

'flammable ice'

8 hours ago | China



Methane hydrate, or 'flammable ice', is a highly energy-intensive fuel source

China has for the first time extracted gas from an ice-like substance under the South China Sea considered key to future global energy supply.

Chinese authorities have described the success as a major breakthrough.

Methane hydrates, also called "flammable ice", hold vast reserves of natural gas.

Many countries including the US and Japan are working on how to tap those reserves, but mining and extracting are extremely difficult.

What is 'flammable ice'?

The catchy phrase describes a frozen mixture of water and gas.

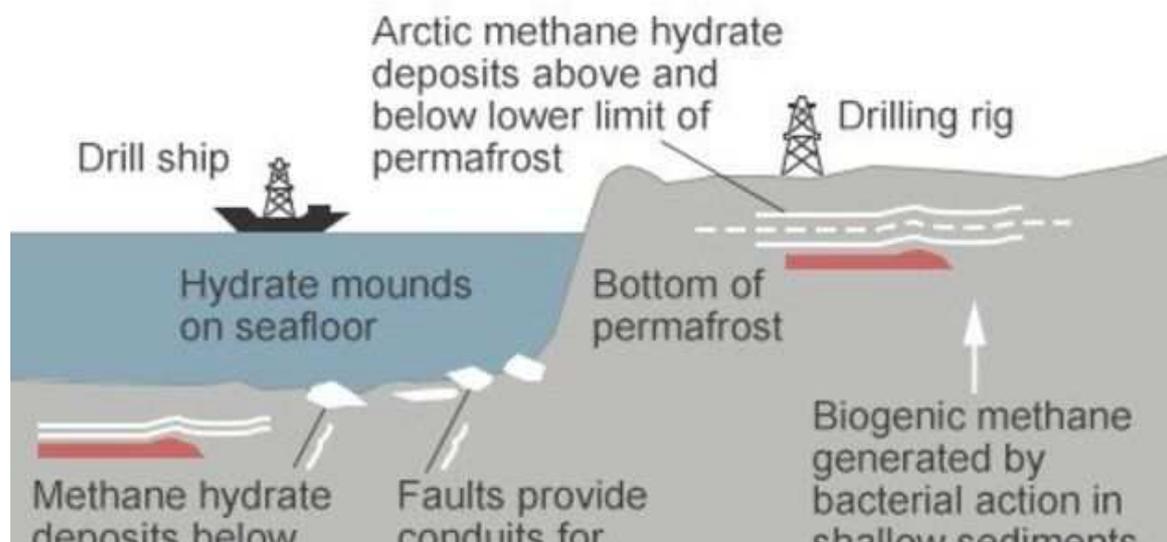
"It looks like ice crystals but if you zoom in to a molecular level, you see that the methane molecules are caged in by the water molecules," Associate Professor Praveen Linga from the Department of Chemical and Biomolecular Engineering at the National University of Singapore told the BBC.

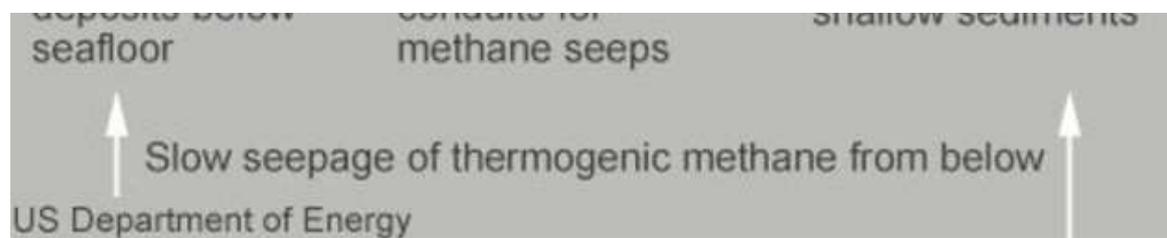
Officially known as methane clathrates or hydrates, they are formed at very low temperatures and under high pressure. They can be found in sediments under the ocean floor as well as underneath permafrost on land.

Despite the low temperature, these hydrates are flammable. If you hold a lighter to them, the gas encapsulated in the ice will catch fire. Hence, they are also known as "fire ice" or "flammable ice".

By lowering the pressure or raising the temperature, the hydrates break down into water and methane - a lot of methane. One cubic metre of the compound releases about 160 cubic metres of gas, making it a highly energy-intensive fuel.

How methane hydrates are formed





The crux, though, is that extracting the gas is extremely difficult and energy consuming.

Methane hydrates were discovered in Russia's north in the 1960s, but research into how to extract gas from them from maritime sediment only began in the last 10 to 15 years.

As a country lacking any natural energy resources, Japan has been a pioneer in the field. Other leading countries are India or South Korea - who also don't have their own oil reserves.

While the US and Canada are also active in the field, they have been focussing on hydrates under permafrost in the far north of Alaska and Canada.

Why is it important?

Methane hydrates are thought to have the potential to be a revolutionary energy source that could be key to future energy needs - likely the world's last great source of carbon-based fuel.

Vast deposits exist basically underneath all oceans around the globe, especially on the edge of continental shelves. Countries are scrambling for a way to make the extraction safe and profitable.

China describes its latest results as a breakthrough and Mr Linga agrees. "Compared with the results we have seen from Japanese research, the Chinese scientists have managed to extract much more gas in their efforts."

"So in that sense it is indeed a major step towards making gas extraction from methane hydrates viable."

It's thought that there is as much as 10 times the amount of gas in methane hydrates than in shale for instance. "And that's by conservative estimates," says Prof Linga.



Methane hydrates recovered in the Gulf of Mexico by the US Geological Survey

China discovered flammable ice in the South China Sea in 2007.

Nestled between between China, Vietnam and the Philippines, the South China Sea has in recent years been an increasingly contentious issue, with Beijing claiming sole sovereignty over it - and hence rights to all natural reserves hidden under its surface.

What next?

While indeed a breakthrough, China's success is still only one step on a long journey, Prof Linga explains.

"It is the first time that production rates actually seem promising," he says. "But it's thought that only by 2025 at the earliest we might be able to look at realistic commercial options."

An average of 16,000 cubic meters of gas with high purity have been extracted per day in the Shenhu area of the South China Sea, according to Chinese media.

But Mr Linga also cautions that any exploitation of the reserves must be done with the utmost care because of **environmental concerns**.

The potential threat is that methane can escape, which would have serious consequences for global warming. It is a gas that has a much higher potential to impact climate change than carbon dioxide.

So the trick is to extract the gas without any of it slipping out.