NATURAL GAS INFRASTRUCTURE

Mountain Valley Pipeline, West Virginia

NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

The Natural Gas Infrastructure Program is pursuing research to help mitigate and reduce methane emissions throughout upstream/midstream infrastructure and to better assess potential methane leakage. Enhanced understanding of the potential size and distribution of methane leak rates will advance scientific basis for technology development efforts to reduce impacts on the environment associated with natural gas and oil operations. Research into mitigation technologies will also help accelerate the commercial availability of cost-effective products and procedures for reducing methane emissions in the coming years.

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NETL implements this effort as part of DOE's Resource Sustainability Program.

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The United States is fortunate to have a significant natural gas resource base estimated as 3,368 trillion cubic feet (technically recoverable) as of year-end 2020. In addition, the volume of natural gas transported through midstream infrastructure has increased nearly five-fold since 1950 and is expected to increase by another 22 percent by 2040. The U.S. natural gas industry includes four major elements: production, processing, transportation/storage, and distribution. NETL's Natural Gas Infrastructure Program accelerates the development of new tools, technologies, and processes that can help industry adopt "next generation" facilities, equipment and components that will conserve natural gas, reduce methane emissions, and improve transportation efficiency. In pursuit of its primary mission, the Natural Gas Infrastructure Program is proceeding along three parallel paths:

- To identify and accelerate development of economical technologies to more effectively reduce or eliminate both inadvertent and operational methane emissions.
- To catalyze the development of new technologies and methodologies for improving the operation of natural gas infrastructure systems.
- To generate the development of new technologies and methodologies for enabling the wider application of "smart" systems within the U.S. natural gas infrastructure that can improve risk assessment, safety, reliability, and operational efficiency.

NETL'S RESEARCH WILL IMPROVE EFFORTS TO PROTECT THE ENVIRONMENT BY INVESTIGATING:

IMPROVED RESILIENCY — To enhance protective coatings and pipeline materials to extend the operational life and further reduce leakage potential.

LEAK DETECTION — To develop improved sensor platforms for "real-time" detection of potential leakage from pipelines, gathering systems, and other midstream infrastructure.

LEAK MITIGATION AND REPAIR — To produce materials and tools to mitigate leakage from pipelines and associated infrastructure components with minimal disruption of service.

MITIGATION SOLUTIONS FOR FLARED GAS — To develop novel processes and technologies for the effective utilization of natural gas that would be otherwise vented or flared.


Bradshaw Compressor Station, Wetzel County, WV (2017)

TECHNOLOGY PARTNERSHIPS

The Pipeline and Hazardous Materials Safety Administration (PHMSA, part of the U.S. Department of Transportation) manages a research program that currently includes efforts to detect internal pipeline defects associated with methane leaks in pipelines. Furthermore, within DOE, ARPA-E has several research projects focused on the development of infrared and spectrometry-based sensors for detecting and quantifying methane leaks from natural gas production sites.


Bradshaw Compressor Station, Wetzel County, WV (July 2019)

The National Energy Technology Laboratory is a U.S. Department of Energy national laboratory that drives innovation and delivers technological solutions for an environmentally sustainable and prosperous energy future. Through its world-class scientists, engineers and research facilities, NETL is ensuring affordable, abundant and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle, enabling environmental sustainability for all Americans, advancing environmental justice and revitalizing the economies of disadvantaged communities.

NETL lends its expertise toward achieving a carbon-free power sector by 2035 and a net-zero economy by 2050 while catalyzing economic revitalization, creating good-paying jobs and supporting workers in energy communities, especially hard-hit coal, oil and gas, and power plant communities across the country. One of the most rewarding aspects of NETL's research is that our innovations and technologies have the potential to improve people's lives in meaningful ways.

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