

Global Methane Initiative and Resources for Oil and Natural Gas Companies

Natural Gas STAR International Meeting with Turkmenistan

November 9, 2011
Farmington, New Mexico

Roger Fernandez
U.S. Environmental Protection Agency



Presentation Outline

- Background: Global Methane Initiative (GMI)
 - Oil and Natural Gas Methane Emissions
 - Why focus on Methane?
 - Key Resources Available
- Company Case Study Examples and Program Accomplishments
- Turkmenistan April 2010 Meeting on Natural Gas System Management
- Contact and Further Information



Background: Global Methane Initiative (GMI)

- The Global Methane Initiative is an international initiative that advances cost-effective, near-term methane recovery and use as a clean energy source in five sectors:



Oil and Gas Systems



Coal Mines



Landfills



Agricultural Waste



Wastewater

- The goals of the Partnership are to reduce global methane emissions to:
 - Enhance economic growth
 - Strengthen energy security
 - Improve air quality and industrial safety
 - Reduce emissions of greenhouse gases



Background: Global Methane Initiative (GMI)

39 Partner Governments and the European Commission

North America

Canada
Dominican Republic
Mexico
United States

South America

Argentina
Brazil
Chile
Colombia
Ecuador
Nicaragua
Peru

Africa

Ethiopia
Ghana
Nigeria

Europe

Bulgaria
European Commission
Finland
Georgia
Germany

Italy

Norway
Poland
Republic of Serbia

Russia

Turkey

Ukraine

United Kingdom

Asia Pacific

Australia

China

India

Indonesia

Japan

Jordan

Kazakhstan

Republic of Korea

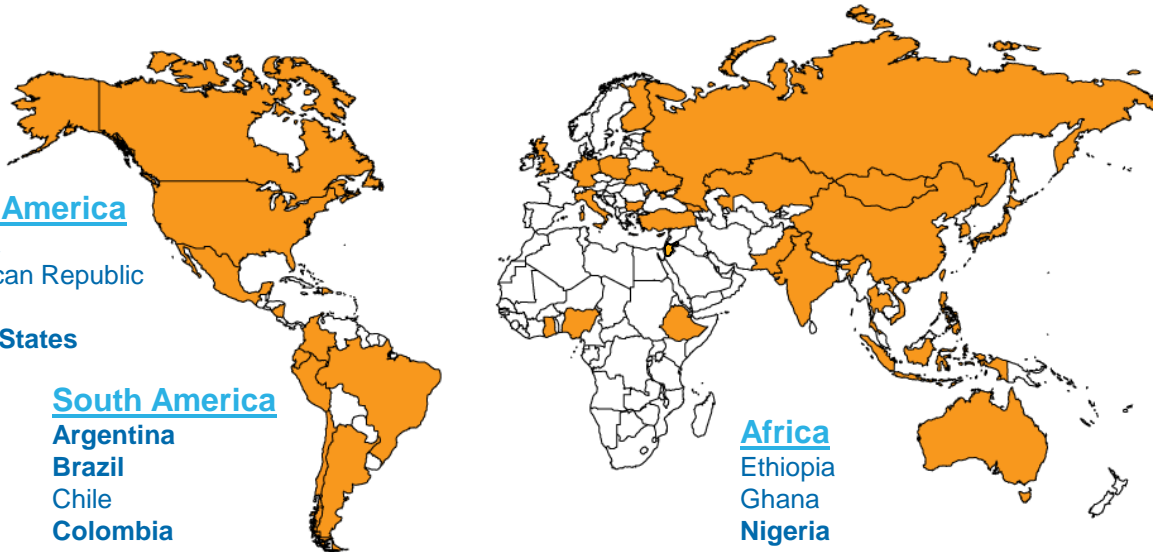
Mongolia

Pakistan

Philippines

Thailand

Vietnam



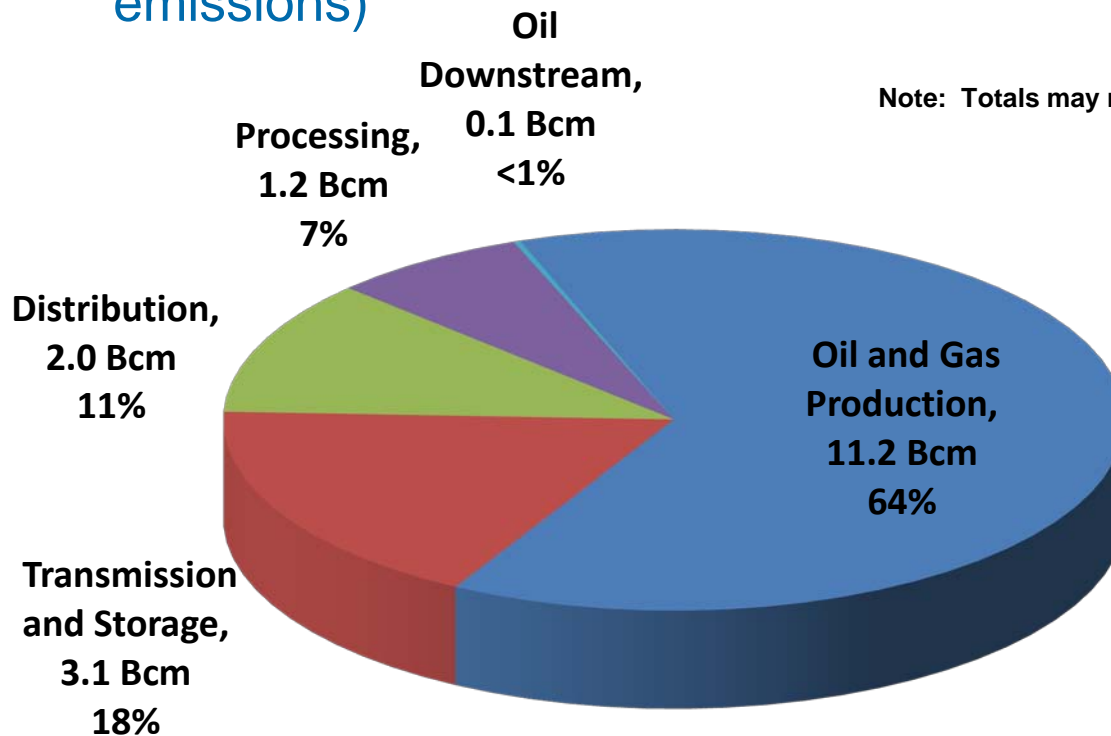
- Private companies, multilateral development banks and other relevant organizations participate by joining the *Project Network*
- For more information globalmethane.org

Note: Bold text indicates the 14 founding partner countries



Oil and Gas Methane Emissions by Sector – U.S. Example

- 2009 U.S. methane emissions from oil and natural gas industry:
17.7 Bcm (3.8% of total U.S. greenhouse gas emissions)



Bcm = billion cubic meters
Note: Totals may not sum due to independent rounding

Why Focus on Methane?

- A potent greenhouse gas (GHG) with 100-year global warming potential of 23; atmospheric lifetime of ~12 years
- The 2nd most important GHG accounting for ~18% of total climate forcing
- A primary component of natural gas and a valuable, clean-burning energy source
 - Proven, viable technologies and practices exist to reduce methane emissions cost-effectively
- Oil and natural gas operations are a significant source (~18%) of total global human-made methane emissions.
 - EPA estimates that methane emissions are projected to grow globally by more than 33% from 2005 to 2015.



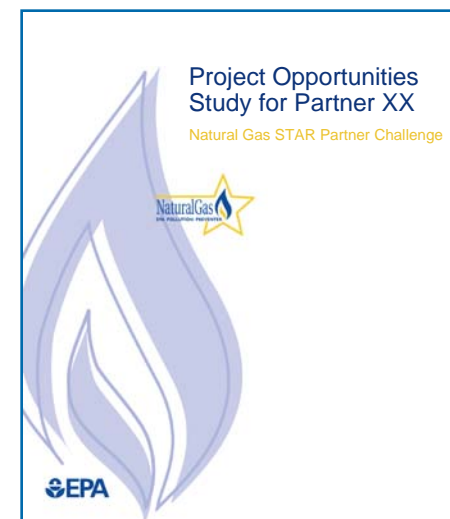
Global Methane Initiative Resources

- Resources to advance cost-effective oil & gas sector methane emission reductions
- General technology transfer, training, and capacity building:
 - Technical documents and research outlining over 80 mitigation options, including analyses of economic, environmental and operational benefits
 - Meetings
 - Study tours



Global Methane Initiative, cont.

- Individual technical assistance to help companies identify and assess cost-effective methane emission reduction opportunities
 - Analysis of estimated methane emission sources and corresponding project opportunities
 - Pre-feasibility and feasibility studies
 - Leak detection and measurement studies
- The following case studies provide examples of ways EPA has collaborated with international oil and gas companies to advance cost-effective methane emission reductions



Companies May Not Realize the Volume of Gas They Are Losing



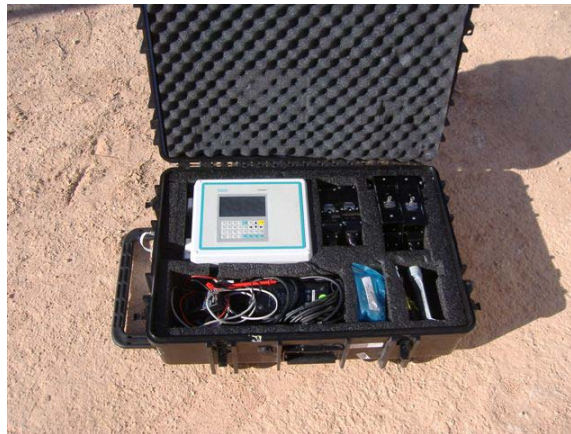
Vented emissions are not readily visible or identifiable without specialized equipment yet they represent significant natural gas losses, reduced operational efficiency, greenhouse gas emissions and potential safety risks

Measurement Study Equipment – Identification & Measurement

Identification:
FLIR Infrared Camera



Measurement: Turbine Meter (Daniels), Ultrasonic Meters, Hi-Flow® Sampler, Calibrated Bags



Case Study 1: Gazprom Replace Centrifugal Compressor Wet Seals with Dry Seals

Gazprom recognized the clear benefits of compressor dry gas seals. Throughout 2006-2008, Gazprom completed dry seal upgrades of 60 compressors and plan to continue these upgrades system wide.

- Other benefits of compressor dry seals include:
 - Elimination of combustible gas contamination by seal oil, which had resulted in pipeline discharge capacity reduction of 1-2 %.
 - Decrease in compressor's capacity losses by reducing friction in seals. Friction in wet seals causes substantial reductions in capacity of the compressor (10 times and more).
 - Increase in compressor seal operational life. Results in lower maintenance costs, higher overall reliability and less compressor downtime.
 - Improved energy efficiency. Wet systems require 50 to 100 kiloWatt/hour, while dry seal systems need about 5 kiloWatt of power per hour.



Case Study 2: Gazprom Pipeline Pump-down and Composite Wrap

Pipeline pump-down is used to prepare a section of pipeline for repairs by using a mobile compressor station to pump natural gas from the pipeline section before depressurization.

- Gazprom developed and verified a joint implementation project and plans to implement the project in the UGSS of Russia applicable for both existing and planned pipelines with diameters ranging from 700 to 1,420 mm.
- In 2010, pilot tests on the mobile compressor stations were made in the area of the Ust-Buzuluk trunk line of Gazprom Transgaz Volgograd.

Composite wrap is a permanent, cost-effective pipeline repair technology, suitable for non-leaking defects such as pits, dents, gouges, and external corrosion. The repair work can take place without shutting down the pipeline.

- Application of composite wraps and sealing materials in Gazprom transmission and distribution facilities saves annually $3 \times 10^6 \text{m}^3$ of natural gas.



Case Study 3: ONGC Technology Transfer

- EPA and ONGC conducted a series of successful technology transfer meetings at four sites to promote methane mitigation opportunities (December 2007)
- Based on the success of the meetings:
 - Conducted desktop prefeasibility analyses to estimate emissions sources at seven sites
 - EPA and ONGC conducted four onsite measurement studies to assess key methane emission sources and potential mitigation measures (May 2008)
 - Presented measurement study results and recommendations to ONGC Board of Directors (September 2008)



Case Study 4: KyrKazGas Leak Detection and Quantification

EPA, in partnership with the Asian Development Bank, conducted a project with KyrKazGas (of the Kyrgyz Republic) to perform leak detection and quantification of its natural gas transmission system.

- Current methane leak inspection and repair practices result in overlooked methane emissions and product loss.
- A field study in February, 2008 demonstrated state-of-the-art leak detection and measurement technologies and techniques and then used those to assess methane emissions, product loss, and operating practices.
- KyrKazGas gained technical training and experience in leak detection and quantification and ability to demonstrate the viability of capital investment in methane emission reduction projects.



Case Study 5: Analysis of Methane Recovery from Colombia Tank Battery

- EPA analyzed company-provided operational data to provide Columbia with recommendations for cost-effective methane mitigation
 - Two sources of wasted methane: methane from gas-liquid separator flared and methane from oil-water separator vented
 - Currently importing expensive diesel to supplement grid electricity

Preliminary proposal

- Install VRU to capture vented emissions
- Install compressor to increase gas condensate output and improve gas quality
- Install Reciprocating Engine/Generator to burn previously flared gas for electricity

Estimated Benefits

- Carbon emissions reduction of 283,000 m³ per year methane or 80,000 TCO₂e per year
- 8 Mega Watts (MW) of power generated
- 14 months simple payback and 87% internal rate of return



Turkmenistan April 2010 Meeting Natural Gas System Management

- Held in Ashgabat, Turkmenistan in April 2010
- Summary of topics covered during this meeting:
 - *Opportunities for Methane Emission Reductions in Natural Gas Processing*
 - *Reducing Methane Emissions in Natural Gas Production*
 - *Reducing Methane Emissions from Transmission Pipelines*
 - *Methane Emissions Reductions at Compressor Stations*
 - *Overview of System Surveillance Technologies and Applications*
 - *Overview of Prioritization of Leak Repair at Compressor Stations (Storage, Transmission and Processing)*
 - *Overview of Management Practices for Leak Detection, Quantification and Economic Repair for Compressors*
 - *Methane Leak Detection and Measurement Technologies*
 - *Key considerations for Financing Successful Programs*



Contact and Further Information

Roger Fernandez

Team Leader, U.S. EPA
Global Methane Initiative - Oil & Gas
Natural Gas STAR International
+1-202-343-9386
fernandez.roger@epa.gov

Global Methane Initiative:
globalmethane.org

Recommended Technologies:

epa.gov/gasstar/tools/recommended.html

Note – all reports are available in Russian

