Methane to Markets Overview – Oil & Gas Sector

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November 5, 2008
Overview

- Methane to Markets (M2M) & Natural Gas STAR Background
- Opportunities in the Oil & Gas Sector
- Resources to Promote Methane Mitigation Projects
- M2M 2008 Workshops & Conferences
- A Note on Project Economics
- Conclusion
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 ~16% of total climate forcing
- A primary component of natural gas and a valuable, clean-burning energy source

Global GHG Emissions in 2000
40,702 million tonnes carbon dioxide equivalent (MtCO₂e)
Methane to Markets Partnership

- The **Methane to Markets Partnership (M2M)** is an international initiative that advances cost-effective, near-term methane recovery and use as a clean energy source in four sectors:
  - Oil and Gas Systems
  - Coal Mines
  - Landfills
  - Agricultural Waste

- 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
Methane to Markets Partnership

- 27 Partner Governments

- Private companies, multilateral development banks and other relevant organizations participate by joining the **Project Network** – over 700 organizations now participating
M2M Partnership Organization

Argentina involvement
- Secretariat of Environment and Sustainable Development
- Participation on the Steering Committee and Agriculture (Chair), Coal mines, Landfill (Chair) and Oil & Gas Subcommittees
- Active promotion of projects in Landfill

US Government commitment
- U.S. EPA coordinates efforts across the US Government
  - Other agencies participating are USTDA, USAID, Department of State, Department of Energy and USDA
- Pledge of $53 million over five years to support technology transfer and project development
Natural Gas STAR Program

The Natural Gas STAR Program is a flexible, voluntary partnership between EPA and the oil and natural gas industry designed to cost-effectively reduce methane emissions from oil and natural gas operations.

- Launched domestically in 1993, internationally in 2006
- Over 110 Program Partners across four sectors
  - Nine International Partners
  - 19 Endorser Associations
Natural Gas STAR International

- Natural Gas STAR International launched September 26, 2006 now has nine partners
Gas STAR Partner Methane Emission Reductions

- Gas STAR Partners reduced methane emissions by 92.5 Bcf in 2007
  - 677 Bcf in cumulative reductions
Methane Emissions from Oil and Gas Operations

- The majority of oil and gas methane emissions come from:
  - Oil production
  - Natural gas
    - Production
    - Processing
    - Transmission
    - Distribution

- Methane emissions can be intentional or unintentional:
  - Leaks
  - Process venting
  - System upsets
Sources of Methane Emissions: Oil and Gas

**Oil Production**
- Venting of casinghead gas
- Flash emissions from crude oil storage tanks

**Natural Gas Production & Processing**
- Well completions, blowdowns and workovers
- Reciprocating compressor rod packing
- Venting from glycol reboilers on dehydrators
- Processing plant leaks
- Gas-driven pneumatic devices

**Gas Transmission**
- Venting of gas for maintenance or repair of pipelines or compressors
- Leaks from pipelines, compressor stations
- Centrifugal compressor seal oil de-gassing

**Gas Distribution**
- Leaks from unprotected steel mains and service lines
- Leaks at metering and regulating stations
- Pipeline blowdowns

*Picture courtesy of American Gas Association*
Natural Gas STAR/Methane to Markets 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
    - Workshops and Conferences
  - Individual assistance to help companies identify and assess project opportunities
    - Estimated methane emission inventories
    - Pre-feasibility and feasibility studies
    - Measurement studies

- All services and resources provided free of charge and at no obligation
EPA Services for Natural Gas STAR Partner Companies

1. Develop Estimated Methane Emissions Inventory

- Companies provide operational data that EPA uses to estimate methane emissions & propose emission reduction opportunities
- EPA delivers report to company detailing
  - Equipment-level emission estimations
  - Recommended mitigation options, including economic and operational benefits and anticipated emission reductions
- Helps prioritize opportunities

![Diagram showing methane emissions sources and estimated reductions.](image-url)
2. Conduct “Desktop” Project Analysis

- Using results from estimated inventory, EPA and company can further evaluate priority projects with high economic and environmental potential.
- EPA will do deeper analysis to provide more specific project recommendation (detailed technical, economic, information, equipment specifications).
EPA Services for Natural Gas STAR Partner Companies

3. On-Site Measurement Study

- For companies seriously considering implementing emission reduction project, EPA can conduct on-site measurement studies
- EPA team uses methane emission identification and measurement equipment to quantify methane emissions
  - Infrared camera
  - Turbine meter
  - Hi-flow sampler
  - Calibrated bags
- EPA delivers to report detailing findings and corresponding mitigation recommendations

Source: Leak Surveys Inc.
Case Study: ONGC & Natural Gas STAR International

- State-owned company produces 78% of India’s oil & gas
- Signed Gas STAR International MOU August 2007
- First non-U.S. based, state-owned company to join
- Leveraged EPA services to kick off Program in first year
  - 4 technology transfer workshops December 2007
  - 7 pre-feasibility studies
  - 4 measurement studies
- Presented measurement study findings & recommended mitigation projects to Board of Directors September 2008
2008-2009 Technology Transfer Workshops

- Production
  - Rock Springs, WY
  - May 1, 2008
- Production
  - Denver, CO
  - April 29, 2008
- Off-Shore Production
  - New Orleans, LA
  - May 6, 2008
- Production and Processing
  - Midland, TX
  - July 23, 2008
- Transmission
  - Charlotte, NC
  - June 25, 2008
- M2M Oil & Gas
  - Monterrey, Mexico
  - January 27-28, 2009
- M2M Oil & Gas
  - Huadong, China
  - April, 17-18, 2008
- Annual Workshop
  - San Antonio, TX
  - November 11-13, 2008
- M2M Oil & Gas
  - Buenos Aires, Argentina
  - November 5-6, 2008
- M2M Oil & Gas Webcast
  - Buenos Aires, Argentina
  - October 16, 2008

For more information on 2008 Gas STAR workshops:
http://www.epa.gov/gasstar/workshops/index.html
A Note on Project Economics

- At $3/Mcf, 77% of the 80 recommended technologies and practices pay back within 3 years and 47% pay back within 1 year
- Economics based on gas value alone may not always drive projects
- Gas value can be augmented if
  - Gas used to replace more expensive fuel (e.g., for electricity generation)
  - Natural gas liquids value included
  - Carbon credit is leveraged

- Four Clean Development Mechanism (CDM) methodologies approved or under review
  - Leak reduction at natural gas compressor and distribution stations
  - Flare reduction and gas utilization at oil wells and gas processing plants
  - Gas distribution pipeline replacement
  - Recovery and Use of Gas from Oil Wells – Reduction of Gas Flaring by the Compression of Low Pressure Gas for Productive Use
Beyond Project Economics

- Companies have reported many reasons for reducing methane emissions
  - Safety concerns
  - Utilization of local energy source
  - Operational and efficiency improvements such as reduced maintenance and fuel costs
  - Reduced loss of a valuable domestic non-renewable fuel
  - Corporate mandate to operate in environmentally responsible manner
  - Internal greenhouse gas emission reduction goals
  - Addressing shareholder concerns about mitigating future climate risk

Beyond Monetary Incentives

- What happens when a transmission company does not directly benefit from the methane reductions?
- Due to GPL’s tariff, there is no monetary incentive for the reduction of methane emissions.
- ONEOK Partner’s Strategic Plan states that we will provide reliable energy-related services in a safe and environmentally responsible manner.
- Environmental Stewardship
Methane to Markets
Activities: In Summary

- Reducing methane emissions can be profitable in a variety of ways:
  - Sales value of recovered methane and other hydrocarbons
  - Lower costs
    - Operations & Maintenance
    - Fuel savings
    - Capital / replacement
  - Potential carbon market value

- EPA provides free services to help Partner organizations benefit from these revenue sources with assistance in:
  - Identification of applicable technologies and practices
  - Methane emission estimated inventories and project feasibility studies
  - Measurement studies
  - Technical training or assistance

- EPA encourages oil and gas companies, government agencies and other stakeholders to inform EPA of interest in working together
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http://www.epa.gov/gasstar/