

# OVERALL OIL AND NATURAL GAS RESEARCH PROGRAM



The National Energy Technology Laboratory's overall research and development effort focused on oil and natural gas incorporates four programs, each focused on specific R&D challenges.

- **Unconventional Oil and Natural Gas Resources**—Developing technologies to extract oil and natural gas from “unconventional” reservoirs like organic-rich shales with minimal environmental impact
- **Offshore**—Developing technologies that can dramatically reduce safety risks in offshore environments
- **Methane Hydrates**—Understanding the potential for methane hydrates to provide a long-term source of energy and the role they play in the earth’s climate systems
- **Midstream (Methane Emissions Quantification and Mitigation)**—Understanding what individual elements of the natural gas production, processing, transportation, and delivery system contributes the most to methane emissions and developing ways to reduce or eliminate these emissions



NATIONAL ENERGY TECHNOLOGY LABORATORY

## THE ISSUES

Several trends are currently converging, amplifying the need for continued research to ensure that the U.S. energy supply remains robust while keeping the environmental impact of developing that supply as low as possible.

- Energy demand continues to grow, and the need to limit energy imports for economic and energy security reasons remains strong
- Natural gas remains an important element of any strategy to help the U.S. transition to a lower carbon energy footprint
- Conventional domestic natural gas production is declining, and the primary alternative for replacing it (e.g., natural gas from hydraulically fractured shales) can lead to environmental impacts that must be avoided or reduced

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- Stakeholders are increasingly concerned about the environmental impacts of large-scale development of shale plays, and are interested in basing decisions on scientifically sound data that reflect the costs and benefits of energy development
- The environmental benefits of using natural gas as a lower carbon energy source depend upon avoiding the emission of methane, a potent greenhouse gas, throughout the natural gas system
- Methane hydrates, while not commercially competitive with other unconventional natural gas resources, are potentially a huge resource for the future and an important factor in understanding climate dynamics

These issues have highlighted the need for good scientific data and more rapid technology development, both of which are objectives of the NETL research programs.

## PROGRAM PORTFOLIO

Currently, there are more than 80 active or recently completed extramural projects spread across the four oil and natural gas programs, valued at approximately \$250 million (not including participant cost-share of at least 20 percent). The project leads and team members are balanced across producers, universities, state agencies, national laboratories, and technology providers. The distribution of projects within each Program can be summarized in the following manner:

- **Unconventional Oil and Natural Gas Resources—** About one third of the projects are focused on improving efficiency or reducing the environmental impacts of hydraulic fracturing; about one sixth on air quality; one sixth on water use; one sixth on well integrity and zonal isolation issues; and the remaining projects dedicated to fundamental science and induced seismicity

- **Offshore—** About one-half of the projects are focused on surface system safety and well stability; about a third on subsea system reliability and automated safety features; and less than one quarter on reducing well drilling and completion risks
- **Methane Hydrates—** About one-half of the projects relate to the role of methane hydrates in the environment; about one quarter on characterization of hydrates in marine sediments; and one quarter on the potential for production of methane from hydrates
- **Midstream (Methane Emissions Quantification and Mitigation)—** There are 12 projects in this program: seven newly-selected projects are mitigation-focused research efforts that will work on developing a suite of natural gas leak reduction technologies and five projects advance methane emission quantification research to better measure and understand methane emissions derived from the natural gas supply chain

Together, these four programs constitute a robust and balanced response to the challenges of ensuring a steady and environmentally sustainable supply of fossil fuels. Details for each program can be found in their respective program fact sheets, as well as online at the NETL website.

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