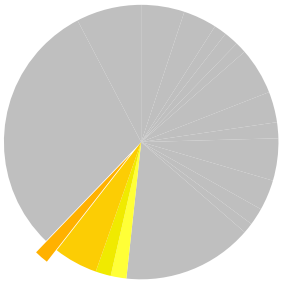
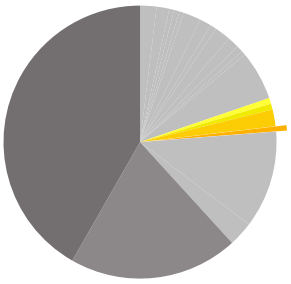
Federal Energy R&D: Oil & Gas

BY DAVID M. HART AND COLIN CUNLIFF | APRIL 2018

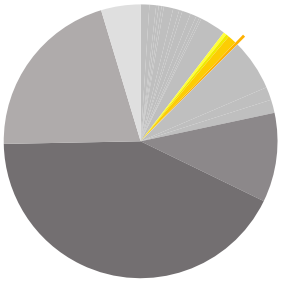
This briefing is part of a series on the U.S. energy budget. See: itif.org/energy-budget.



Oil & Gas (orange)
Other Fossil (yellow)
Energy R&D (light gray)



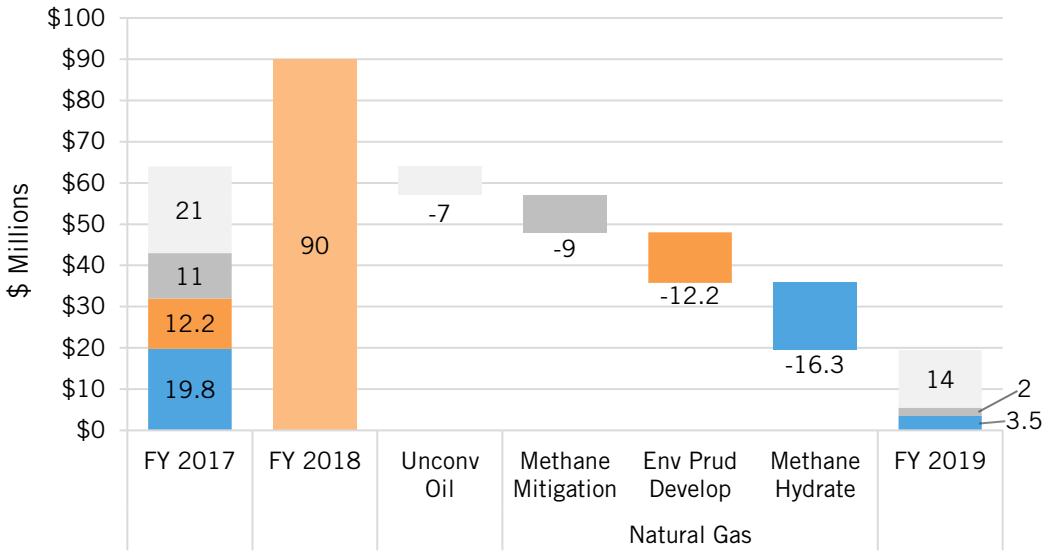
Oil & Gas & Energy R&D
Basic Science R&D
Defense R&D



Oil & Gas & Energy
Basic Science
Defense
Environ Mngmt
Other DOE

The Department of Energy's (DOE) oil and natural gas program supports R&D and policy options that ensure domestic and global supplies of oil and natural gas remain secure. A key focus of this program has been to improve the safety, and mitigate the environmental impacts, of oil and natural-gas energy systems. For example, the program has explored the connection between hydraulic fracturing and induced seismicity, while also seeking to mitigate emissions. In addition, it has funded R&D to reduce the amount of water used in oil and gas production, and to develop technologies to treat brackish water that is co-produced with oil and gas. The program also focuses on the development of new oil and gas resources, including methane hydrates and unconventional oil.

Figure 1: The FY 2019 Budget Request Would Reduce Oil and Gas R&D by 78 Percent



What's At Risk

Domestic production from unconventional reservoirs has enabled the United States to become the world's largest producer of oil and gas over the last few years, keeping energy prices low, and decreasing reliance on imported crude oil. However, current technology allows for recovery of only 7 to 10 percent of the oil found in such reservoirs. More R&D on subsurface flow mechanics is needed to improve these factors. R&D to characterize and evaluate domestic sources of methane hydrate deposits could also lead to large new sources of domestic natural gas in such places as Alaska and the Gulf of Mexico.

Other R&D activities focus on improving the efficiency of natural gas infrastructures—including pipelines and storage facilities—to reduce natural gas leaks and better conserve domestic energy resources, as well as address high-priority challenges to the safe and prudent development of unconventional oil and gas resources. For example, subsurface fluid flow and the causative factors of induced seismicity must be further studied if technologies and practices to reduce seismic risk are to be developed. Reduced funding could inhibit progress toward key public health, safety, and environmental goals.

Oil & Gas R&D Activities

R&D in oil and natural gas is spread among four activities:

- **Unconventional Fossil Energy from Petroleum R&D** supports the development of domestic production from unconventional reservoirs, which requires complicated engineering measures, such as hydraulic fracturing and directional drilling, to improve access and enable commercial production.

- **Methane Emissions Quantification and Mitigation** focuses on technologies that quantify and reduce methane leaks and vented emissions from natural gas systems. Methane, the main component of natural gas, is a powerful greenhouse gas that, on a pound-for-pound basis, is about 30 times more effective at trapping heat than carbon dioxide, although its atmospheric residence time is much shorter.[1] Reducing methane emissions would have the dual effect of improving the environmental performance of natural gas systems and enhancing stewardship of domestic gas resources.

- **Environmentally Prudent Development** conducts research on induced seismicity and wellbore integrity, as well as into water quality, water availability, air quality, and environmental impacts of oil and gas resource development.

- **Gas Hydrates R&D** aims to develop technologies that will enable natural gas production from domestic and arctic offshore methane hydrate deposits. Methane hydrates are methane molecules trapped in ice that turn into natural gas and water when heated or depressurized.

Key Elements of the FY 2019 Budget Proposal

- **A 33-percent reduction in the Unconventional Petroleum program,** including elimination of field laboratories focused on shale geology and fracture dynamics. Research on the relationship between hydraulic fracturing and induced seismicity, treatment and reuse of produced water (i.e., brackish water that is coproduced with oil and gas), and technologies for conversion and utilization of stranded or flared gas will continue.

- **An 82-percent reduction in Methane Emissions Quantification and Mitigation R&D**, including a discontinuation of all emission quantification R&D, which aims to identify and measure leaks and other emissions sources from

the natural gas system. R&D of technologies to reduce methane emissions and improve the efficiency of natural gas systems would be cut by 71 percent.

- **Elimination of all Environmentally Prudent Development research.**
- **An 82-percent reduction in Gas Hydrates R&D,** including termination of field work in the Gulf of Mexico and field tests in Alaska.

ENDNOTES

1. EPA, "Understanding Global Warming Potentials," accessed April 15, 2018, https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.

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