

METHANE HYDRATE R&D PROGRAM



Program 099, September 2024



**NATIONAL ENERGY
TECHNOLOGY LABORATORY**

OVERVIEW

Since 2000, NETL has been leading the Department of Energy's Methane Hydrate R&D Program. The primary mission of this program is to advance the scientific understanding of gas hydrates as they occur in nature so that their resource potential and role in climate change can be fully understood. The DOE is working with our international and domestic partners to ensure safe and environmentally prudent gas hydrate development and to maintain U.S. leadership in fundamental and applied energy R&D on gas hydrates in natural systems. This includes enhancing DOE laboratory, university, and industry partnerships that focus on essential assessment of resource concentrations, recovery rates, reservoir behavior, and wellbore stability during methane hydrate production.

PARTNERSHIPS AND STRENGTHS

To achieve goals and expand scientific knowledge of naturally occurring hydrate-bearing formations, NETL's Methane Hydrate Program created partnerships with top researchers across a broad spectrum of organizations, including U.S. National Laboratories and government agencies including the U.S. Geological Survey, domestic and international research organizations, public and private universities and industry entities.

Through these partnerships, NETL's Methane Hydrate R&D Program has succeeded in supporting a range of investigations including: geophysical data analysis for mapping subsurface hydrates, field sampling of hydrate-bearing formations for onsite and laboratory analysis, development of specialized pressure core sampling and handling tools, establishment of world-class laboratory facilities for physical property analysis of hydrate specimens under controlled pressure and temperature conditions and expansion and optimization of numerical models that predict hydrate reservoir behavior. In addition, NETL has established itself as a supporter of emerging hydrate scientists and a communication hub for hydrate researchers and stakeholders worldwide.

PAST PROGRAM ACCOMPLISHMENTS

In its 22 years of collaborative efforts with committed partners, the program has made significant strides in the following R&D areas:

- Evaluating and characterizing the gas hydrate resource in the Gulf of Mexico and Alaska North Slope.
- Designing and testing hydrate sampling and analysis technologies in onshore and offshore environments.
- Sharing knowledge and exchanging data with international partners on hydrate field projects around the world.
- Developing and testing of reservoir modeling codes that incorporate hydrate behavior.
- Building data and knowledge on the role of hydrate deposits in the global carbon cycle and global climate change.
- Leading outreach and communication efforts through the Methane Hydrate Fellowship Program and the "Fire in the Ice" Newsletter.

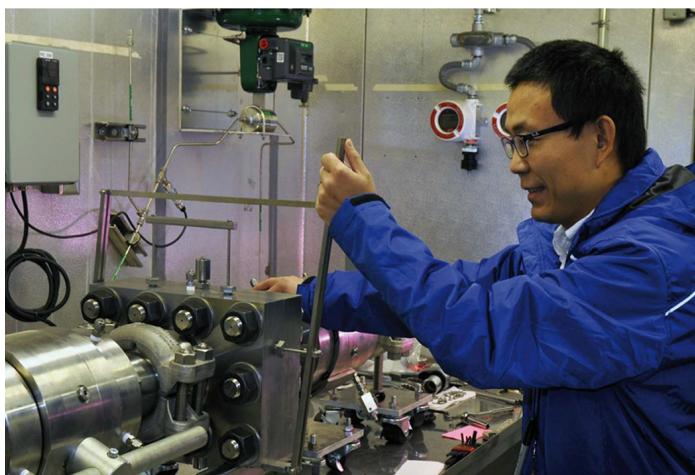
NEW AND ONGOING RESEARCH THRUSTS

HYDRATE-CLIMATE INTERACTIONS – Several research efforts aimed at addressing hydrate-climate interactions are being spearheaded by the National Labs. One project is aimed at determining the effect of climate change on hydrate stability in continental margin settings, and another is investigating the influence of possible future production on the earth's atmospheric carbon budget.

NETL's Research and Innovation Center is collaborating with West Virginia University to conduct an environmental life cycle analysis of gas hydrate systems to understand potential climate impacts of future production of gas from hydrates. USGS researchers will provide geological expertise and production engineering data in support of this project.

Lawrence Berkeley National Laboratory will launch a new investigation of subsea permafrost and sub-permafrost hydrate systems in continental shelf settings using its Tough+hydrate family of modeling tools. The objective is to evaluate the impacts of methane release into the water column in response to ocean warming with a careful look at potential release of CO₂ to the atmosphere after oxidation of the methane. This project also relies on data and expertise provided by the USGS.

Pacific Northwest National Lab (PNNL) is beginning to test realistic strategies for creating stable CO₂ gas hydrate in subsurface geologic reservoirs to examine the viability of pursuing this approach on a commercial scale. The study will rely on the PNNL's [STOMP-HYDT-KE](#) family of simulators.



ESTABLISHING A LONG-TERM TEST SITE – An ongoing and successful effort has been to establish a site for long-term testing of methane hydrate reservoirs on the North Slope of Alaska. The plan for this project was developed through collaboration between NETL and Japan Oil, Gas and Metals National Corporation with technical and scientific expertise provided by the USGS. This project earned recognition as an NETL Science and Technology Accomplishment during 2020.

INTERNATIONAL COLLABORATION – NETL continues to collaborate with methane hydrate scientists and engineers around the world, in an environment of cooperation and knowledge sharing, to achieve a more complete understanding of hydrate deposits as they occur in a wide variety of geologic settings.

OUTREACH – NETL continues to publish “Fire in the Ice,” the methane hydrate newsletter that serves the international hydrate R&D community. In addition, NETL and the National Academies of Science, Engineering and Medicine continue their Methane Hydrate Fellowship program to support promising new researchers in methane hydrate science.

RELEVANT LINKS

NETL Methane Hydrate R&D Program Web Site: <https://netl.doe.gov/oil-gas/gas-hydrates>

NETL's Fire in the Ice Methane Hydrate Newsletter: <https://www.netl.doe.gov/advsearch?tid=113>

U.S. DOE Office of Fossil Energy Methane Hydrate Web Page: <https://www.energy.gov/fe/science-innovation/oil-gas-research/methane-hydrate>





NETL is a U.S. Department of Energy national laboratory that drives innovation and delivers solutions for a clean and secure energy future by advancing carbon management and resource sustainability technologies. Through its expertise and research facilities, NETL is advancing innovations to enable environmental sustainability for all Americans. Using the power of workforce inclusivity and diversity, innovators at NETL's research laboratories in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania, conduct a broad range of research activities that support DOE's mission to ensure America's security and prosperity by addressing its energy and environmental challenges through science and technology solutions.

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