

25th world gas conference  
"Gas: Sustaining Future Global Growth"

# The Global Methane Initiative and the Natural Gas STAR International Program

Partnering to Advance Clean Energy  
Development & Climate Protection

Scott Bartos

June 5, 2012

CS6\_2 PGCA GHG Emission Reduction Efforts



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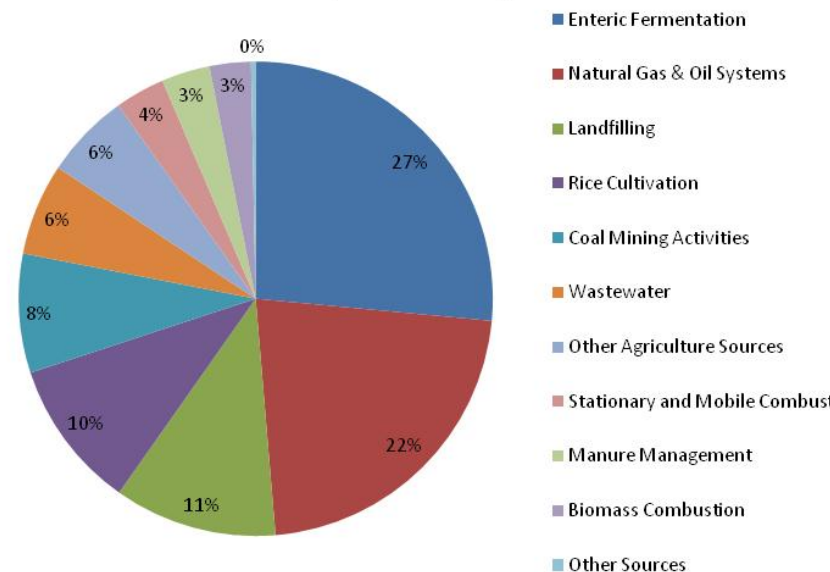
# Agenda

- Importance of Methane
- Global Methane Initiative
- Oil and Gas Sector Methane Emissions
- Natural Gas STAR Program
  - Background
  - Resources
  - Case Studies
- Conclusion

# Why Methane?

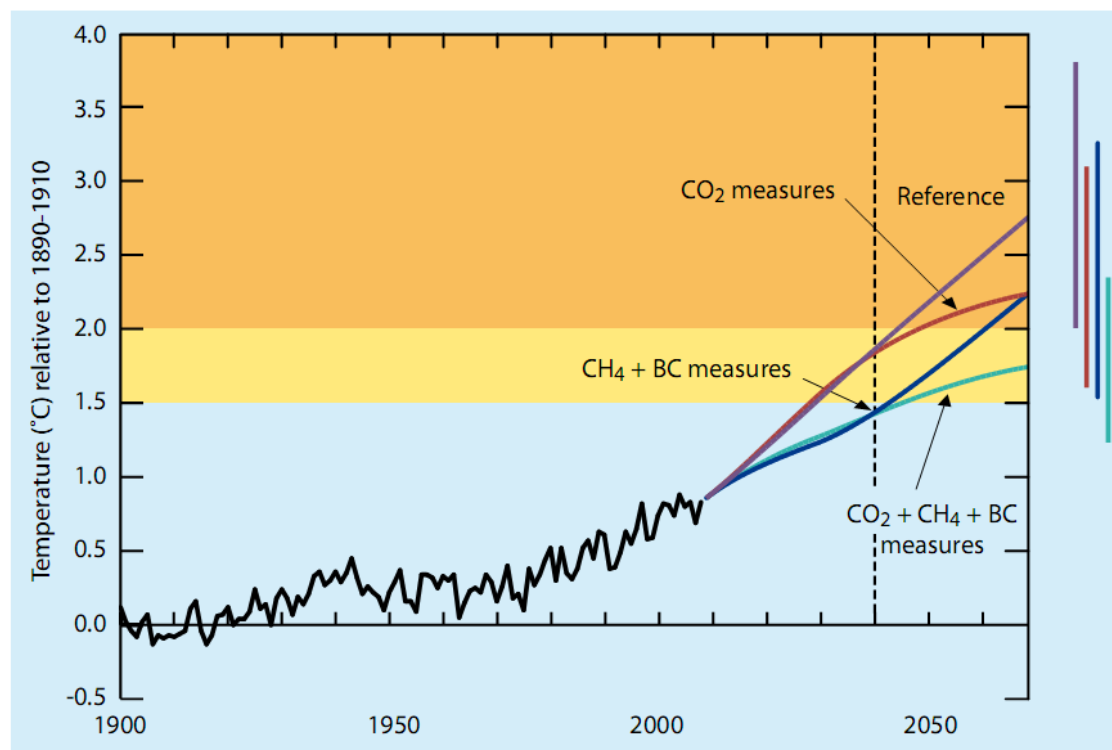
- **CLIMATE:** Potent GHG, over 20 times as potent as carbon dioxide, that accounts for 14% of global GHG emissions and over one-third of current anthropogenic warming
- **ENERGY and ECONOMY:** Natural gas is a valuable, clean-burning commodity
- **AIR QUALITY:** Pre-cursor to smog-forming ground-level ozone, which is harmful to human health and ecosystems
- **NEAR-TERM IMPACTS:** Methane emission reductions are critical to achieving near-term climate protection goals due to strong short-term warming impacts

2010 Worldwide Total CH<sub>4</sub> Emissions  
(in MtCO<sub>2</sub>e)



# Avoiding Critical Temperature Thresholds

- Recent studies show that focus on CO<sub>2</sub> reductions alone will not achieve near-term global temperature goals
- Combination of CO<sub>2</sub>, methane and black carbon reductions will have the greatest temperature impact in the near-term



**Figure 3.** Observed deviation of temperature to 2009 and projections under various scenarios. Immediate implementation of the identified BC and CH<sub>4</sub> measures, together with measures to reduce CO<sub>2</sub> emissions, would greatly improve the chances of keeping Earth's temperature increase to less than 2°C relative to pre-industrial levels. The bulk of the benefits of CH<sub>4</sub> and BC measure are realized by 2040 (dashed line).

# Global Methane Initiative

- Started as Methane to Markets in 2004, the Global Methane Initiative (GMI) advances cost-effective, near-term methane recovery and use as a clean energy source in five sectors:



***Oil and Gas Systems***



***Coal Mines***



***Landfills***

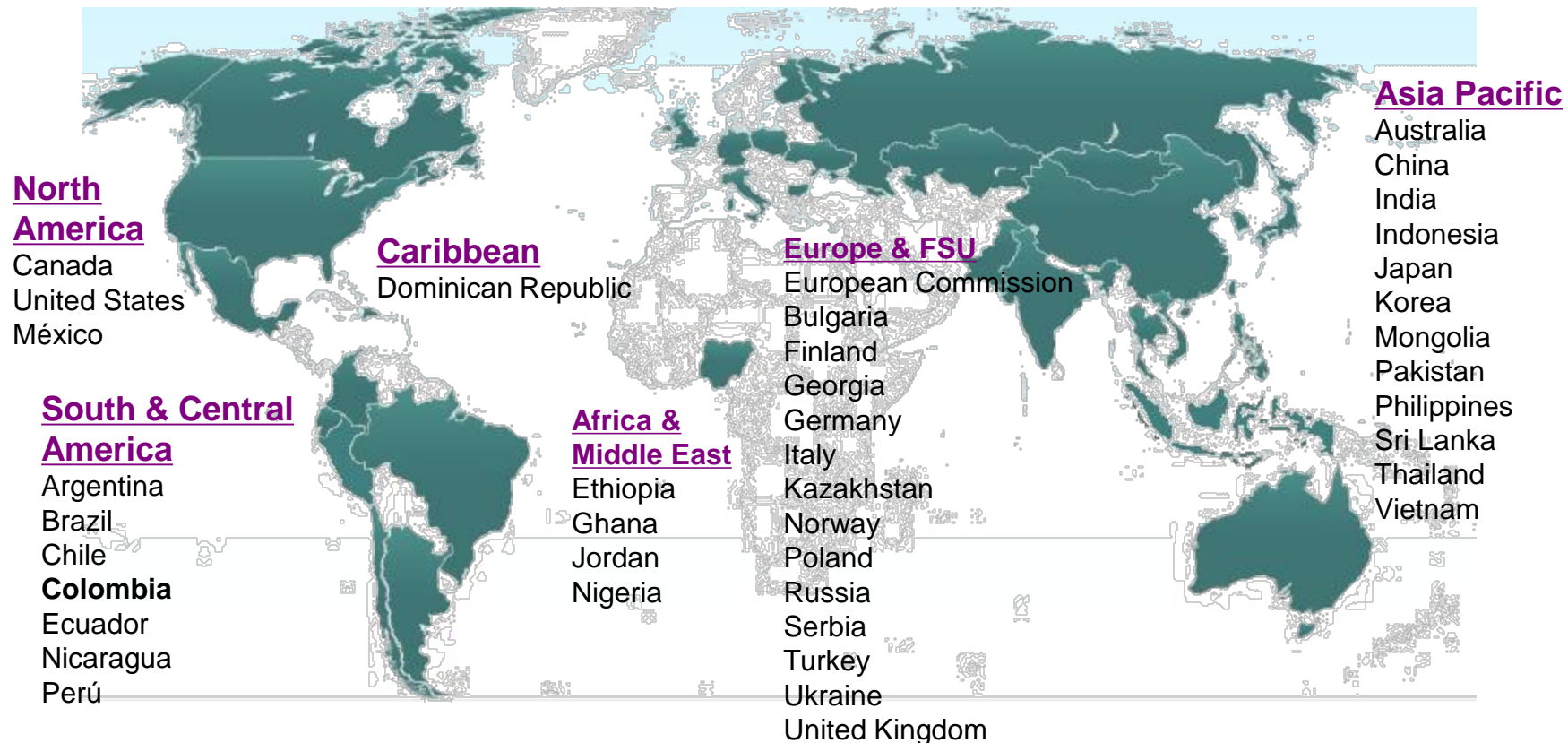


***Agricultural Waste  
and Wastewater***

- 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
- Since 2004, GMI has helped facilitate projects that have now reduced MMTCO<sub>2</sub>e of methane

# GMI Partner Governments

- 41 Partner Governments represent nearly 70% global anthropogenic methane emissions and all of the 10 top methane emitting countries



- Over 1,000 private companies, multilateral development banks and other relevant organizations participate by joining the Project Network

# Global Oil and Gas Sector Methane Emissions

- Over 4,200 Bcf (120 Bcm) of natural gas lost annually worldwide
  - US\$12 to \$29 billion lost revenues
  - Over 4% of global net dry gas consumption
  - 1,595 MMTCO<sub>2</sub>e
- Upstream gas releases can include volatile organic compounds (VOCs) and hazardous air pollutants
- Majority of emissions from
  - Natural gas Production, Processing, Transmission, Distribution
  - Upstream oil (production)
- Intentional or unintentional
  - Leaks/fugitives
  - Process venting
  - System upsets



# Challenges to Identifying and Quantifying Volume of Gas Lost

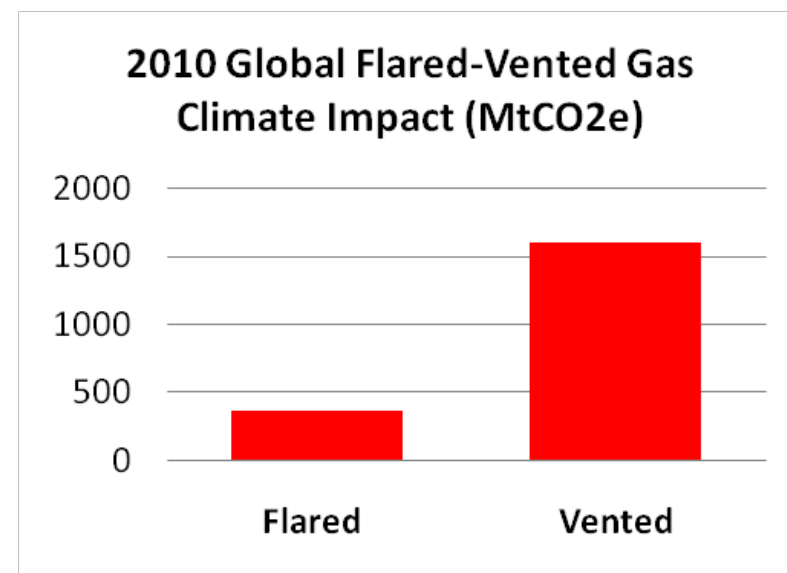
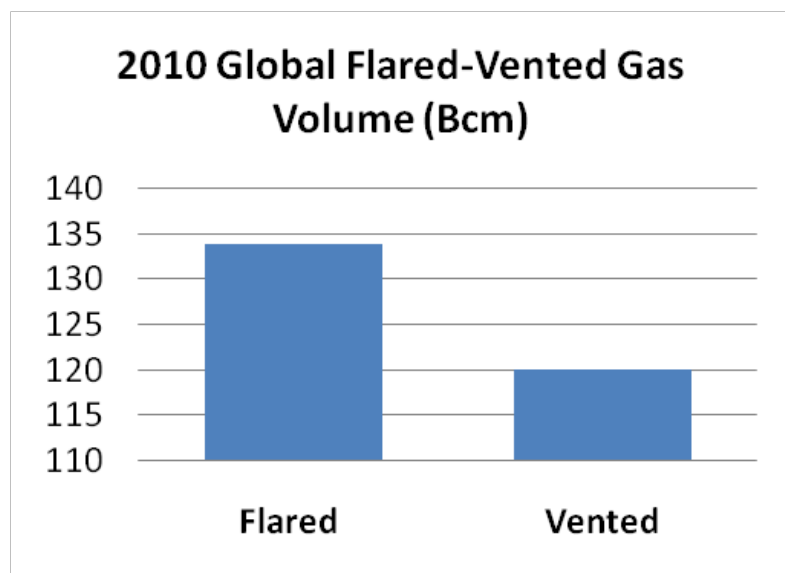


- Vented/leaked emissions are not readily visible or easily identifiable without specialized equipment
- Relatively large uncertainty in accounting for emissions

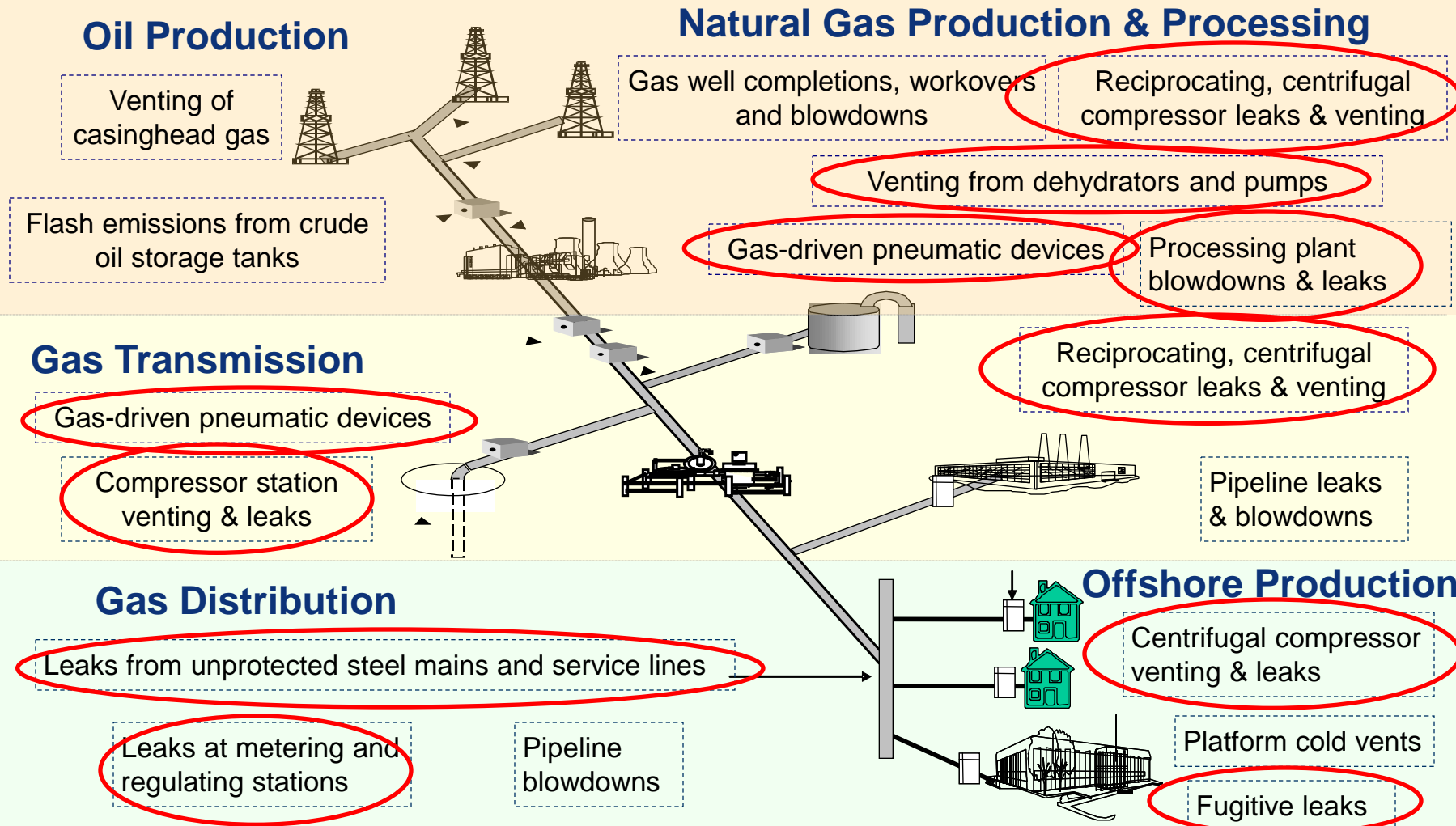


# Gas Flaring vs. Venting/Fugitives

- Greater volume of gas flared versus vented/fugitive losses worldwide
- However, climate impact of venting/fugitives over 300% greater than that of global natural gas flaring
- Reduction efforts can be complementary



# Top Sources of Oil and Gas Methane Emissions



# Natural Gas STAR Program

- Started in U.S. in 1993, expanded internationally in 2006
- Over 120 domestic and 14 international partners have
  - Identified over 60 cost effective technologies and practices to reduce methane emissions
  - Reduced methane emissions by nearly 1,100 Bcf (30 Bcm), saving over \$3 billion(US)



# Natural Gas STAR, 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 60 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**
    - **Measurement studies**
    - **Mitigation project feasibility studies**
- Services and resources provided free of charge and at no obligation



# Over 60 Cost Effective Methane Reduction Opportunities

Recommended Technologies and Practices | Natural Gas STAR Program | U.S. EPA - Windows Internet Explorer provided by EPA

US EPA http://www.epa.gov/gasstar/tools/recommended.html

File Edit View Favorites Tools Help

US EPA Recommended Technologies and Practices | Natural G...

## Pneumatics/Controls

Document Title	Capital Costs	Production	Gathering and Processing	Transmission	Distribution
<b>Estimated Payback: 0-1 year</b>					
Convert Gas Pneumatic Controls to Instrument Air <a href="#">Lessons Learned (PDF)</a> (12 pp, 314K)	> \$50,000	X	X	X	X
<b>Estimated Payback: 1-3 years</b>					
Options for Reducing Methane Emissions From Pneumatic Devices in the Natural Gas Industry <a href="#">Lessons Learned (PDF)</a> (12 pp, 201K) <a href="#">Presentation (PDF)</a> (20 pp, 384K) November 2011	< \$1,000	X	X	X	X
Convert Pneumatics to Mechanical Controls <a href="#">PRO Fact Sheet #301 (PDF)</a> (3 pp, 204K)	\$1,000-\$10,000				
Convert Natural Gas-Driven Chemical Pumps <a href="#">PRO Fact Sheet #202 (PDF)</a> (3 pp, 130K)	\$1,000-\$10,000				
Replacing Gas-Assisted Glycol Pumps with Electric Pumps <a href="#">Lessons Learned (PDF)</a> (17 pp., 197K)	\$1,000-\$10,000				

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## Tanks

Document Title	Capital Costs
Convert Water Tank Blanket from Natural Gas to Produced CO <sub>2</sub> Gas	\$1,000-\$10,000

- Low implementation costs
  - 50% cost <\$5,000 to implement
  - 25% <\$1,000 to implement
- Quick payback times (\$3/Mcf)
  - 50% pay back in <1 year
  - 67% pay back in <2 years
- Low cost per Mcf or tCO<sub>2</sub>e reduced
  - 70% cost <\$3 per Mcf reduced
  - 70% cost <\$10 per tCO<sub>2</sub>e reduced

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# Strategy for Addressing Methane Emissions

## Develop Emissions BASELINE



- Develop source- and process-specific methane inventory
- Use emission factors, engineering calculations, software tools, direct measurement

## Evaluate Best REDUCTION OPPORTUNITIES



- Prioritize largest sources and most cost-effective reduction projects
- Conduct measurement studies and detailed analyses to confirm volumes and scope reduction projects

## IMPLEMENT Reduction PROJECTS



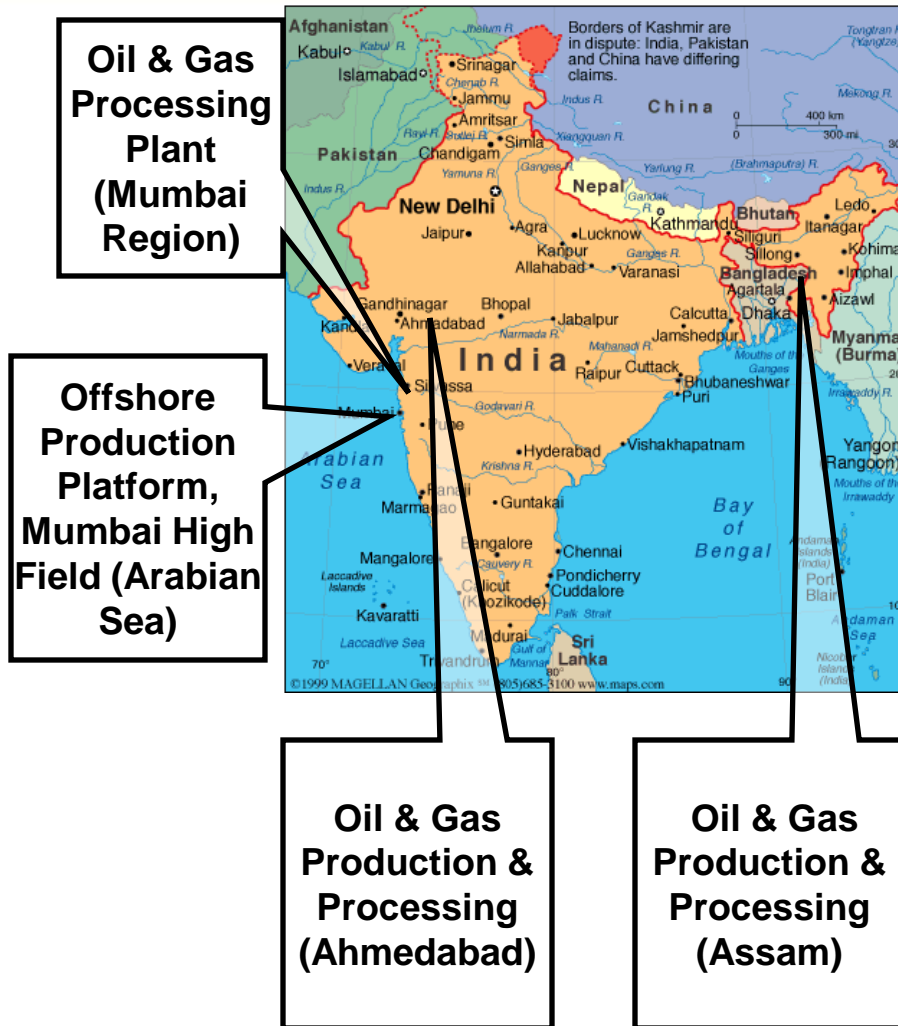
- Implement top reduction projects
- Pilot projects or company-wide
- Document and share lessons learned

## Document and SHARE SUCSESSES



- Quantify operational, economic, and environmental results
- Publicize results to stakeholders

# Partner Example: ONGC & Natural Gas STAR International



- Over 1 Bcf (30MM cm) of methane emissions identified and measured from 7 installations
  - EPA sponsored 7 studies
  - ONGC internal measurement team continuing studies
- Reduced methane emissions by nearly 400 MMcf (11MM cm) to date
  - Maintenance activities
  - Reciprocating compressor rod packing change
  - Installing vapor recovery units (VRUs)
  - Installing instrument air systems
- Over \$3.4 MM worth of recovered methane, fuel gas and other hydrocarbons

# Case Study: Chesapeake Pneumatic Device Retrofits

- Natural gas powered pneumatic devices used throughout the oil and natural gas industry
- Emissions reduction options include
  - Retrofits
  - Replacements
  - Conversion to instrument air
- Chesapeake retrofitted controllers with Mizer low bleed components
- Total 2,670 retrofits done through March 31, 2009
  - \$1,447,140 in costs
  - 636 MMcf (18MMcm) gas savings
  - 7 month simple payback reported using Chesapeake's gas value of ~\$3.50/MMBtu



Fisher 2500, 2506  
Retrofit w/ Mizer, bracket,  
tubing & relay plug



# Case Study: Encana Directed Inspection & Maintenance (DI&M)



- DI&M is a voluntary program to identify and fix leaks that are cost-effective to repair
  - Majority of fugitives are from small number of components
  - In many cases survey cost will pay out in the first year
  
- Encana surveyed methane areas of two processing plants: 23,169 components
  
- Identified leaking components: 857 or about 3.6% of components surveyed
  
- Repaired 80 to 90% of leakers
  
- 198 MMcf (5.6 MMcm) / year methane emissions reductions
  
- \$1,386,000/year annual savings at Encana assumed value of ~\$7/MMBtu
  - \$594,000/year savings for \$3/MMBtu gas value

# Significant Benefits of Methane Reduction Projects

## Economic Benefits

- Increased natural gas sales revenue
- Using natural gas to replace a more expensive fuel for onsite energy generation
- Reduced operating, maintenance and fuel costs

## Environmental Benefits

- Reduced greenhouse gas emissions
- Improved local air quality

## Operational Benefits

- Increased energy efficiency at oil and gas facilities
- Reduced waste of a valuable fuel and local energy source
- Improved industrial safety
- Progress toward corporate goals

## Contact Information



Scott Bartos

Global Methane Initiative – Oil & Gas Sector

[bartos.scott@epa.gov](mailto:bartos.scott@epa.gov)

+1 202 343-9167

Carey Bylin

Global Methane Initiative – Oil & Gas Sector

[Bylin.carey@epa.gov](mailto:Bylin.carey@epa.gov)

+1 202 343-9669

[www.globalmethane.org](http://www.globalmethane.org)

<http://www.epa.gov/gasstar/international/index.html>

<http://www.epa.gov/gasstar/tools/recommended.html>

