Methane to Markets

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Please note that this presentation was given during the United Nations Climate Change Conference (COP-15) in Copenhagen, December 7-18, 2009 for more information please visit http://www.cop15.state.gov/ .

UNITED STATES 09
COPENHAGEN

Methane to Markets

Methane Emission Measurement at India Oil and Natural Gas Facilities

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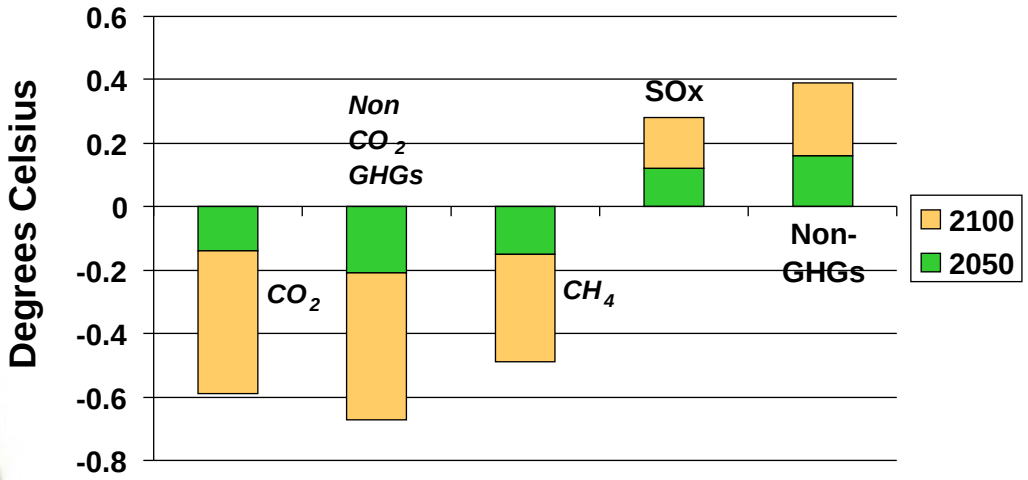
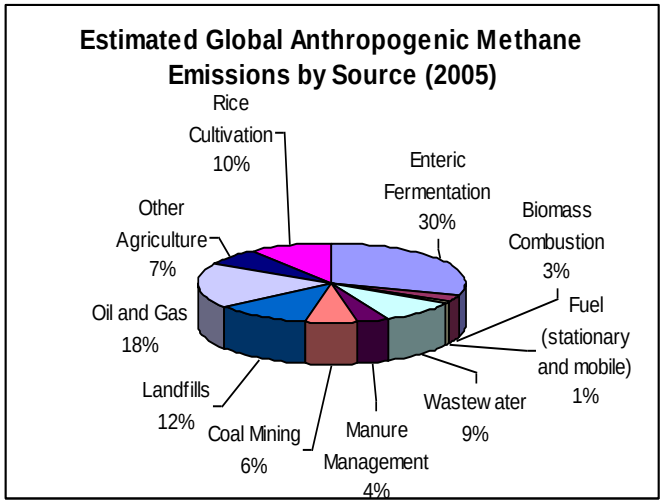
Why focus on Methane?

- **2nd most important GHG** accounting for ~18% of total radiative (climate) forcing
- A **primary component of natural gas** and a valuable, **clean-burning energy source**



Source: Pew Center on Global Climate Change, 2003



Source: U.S. EPA Report (2006)

- Critical to achieving **short-term climate impacts**
- 50% reduction in global methane emissions will have **same temperature impact** as a 50% reduction in carbon dioxide emissions

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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

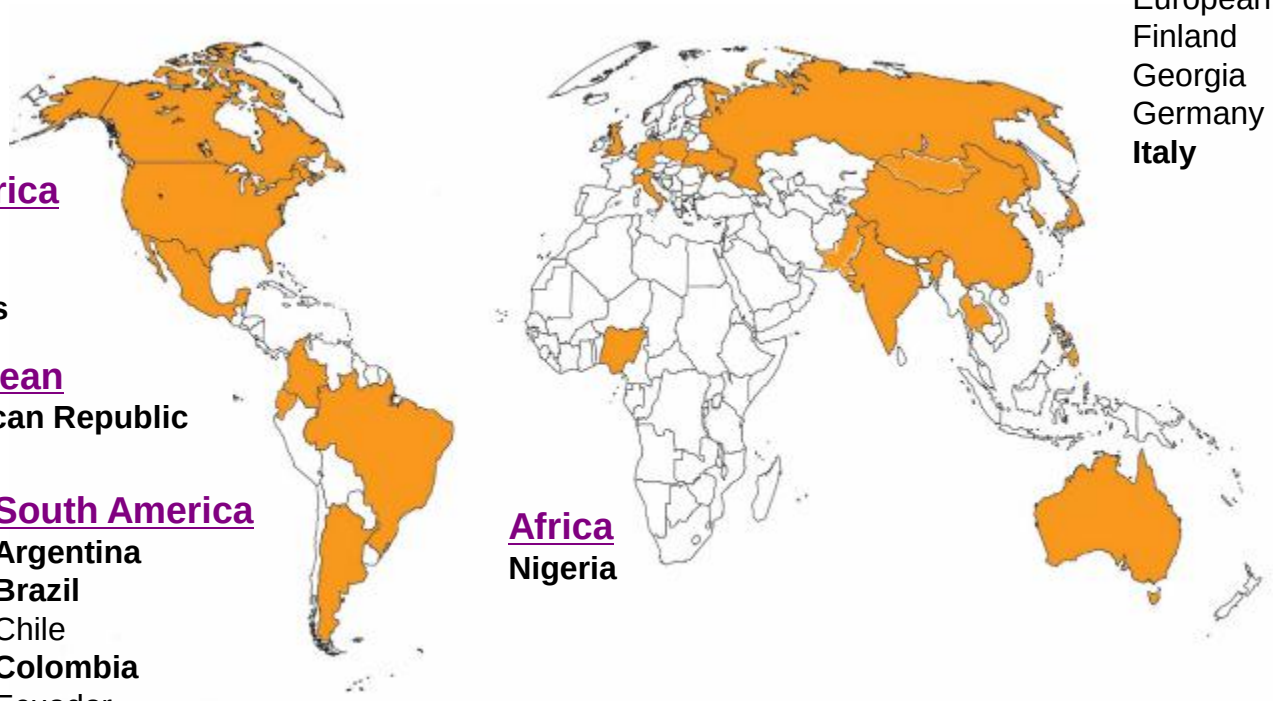
Landfills

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

- 31 Partner Governments



North America
Canada
Mexico
United States

Caribbean
Dominican Republic

South America
Argentina
Brazil
Chile
Colombia
Ecuador

Africa
Nigeria

Europe & FSU
Bulgaria
European Commission
Finland
Georgia
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 900 organizations now participating***

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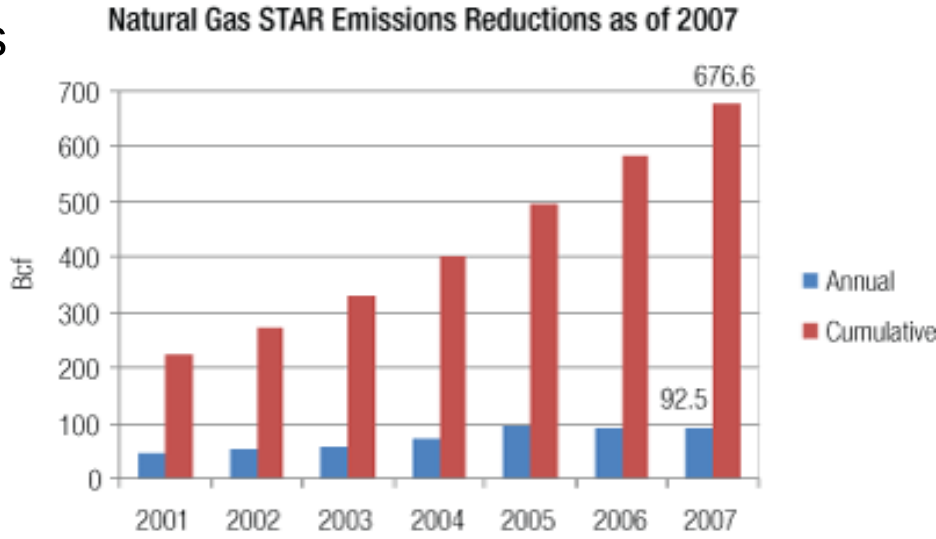
Natural Gas STAR Program

- Partnership between EPA and oil and natural gas industry
  - Started in the U.S. in 1993
  - Expanded internationally in 2006
- Partner companies report methane mitigation activities to EPA
- Program provides resources to advance cost-effective oil & gas sector methane emission reductions:
- General technology transfer, training, and capacity building
  - Technical documents, research, workshops and conferences
- Individual assistance to identify and assess project opportunities
  - Estimated methane inventories
  - Feasibility studies
  - Measurement studies



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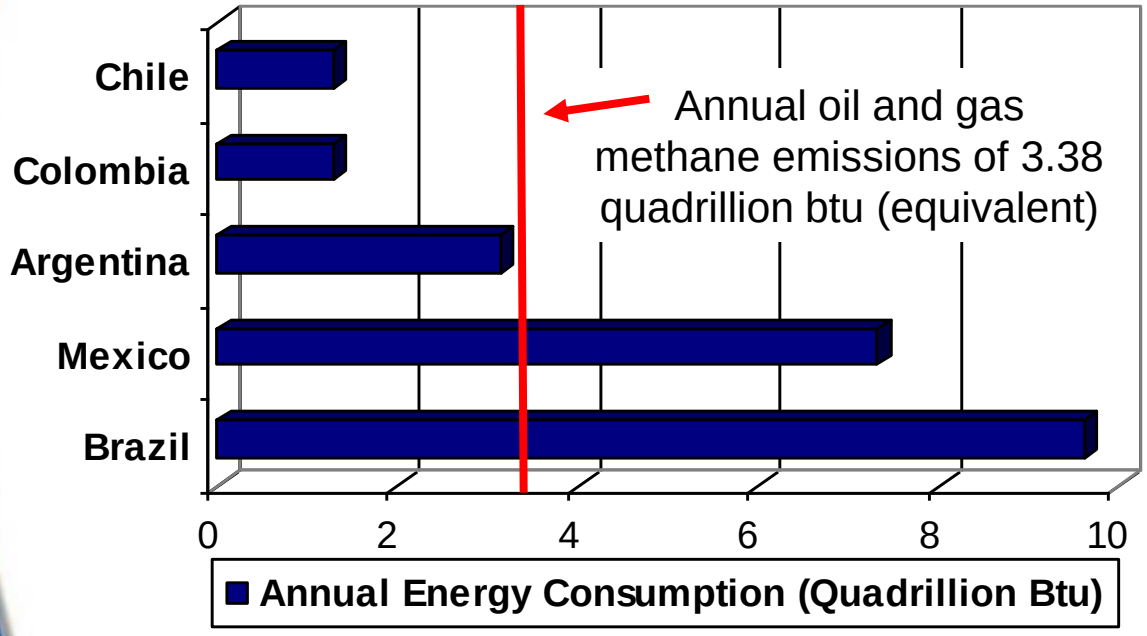
Importance of Methane Emissions in the Oil and Gas Sector

→ ECONOMIC LOSS OF A VALUABLE PRODUCT

- 94.2 billion m^3 of natural gas* lost annually by global oil and gas industry equates to **U.S. $10 to $20 billion lost revenues**



EIA. (2008) International Energy Statistics

Energy value of gas lost annually is equivalent to 5 months to 2.6 years worth of TOTAL primary energy consumption for these countries

*Methane is the primary component of natural gas

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

Why Do Companies Lose This Gas?

Where is the leak?

ONGC Measurement Study: Equipment and Techniques

- Infrared (IR) camera was used to identify ('see') methane emissions

- Measurement was undertaken using
  - Hi-Flow Sampler
  - Calibrated bag
  - Turbine meter

Overview of ONGC Measurement Studies

Oil & Gas Processing Plant (Mumbai Region)

Offshore Production Platform, Mumbai High Field (Arabian Sea)

Oil & Gas Production & Processing (Ahmedabad)

Oil & Gas Production & Processing (Assam)

- Measured methane losses of 16 million m3 per year
  - –232,599 Tonnes CO2e
  - –Lost gas worth >$1MM/year
- Three major sources of emissions identified:
  - –Vents: 10.07 MM m3
  - –Wet seal compressors: 5.99 MM m3
  - –Fugitive leakage: .44 MM m3
- Recommended projects have a range of costs
  - –Periodic leak survey and repair
  - –Retrofit existing equipment
  - –Install gas capture technology

Measurement Study Benefits

- Measurement study allows for identification and prioritization of reduction projects to
  - Reduce greenhouse gas emissions
  - Reduce losses of a valuable product
  - Utilize a non-renewable domestic energy source
  - Enhance safety of operations
  - Improve operational efficiency
- Top recommended methane recovery projects also
  - Increase production
  - Recover natural gas liquids
  - Increase pipeline efficiency

Outcomes and Next Steps

- Positive outcomes with environmental, safety, operational and economic benefits provides impetus for replicating studies more broadly
- Overall collaboration promoted capacity building within organization
- Company forming internal measurement team and planning future studies in India and abroad
  - Results will feed into GHG emission inventory
  - Basis for ongoing reduction assessment for setting targets

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