



Oil and Gas Systems

Methane emissions from oil and gas systems can be the result of normal operations, routine maintenance, and system disruptions. Reducing fugitive emissions can reduce product losses, enhance energy security, lower methane emissions, and increase revenues. In 2005, global methane emissions from oil and gas systems that could be utilized were estimated at nearly 1,170 MMTCO₂E.

The United States has collaborated with the Methane to Markets Partnership to encourage Partner Countries to implement proven, cost-effective technologies and practices that improve operational efficiency and reduce emissions. In this reporting year, the U.S. government has spent more than \$2.6 million to support the deployment of these measures. Some of the U.S. government's notable 2007 accomplishments and ongoing activities are discussed below.

Assessing Emission Reduction Opportunity at PEMEX

Since 2006, USAID and EPA have supported several project activities with Mexico's state-owned oil company, Petróleos Mexicanos (PEMEX), including measuring and analyzing emissions, installing dry seals at the Ciudad PEMEX Gas Processing Center, and supporting an emission reduction program at select facilities. In addition, PEMEX reviewed and quantified emissions along the Cardenas Pipeline Sector and found PEMEX's maintenance program to be effective at minimizing fugitive emissions from the pipeline operations.

Natural Gas STAR International: Reducing Methane Emissions and Delivering More Gas to Markets

In 2006, EPA launched Natural Gas STAR International, a global partnership with oil and gas companies. Natural Gas STAR International builds on the success of the domestic Natural Gas STAR Program, which has partnered with U.S. oil and gas companies since 1993 to promote cost-effective methane emission reduction activities.

The partnership started with seven charter partners (ConocoPhillips Canada Ltd., Devon Energy Corporation, Enbridge Inc., ExxonMobil Corporation, Marathon Oil Corporation, Occidental Oil and Gas Corporation, and TransCanada), which were soon joined by the Oil and Natural Gas Company of India Ltd. (ONGC) and Comgas, a natural gas distribution company in São Paulo, Brazil. ONGC is the first state-owned oil and gas company; ONGC and Comgas are the first non-North America-based companies to join.

These partners' efforts are already yielding significant results. Natural Gas STAR International partners have reduced methane emissions by 2.68 MMTCO₂E in 2007 and 4.4 MMTCO₂E since 2006.



Collectively, these efforts have yielded significant methane emission reductions and increased PEMEX's interest in expanding methane emission reduction program efforts. EPA is currently working with PEMEX to integrate the analysis results into a broader, PEMEX-wide methane emission reduction program and to support the design of a PEMEX-funded \$22 million program to install dry seals on more than 40 compressors. Working together, EPA and PEMEX have identified next steps for the program, to be implemented in calendar year 2008, including specialized training, developing pilot measurement protocols, improving emissions inventory data, developing facility- and operations-specific action plans, providing technical support, and gaining internal and external support for expanded emission reduction program activities.

Improving Leak Detection and Repair in Ukraine

Ukraine is the largest natural gas transit country in the world by volume. Emissions from Ukraine's natural gas system are very large, a function of both the design and age of the system. Since 2000, several U.S. government agencies have been working with Cherkasytransgas, a large Ukrainian branch company of Ukrtransgaz, on methane emission reduction initiatives involving detecting and measuring leaks, developing and implementing leak repair plans, confirming methane reductions with post-repair measurements, and summarizing successes.

Building on the success of Cherkasytransgas, EPA began a four-year project in 2007 to engage the U.S. Embassy, Ukrainian government organizations, Cherkasytransgas, Ukrtransgaz, and Naftogaz Ukrainy (the large, state-owned holding company of which Ukrtransgaz is a subsidiary). The main goal



PEMEX engineer takes a measurement of newly installed dry gas seals at facility in Mexico City, Mexico.

of this effort was to establish more formal technology transfer and information-sharing networks to promote methane mitigation projects in the Ukrainian natural gas transmission sector. EPA also funded the purchase of sealants as part of a project to further reduce methane emissions from valves in Cherkasytransgas's system, which reduced emissions by approximately 720,000 cubic meters.

As a result of this collaboration, the Ukrainian Ministry of Fuel and Energy developed a working group to discuss potential finance options for implementing methane mitigation projects in the Ukrainian natural gas transmission system. In addition, Ukrtransgaz held the first-ever methane mitigation technology transfer seminar (co-led by Cherkasytransgas) for all six of its subsidiaries; the seminar was well attended and resulted in recommendations to promote methane mitigation projects. As a next step, EPA will continue to build on this collaboration. In particular, Naftogaz and Ukrtransgaz are researching options for large-scale system-wide methane mitigation measures. Through its collaboration with EPA, Cherkasytransgas has set a goal of reducing methane emissions by 3.7 million cubic meters by 2010.

Reducing Emissions from Oil and Natural Gas Assets in India

EPA has launched an extremely successful partnership with India's Oil and Natural Gas Corporation (ONGC). In September 2008, the ONGC Chairman directed his personnel to pursue implementation of cost-effective technologies and practices that could reduce ONGC's methane emissions by an estimated 10 million cubic meters per year, potentially saving \$740,000 worth of natural gas. The declaration was the direct result of a year-long collaboration between EPA and ONGC, in which EPA provided support for onsite methane emission measurement studies to identify and measure major methane emission sources that could then be paired with established mitigation technologies and practices. The recommended mitigation activities cover only four out of the many facilities operated by ONGC, so this first effort is just the start of the significant volume of methane emission savings that can ultimately be achieved. ONGC is also planning to form an internal measurement team to institutionalize the leak evaluation strategies applied during the collaboration with EPA.

Developing and Implementing Reduction Strategies in Poland

EPA is working with GAZ-SYSTEM SA, Poland's largest state-owned natural gas transmission company, to provide technical information and assistance in implementing methane mitigation measures at compressor stations and pipelines. GAZ-SYSTEM has identified a list of major emissions sources and activities to be addressed (such as reducing vented emissions from compressors and pipelines), and EPA is providing technical information and assistance on cost-effective measures to address these sources and activities, including expected methane emission reductions, implementation cost data, and economic benefit analyses to help prioritize



PEMEX engineer descends scaffold tower after taking wet seal measurements at a PEMEX gas processing center.

measures. In addition, EPA and GAZ-SYSTEM developed a broader strategy to achieve methane reductions with EPA's continued involvement in identifying and prioritizing opportunities and providing technical information on cost-effective technologies and practices.

Partnering with Gazprom, the World's Largest Natural Gas Producer

Russia is the largest emitter of methane emissions from oil and natural gas operations worldwide. Its state-owned natural gas company, Gazprom, is the world's largest natural gas producer and possesses the world's largest natural gas reserves. EPA is working with Gazprom to plan a joint technology transfer workshop and technical training in Russia in fall 2008, which will feature EPA and industry experts. The goal of the workshop and training is to learn about Gazprom's current methane mitigation activities and to share information on other cost-effective technologies and practices Gazprom might consider using to reduce emissions.

EPA also awarded a multi-year grant to the Russian Academy of Sciences to identify methane emission reduction project opportunities in the distribution sector. The Academy collaborated with various Russian companies and sector experts to bring projects before the Russian government for possible government certification under Russian climate initiatives.

Identifying Methane Emission Reduction Opportunities at Chinese Oil and Gas Companies

EPA has been working with several partners, including Environment Canada and the China National Petroleum Corporation (CNPC) to identify methane emission reduction opportunities at the Changqing Oilfield Company (a subsidiary of CNPC). Preliminary audits revealed that improvements to flaring and venting practices at facilities at the oil production facilities and the control of casing gas flaring and venting and flashing losses from storage tanks could yield significant methane emission reductions. Additional field audits will be conducted in late 2008. EPA and the CNPC Environmental Engineer Technology Center are collaborating to draft corporate emission reduction guidelines and to plan a series of tours for CNPC officials to visit North America and meet with relevant technology vendors.

Studying Pipeline and Compressor Station Methane Leak Detection in the Kyrgyz Republic

EPA has launched a project aimed at studying leak detection, measurement, and analysis at gate and compressor station facilities on a 116-kilometer natural gas transmission system of the Tashkent-Bishkek-Almaty pipeline in the Kyrgyz Republic. Project partners include KyrKazGaz, KyrgyzGaz, and ADB—a Methane to Markets Project Network member and multilateral financial institution whose mission is to help member countries reduce poverty and improve quality of life by providing project funding, offering technical assistance, and building knowledge capacity. The goal of the project is to identify feasible methane emission reduction projects while providing training and technology transfer to the pipeline operator. Upon completion, the project is expected to yield annual emission reductions of 25,000 MTCO₂E.