



Methane to Markets

Methane to Markets Overview – Oil & Gas Sector

Oil & Gas Subcommittee Technology Transfer Workshop

January 28, 2009
Monterrey, Mexico

Overview

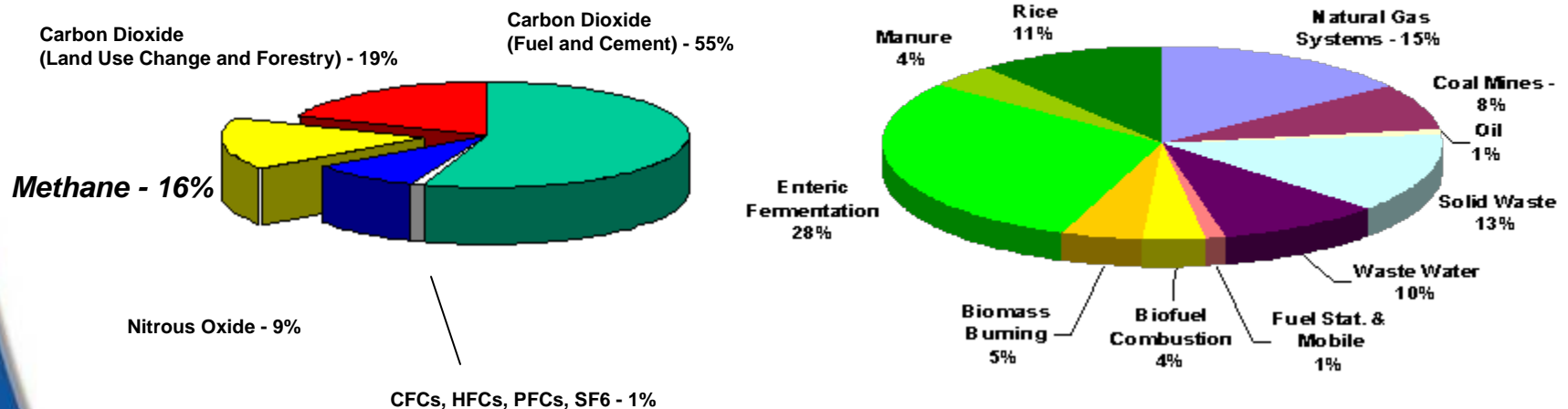
- Methane to Markets (M2M) & Natural Gas STAR Background
- Opportunities in the Oil & Gas Sector
- Resources to Promote Methane Mitigation Projects
- M2M 2008 Workshops & Conferences
- A Note on Project Economics
- Conclusion

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

North America

Canada
Mexico
United States

South America

Argentina
Brazil
Colombia
Ecuador

Africa

Nigeria

Europe & FSU

European Commission
Finland
Germany
Italy
Kazakhstan
Poland
Russia
Ukraine
United Kingdom

Asia Pacific

Australia
China
India
Japan
Korea
Mongolia
Pakistan
Philippines
Thailand
Vietnam

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

Natural Gas STAR International Program

- Under the Methane to Markets partnership, Gas STAR International is an initiative aimed at voluntarily reducing methane emissions from international oil and natural gas operations



Oil and Gas
Subcommittee



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
 - Ten International Partners
 - 19 Endorser Associations

Natural Gas STAR International

- Natural Gas STAR International launched September 26, 2006 now has ten partners

 ConocoPhillips

 devon



 ENBRIDGE™

 COMGAS
Natural

 ExxonMobil

 Marathon
Oil Company

 OXY

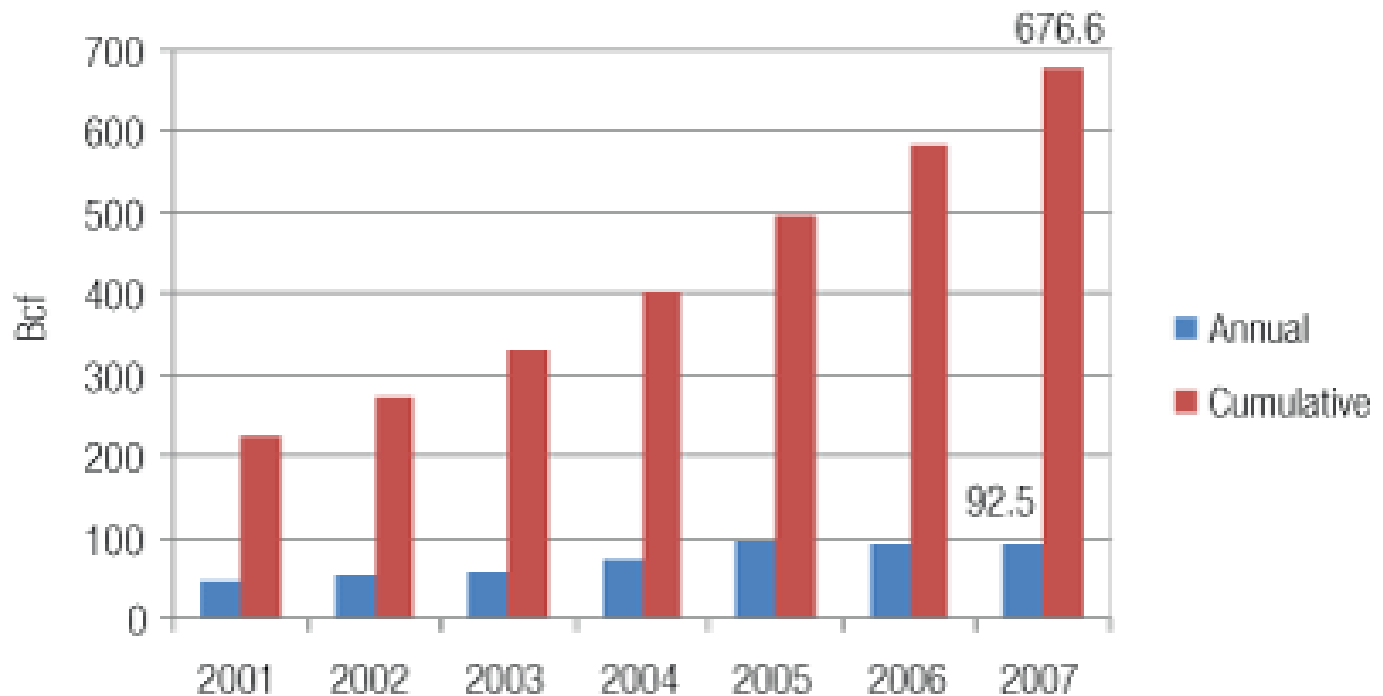
 TransCanada
In business to deliver

 GAZ-SYSTEM S.A.

Gas STAR Partner Methane Emission Reductions

- Gas STAR Partners reduced methane emissions by 92.5 Bcf in 2007
 - 677 Bcf in cumulative reductions

Natural Gas STAR Emissions Reductions as of 2007



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

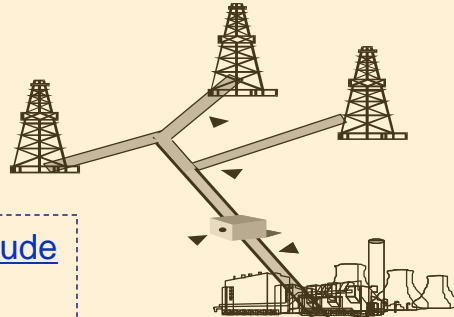


Sources of Methane Emissions: Oil and Gas

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

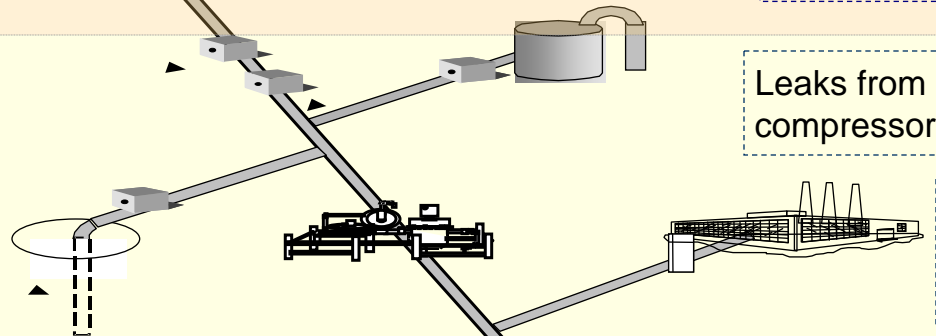
Gas-driven pneumatic devices

Gas Transmission

Venting of gas for maintenance or repair of pipelines or compressors

Leaks from pipelines, compressor stations

Centrifugal compressor seal oil de-gassing

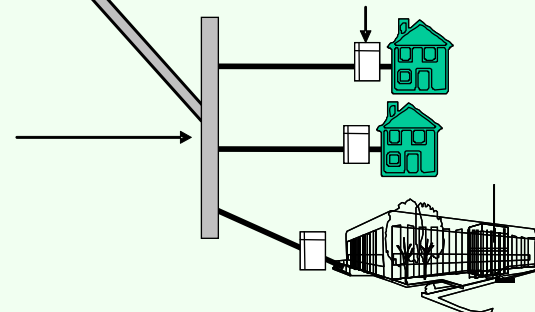


Gas Distribution

Leaks from unprotected steel mains and service lines

Leaks at metering and regulating stations

Pipeline blowdowns



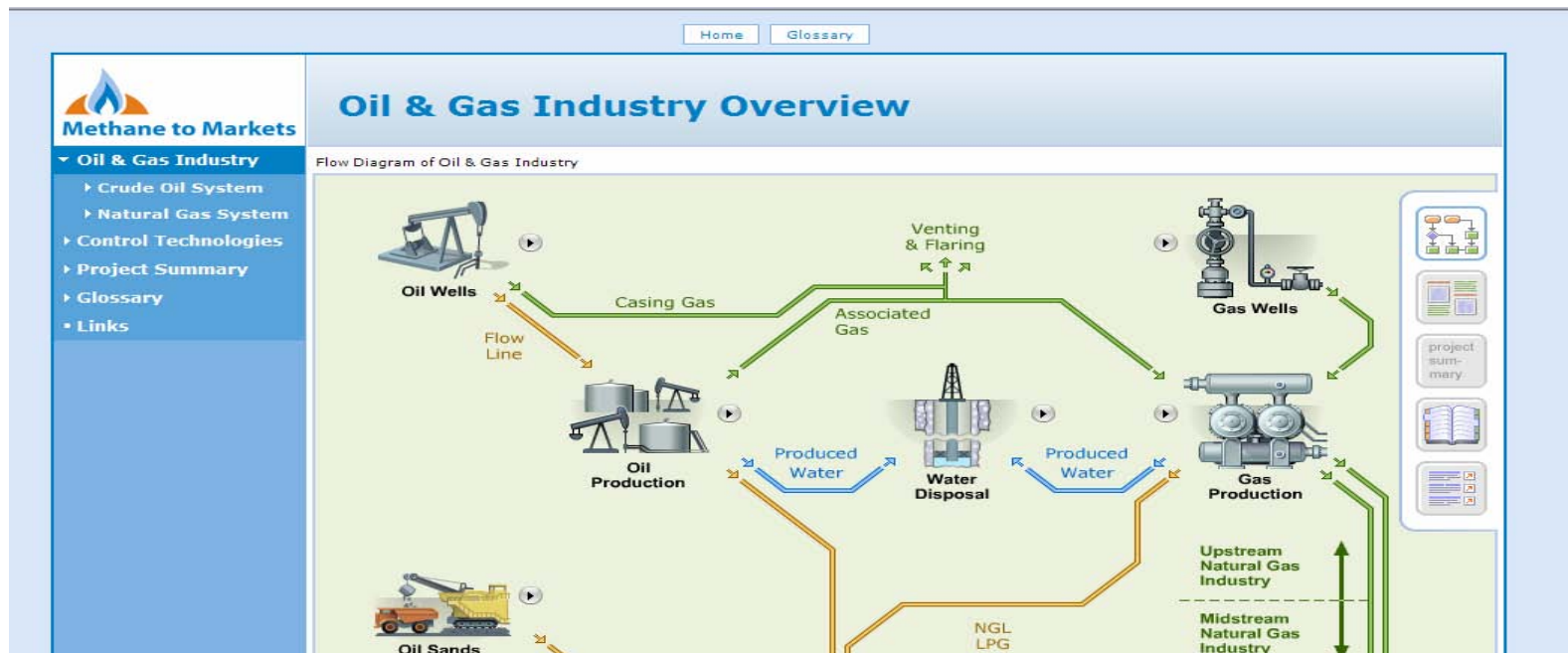
Natural Gas STAR/Methane to Markets Resources

- 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



ON TIME = Online Tool to Identify Methane Emission Reduction Opportunities

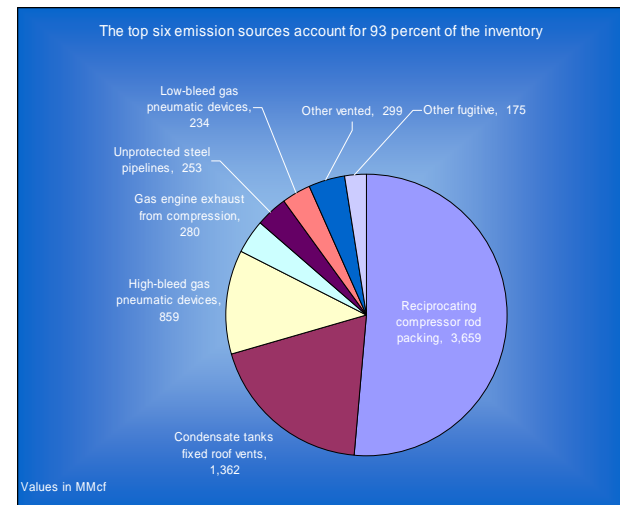
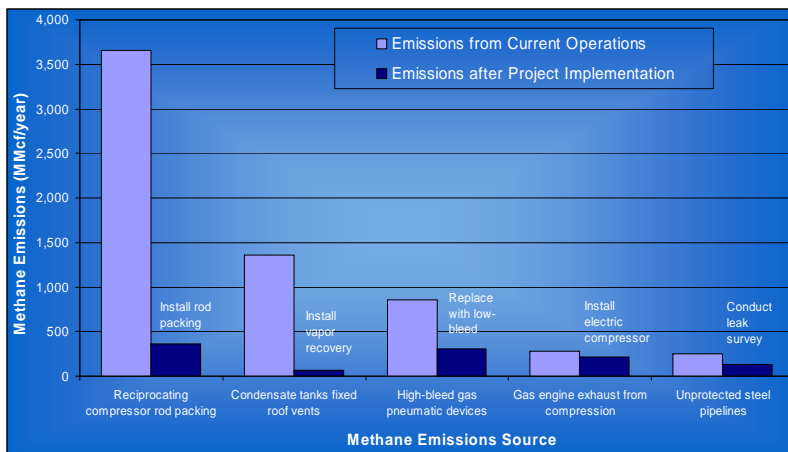
- A new online gateway to proven and cost-effective technologies and practices that reduce methane emissions in oil and natural gas operations.
- www.ontime.methanetomarkets.org



EPA Services for Natural Gas STAR Partner Companies

1. Develop Estimated Methane Emissions Inventory

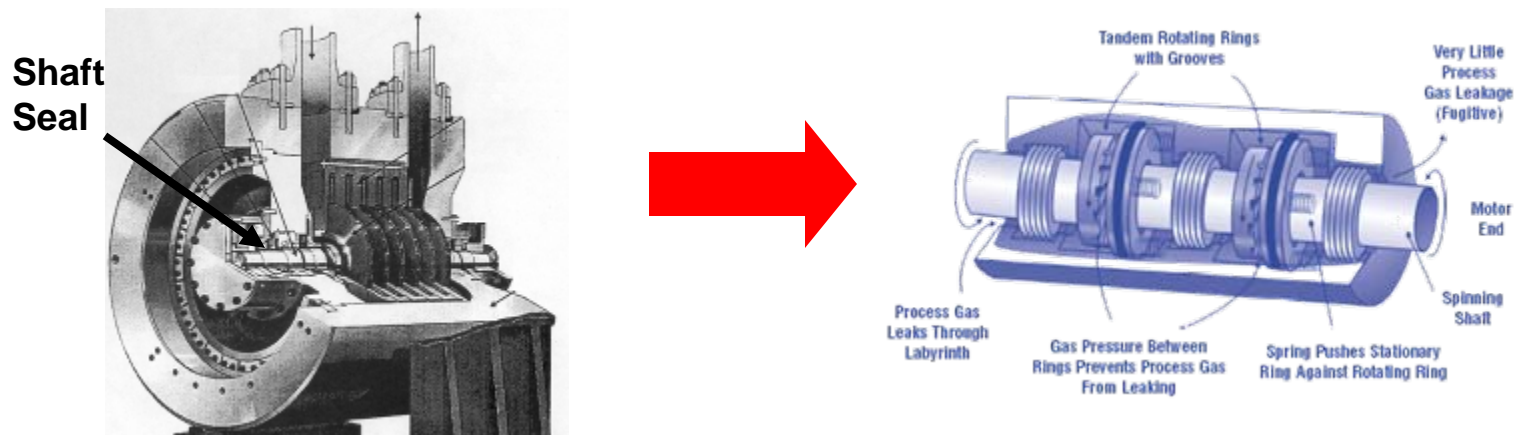
- Companies provide operational data that EPA uses to estimate methane emissions & propose emission reduction opportunities
- EPA delivers report to company detailing
 - Equipment-level emission estimations
 - Recommended mitigation options, including economic and operational benefits and anticipated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



EPA Services for Natural Gas STAR Partner Companies

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

Infrared Leak Detection



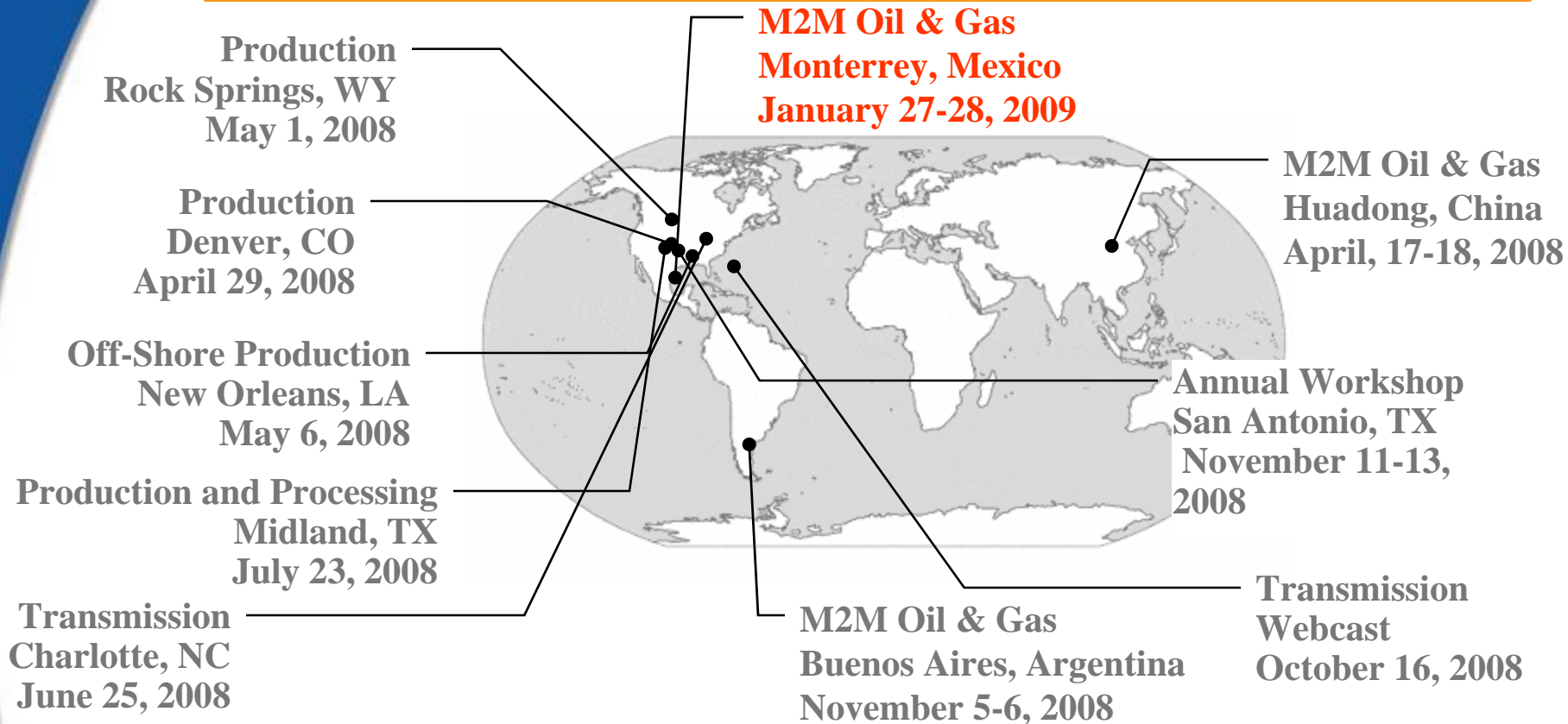
Source: Leak Surveys Inc.

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



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 (eg. for electricity generation)
 - Natural gas liquids value included
 - Carbon credit is leveraged
- Four Clean Development Mechanism (CDM) methodologies approved or under review



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

Contact Information

Carey Bylin
Program Manager, U.S. EPA
Methane to Markets, Oil & Gas
Natural Gas STAR International
bylin.carey@epa.gov, +1-202-343-9669

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

www.methanetomarkets.org

<http://www.epa.gov/gasstar/>