METHANE EMISSIONS QUANTIFICATION AND MITIGATION RESEARCH PROGRAM

Researchers measuring the gas leakage rate on a pneumatic controller, a source of vented emissions, that relies on pressurized natural gas to control the opening and closing of a valve on a separator.

The United States is fortunate to have a large natural gas resource base. The natural gas share of total U.S. energy consumption has varied between 20 and just over 30 percent since the 1950s, and is expected to remain steady at about 20 percent of total energy consumption through 2040. However, the volume of natural gas moving through the growing system has increased nearly five-fold since 1950 and is expected to increase by 22 percent by 2040. Our natural gas delivery system includes four major elements: production, processing, transportation/storage, and distribution. Methane emissions can occur anywhere within this integrated system. Because methane is a greenhouse gas—acting like a blanket and making the Earth warmer than it would otherwise be—reducing methane emissions is critical to alleviating the effects of global warming on the environment and society.

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To reduce methane emissions, the Department of Energy (DOE) aims to cut methane emissions by 40 to 45 percent of 2012 levels by 2025. Accordingly, DOE's Office of Fossil Energy (FE) is pursuing a research program to help mitigate methane emissions in the natural gas pipeline system and to improve the data available for methane emission quantification. Better understanding of the size and distribution of methane leak rates will help provide a scientific basis for both regulatory and technology development efforts. Research into mitigation technologies will help accelerate the commercial availability of cost effective products and procedures for reducing methane emissions.

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THE ISSUES

The U.S. 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 can release methane into the atmosphere, sometimes posing an immediate danger to workers and nearby residents. In addition, more than 1,400 compressor stations maintain pressure on the natural gas pipeline network and ensure continuous flow. Today's conventional compressors may require operators to intentionally release methane during normal operations, due to the compressor's functional design. They may also generate methane-containing exhaust during their regular operation.

Natural gas compressors, perhaps older ones running less efficiently, can emit un-combusted methane from their exhaust stacks.

Corrosion in vintage cast-iron natural gas distribution system pipelines is one of the reasons for methane emissions within these systems.

If a condensate tank hatch is left open after the liquid level is gauged, fugitive emissions will escape.

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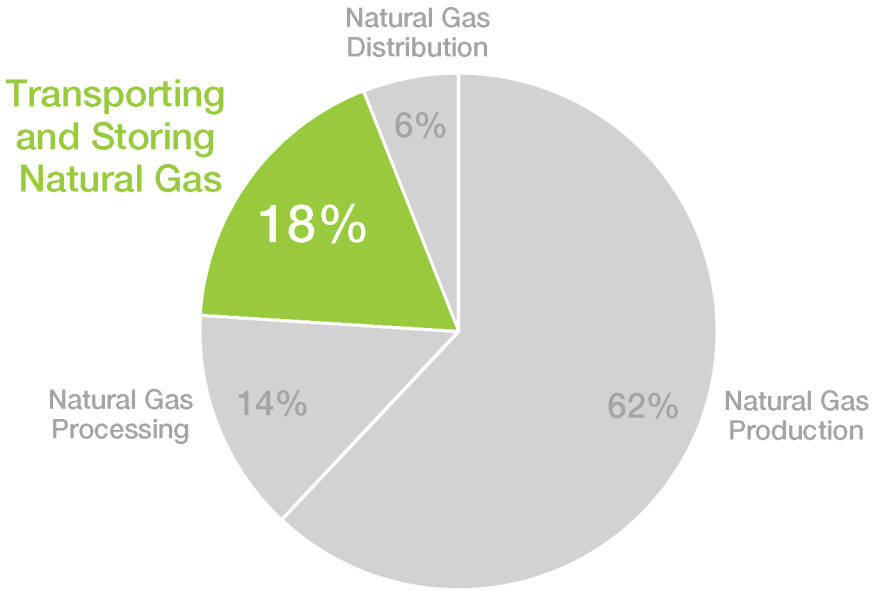
The most recent EPA inventory of methane emissions estimates that, based on 2014 data, methane emissions from the Nation's natural gas production, transportation and delivery system were responsible for 24 percent of total U.S. anthropogenic methane emissions, or 2.6 percent of total GHG emissions.

Such estimates can change as the Environmental Protection Agency (EPA) re-evaluates its leakage estimates, the cost of applying emissions reduction technology is reduced, and the value of natural gas fluctuates. However, recognition of the full costs of global climate change, coupled with recent and expected regulatory changes, are making the case for proactively reducing non-hazardous methane emissions more attractive.

PROJECT PORTFOLIO

In early 2016, FE released a funding opportunity announcement that focused on improving pipeline-leak mitigation and methane emission data. The solicitation's focus on pipelines has the potential to effect dramatic reductions in midstream methane emissions.

There are 12 projects in this program, valued at approximately $13 million (not including participant cost-share). Seven of these newly-selected projects are mitigation-focused research efforts that will work on developing a suite of natural gas leak reduction technologies. The remaining five projects advance methane emission quantification research that is intended to better measure and understand methane emissions derived from the natural gas supply chain.



Transporting and storing natural gas is responsible for 18 percent of methane emissions. Natural gas production (62 percent), processing (14 percent), and distribution (6 percent) are the source of the rest.

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