

OIL AND NATURAL GAS RESEARCH



NETL's Oil & Natural Gas programs are advancing technologies to improve hydrocarbon recovery efficiency, reduce the operational and safety risks of production, improve the performance of our nation's pipeline infrastructure, and characterize resources in emerging and unconventional *plays. The prudent development of our oil and gas resources is essential to ensuring the nation's continued energy resilience, economic strength, and security.

*In geological terms, a petroleum play is a group of actual or prospective oil fields in the same region that are controlled by the same set of geological circumstances. This term is widely used concerning the extraction of hydrocarbon-based resources.



NATIONAL ENERGY TECHNOLOGY LABORATORY

NETL's programs combine theory, computational modeling and advanced optimization tools with field experiments and private sector input in the design and validation of innovative technologies to maximize the safe, efficient, and economic recovery of the nation's abundant conventional and unconventional oil and gas resources and unlock the potentially game-changing secrets of gas hydrates. NETL works closely with the private sector to collect insight on "pinch-point" issues where advances in technology may prove particularly valuable, processes this information and uses it to make informed research investment decisions and to assist industry stakeholders in overcoming challenges in each of the following areas:

- Conventional and Unconventional Resources
- Offshore Oil & Gas Production
- Natural Gas Infrastructure
- Methane Hydrates

Through the Oil & Natural Gas portfolio of programs, NETL is conducting foundational research to improve the production, processing, transportation and storage of our nation's abundant oil and natural gas resources and characterize new sources of hydrocarbons in unconventional and emerging fields to enhance our America's energy resilience, economic strength, and security.

Albany, OR • Anchorage, AK • Morgantown, WV • Pittsburgh, PA • Houston, TX



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ENERGY

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UNCONVENTIONAL

This program develops cost effective technologies with the goal of ensuring a reliable, affordable, and secure domestic supply of oil and clean-burning natural gas that is developed and produced in a manner that minimizes environmental impact. While the definition of the term "unconventional" has evolved over time, this research program is focused on the production of a variety of hydrocarbons (natural gas, natural gas liquids, and oil) from shales and other tight formations. The current portfolio of active projects is balanced among efforts to improve recovery efficiency, develop and test cost-effective ways to characterize the subsurface, and more accurately quantify and validate transformational tools, technologies, and processes to enhance the exploration and production process.

OFFSHORE

While recent estimates of existing oil and gas resources within the United States offshore regions have expanded, these resources are increasingly harder to characterize and produce due to the challenges of their environment. An example can be found in the subsalt lower tertiary play. To safely and economically develop and extract these resources, innovative technologies are required. High-temperature and high-pressure (HTHP) conditions, geohazards, the need for increasingly sophisticated seismic imaging to visualize deep and complex reservoirs, flow assurance issues in deep-water pipelines and the demands of operating subsea production equipment under extreme conditions are just a few of the obstacles that cause these resources to be increasingly difficult to locate and safely develop and that are under investigation within this program.

NATURAL GAS INFRASTRUCTURE

The United States natural gas pipeline network is vast, including more than 210 individual pipeline systems that total more than 300,000 miles of interstate and intrastate transmission pipelines. A leak or rupture anywhere in a pipeline system releases methane into the atmosphere and causes a significant disruption in transmission service. This program is focused on developing tools and technologies to improve the resiliency and flexibility of natural gas pipeline system components, to monitor and repair leakage throughout midstream infrastructure, and to capture and utilize natural gas that would be otherwise vented or flared, reducing the loss of valuable resources.

METHANE HYDRATES

Methane Hydrates research is focused on collaborating with industry, academia, international research organizations, and other United States government agencies to advance the scientific understanding of naturally occurring subsurface gas hydrates so that their potential role as a safe and economic energy resource can be more fully understood. Three parallel paths are being pursued: the first, to confirm the scale and nature of the potentially recoverable hydrate resource through drilling and coring programs; the second, to develop the technologies needed to safely and efficiently locate, characterize and recover methane from hydrates through field testing, numerical simulation and laboratory experimentation; and the third, to better understand gas hydrate's role in the natural environment.

The Department of Energy is developing a cohesive network of 17 field laboratories and industry-operated test sites. These sites are being used to carry out collaborative research that will help find better ways for the United States to extract as much energy as possible, with as little environmental impact as possible, from unconventional shale and other low-permeability rock formations. Furthermore, the sites gather and share valuable scientific data and optimize well completions. For more information on these laboratories and sites, please contact NETL Public Affairs.

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