

# How to reduce greenhouse gas? Tips from a methane-eating microbe

November 13 2020, by Aliyah Kovner

---



Credit: AI-generated image ([disclaimer](#))

Scientists have determined the structure of a unique enzyme, produced by a species of methane-eating bacteria, that converts the greenhouse gas into methanol—a highly versatile liquid fuel and industrial product ingredient.

Their new study, published in the *Journal of the American Chemical Society*, is the first to report the structure of the enzyme, called soluble methane monooxygenase (sMMO), at room temperature in both its reduced and oxidized forms. This detailed structural information will help researchers design efficient catalysts for industrial methane to methanol conversion processes.

"We were able to reveal the structure of sMMO and see how the environment of the two iron atoms in the enzyme's active site changes and supports the catalysis of this challenging chemical reaction," said author Jan Kern, a Berkeley Lab bioscientist. The process "involves breaking a carbon-hydrogen bond and insertion of an oxygen—converting a hydrocarbon into an alcohol. Additionally, our results showed the value of using an X-ray [free electron laser](#) (XFEL) in situations where traditional crystallography is not possible, in this case due to the reactive metals within the center of the enzyme."

Studying such enzymes by traditional X-ray methods typically gives incorrect results because of radiation damage. By using XFEL, the researchers were able to get accurate structural information in the two oxidation states.

Bacteria that metabolize methane (methanotrophs) are found in soil and aquatic environments with little to no oxygen. In these anaerobic habitats, the bacteria play a critical role as carbon recyclers; they convert methane (CH<sub>4</sub>) into more useful molecules that they and other organisms depend on.

**More information:** Vivek Srinivas et al. High-Resolution XFEL Structure of the Soluble Methane Monooxygenase Hydroxylase Complex with its Regulatory Component at Ambient Temperature in Two Oxidation States, *Journal of the American Chemical Society* (2020). [DOI: 10.1021/jacs.0c05613](https://doi.org/10.1021/jacs.0c05613)

Provided by Lawrence Berkeley National Laboratory

Citation: How to reduce greenhouse gas? Tips from a methane-eating microbe (2020, November 13) retrieved 8 May 2024 from <https://phys.org/news/2020-11-greenhouse-gas-methane-eating-microbe.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.