the developed world to take up methane farming in a big way, as an energy alternative to costly and depleting fossil fuels. As a chemical compound with carbon and hydrogen atoms, methane has versatile uses, viz. as cooking gas, as transportation fuel, as feedstock for fertilizer production, for electricity generation, in the longer term as a source of alternative liquid fuels (gas to liquid conversion) and for isolating hydrogen for fuel cells. It can be produced from as simple a substance as cowdung. But was the U.S. President exhorting everybody to do livestock rearing for sustainable methane farming? Probably not. Perhaps, he was laying the ground for something entirely different - to mine methane from methane gas hydrates.



Methane Hydrate

Methane gas hydrates exist along the continental margins worldwide, mostly in oceanic sediments, hundreds of metres below the seafloor in water depths more than 500 metres or in permafrost areas. The United States Geological Survey (USGS) has recently estimated that reserves of methane hydrates are twice the volume of all fossil fuels (oil, natural gas and coal) combined. Even though scientists have known about methane hydrates for over a century, the real interest in them began in 1964. By 1995, the USGS completed its most detailed assessment of gas hydrate resources. Today, the potential to extract commercially relevant quantities of natural gas from hydrates is speculative at best. It is also critical whether it would take more energy to extract the gas hydrates than the gas it may provide. The US Federal Government, in 1999, initiated a research and development programme through its Department of Energy (DoE) and in 2000, even enacted a 'Methane Hydrate Research and Development Act'. The Act has authorised appropriation of \$430 million for the five year period of 2001-2005 for this R&D programme.

It is interesting in this context to critically view the recently launched 'Methane to Markets Partnership' initiatives of the US government. They were successful in getting India, Brazil, China, Russia and nine other countries to sign the partnership. The project envisages capturing and using nine million tons of methane annually - emitted from landfills, coal mines and oil and gas operations - by 2015, for producing energy. But critics view this as an attempt to undermine the Kyoto Protocol. There is no attempt to reduce the emission of methane, only to capture it. Experts point out the US's earlier initiative - 'Carbon Sequestration Leadership Forum' - to defeat the Kyoto Protocol. It could perhaps also be a precursor to large-scale methane mining from ocean beds and permafrost!

The DoE of the US government confesses that methane, as a greenhouse gas is 20 times more harmful to the ozone layer than carbon dioxide. Large-scale extraction and use of hydrates to produce methane gas could result in extensive leakage of methane or its chemical conversion to carbon dioxide. There are also warnings about the stability of ocean slopes and floors. Major seafloor slides can cause **tsunami** - large oceanic waves that bring about catastrophic damage to low-lying coastal areas. The chances of further pollution of the already toxic oceans, through large-scale drilling is another major threat. Carolyn Ruppel, Associate Professor of Geophysics in Georgia Institute of Technology, who is in charge of the gas hydrate research programme says, "Even if a portion of the methane released from hydrates gets out of the oceans and into the atmosphere, it could exacerbate global warming and lead to synergy between destruction of hydrate, release of methane and climate change." No wonder methane hydrate has another name - 'burning ice'!

