

Replacing one gas with another helps efficiently extract methane from permafrost

December 30 2019



Credit: Skolkovo Institute of Science and Technology

Scientists from Skoltech and Heriot-Watt University proposed extracting methane by injecting flue gas into permafrost hydrate reservoirs. Since the flue gas contains carbon dioxide, the new technology will also

contributes to reduction of this green house gas in the Arctic atmosphere. The results of their study were published in the journal *Scientific Reports*.

The Russian Arctic is actively developing due to exploitation of recently discovered oil and gas fields. However, operations in the Arctic region face numerous geological challenges. One of the most serious of them is formation of gas hydrates in frozen rock mass. Gas hydrates are ice-like crystalline structures formed by water and gas molecules. Their accumulations strongly hinder oil and gas field development and trigger spontaneous methane emissions into the atmosphere on the Arctic coast and shelf.

The scientists from the Skoltech Center for Hydrocarbon Recovery (CHR) and from Heriot-Watt University (Edinburgh, Scotland) developed a unique method for extracting methane from permafrost gas-hydrates by injecting flue gases, generated by fuel combustion. The main sources of flue gas are waste gases from coal-burning power plants and metallurgical plants and other industrial facilities.

The research team has found optimal injection conditions and identified the effect of [flue gases](#) on the efficiency of methane recovery. It is important to emphasize that [flue gas](#) contains considerable amounts of the green house gas carbon dioxide that will also be buried subsurface. The [carbon](#) dioxide forms a [hydrate](#) replacing the original methane hydrate. The new technology is essential for development of the hydrocarbon fields in the highly sensitive Arctic environment.

"Our approach not only helps extract methane and prevent its free release into the atmosphere but also reduces [carbon dioxide](#) emissions. I would say our method offers a double dividend in terms of environmental safety," says Leading Research Scientist at CHR, Evgeny Chuvilin.

More information: Aliakbar Hassanpouryouzband et al, An Experimental Investigation on the Kinetics of Integrated Methane Recovery and CO₂ Sequestration by Injection of Flue Gas into Permafrost Methane Hydrate Reservoirs, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-52745-x](https://doi.org/10.1038/s41598-019-52745-x)

Provided by Skolkovo Institute of Science and Technology

Citation: Replacing one gas with another helps efficiently extract methane from permafrost (2019, December 30) retrieved 2 May 2024 from <https://phys.org/news/2019-12-gas-efficiently-methane-permafrost.html>

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