Natural Gas STAR Program

Overview and Accomplishments

Producers and Processors
Technology Transfer Workshop
Billings, MT
August 31, 2009

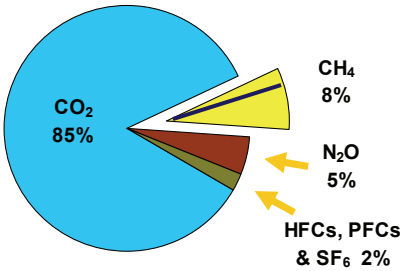
Outline

- Background
- Natural Gas STAR Program Overview & Highlights
- Program Resources and Tools

Background

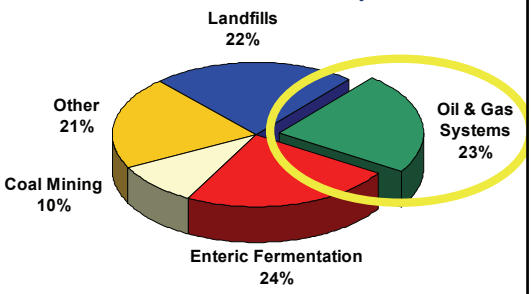
Current U.S. Greenhouse Gas Emissions Estimates

U.S. Greenhouse Gas Emissions All Sources



Methane emissions from **Oil and natural gas systems** make up about **2%** of **total** U.S. greenhouse gas emissions

U.S. Methane Emissions by Sector

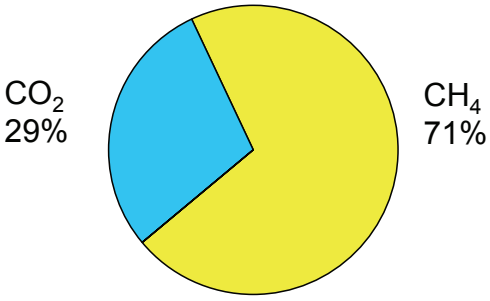


Oil and natural gas systems are the second **largest** man-made source of methane emissions in the U.S. **(23%)**

Source: EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007.* April, 2009.

U.S. Natural Gas Industry GHG Emissions: 20 year Global Warming Potential Basis

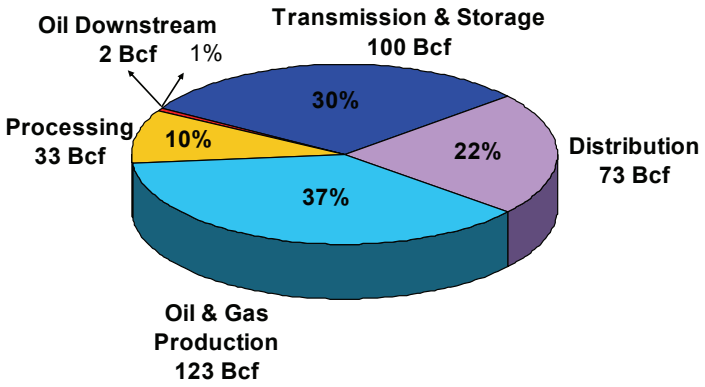
- Methane emissions comprise 72% of total U.S. Natural Gas industry GHG emissions



N_2O Emissions are negligible
EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007.* April, 2009. Updated with 20-year GWP from IPCC. Changes in Atmospheric Constituents and in Radiative Forcing. 2007.

Background: U.S. Oil and Gas Methane Emissions by Sector

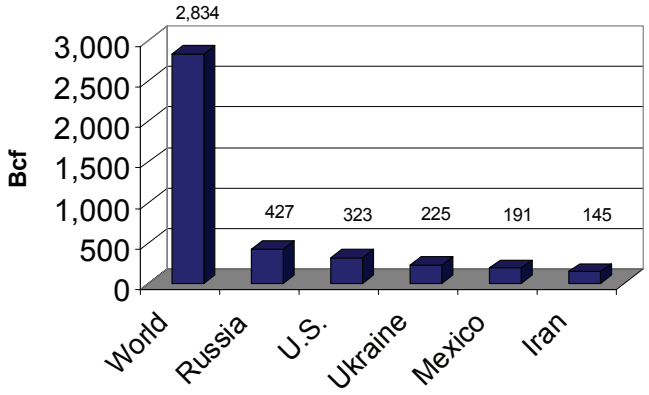
- **2007 U.S. methane emissions from oil and natural gas industry: 331 Bcf (2% of total U.S. greenhouse gas emissions)**



Source: EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007.* April, 2009.
Note: Natural Gas STAR reductions from gathering and boosting operations are reflected in the production sector.

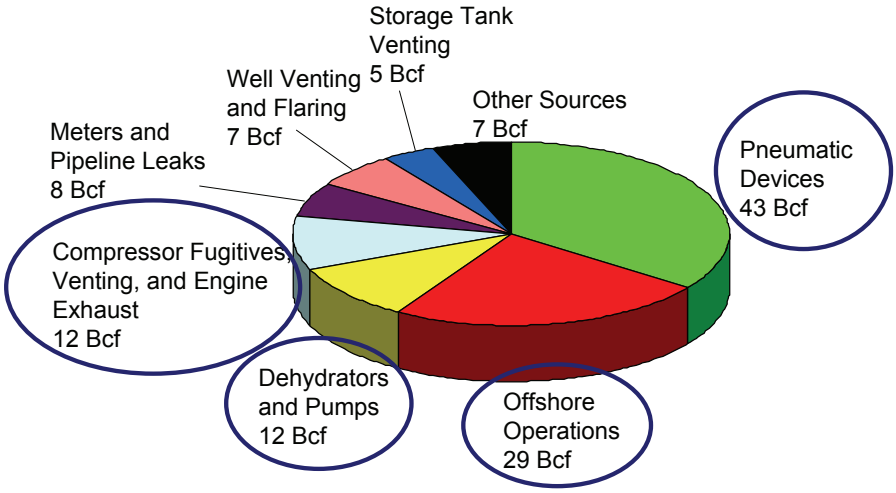
Oil and Gas Industry Methane Emissions: U.S. & International

- U.S. contributes 11% of worldwide methane emissions from oil and natural gas systems



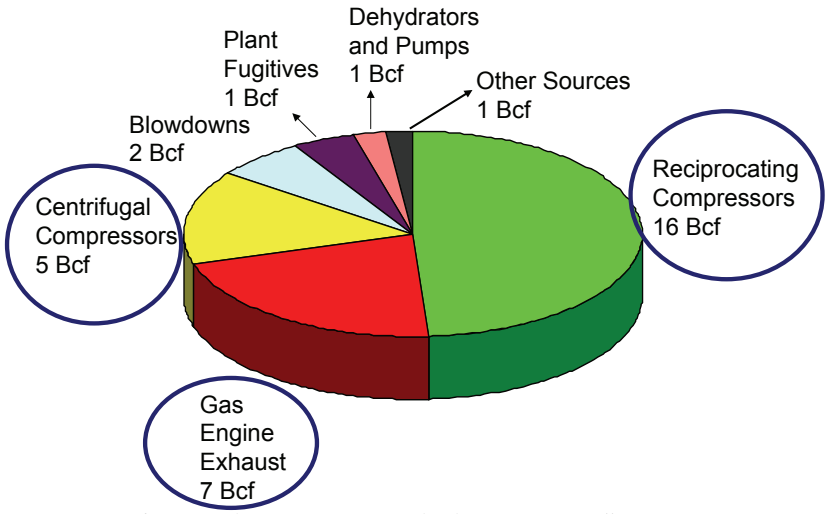
Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2006, USEPA, April, 2008
Global Anthropogenic Non-CO_2 Greenhouse Gas Emissions: 1990 – 2020, USEPA, June 2006

Background: U.S. Production Sector Methane Emissions



Source: EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007.* April, 2009.
Note: Natural Gas STAR reductions from gathering and boosting operations are reflected in the production sector.

Background: U.S. Gathering and Processing Sector Methane Emissions



Source: EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007.* April, 2009.
Note: Natural Gas STAR reductions from gathering and boosting operations are reflected in the production sector.

Why Focus on Methane?

- **A potent greenhouse gas (GHG) with 100-year global warming potential of 25; 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 of total U.S. (23%) and global (18%) human-made methane emissions.**

U.S. Oil & Natural Gas Opportunities: Why Gas STAR?

- **331 Bcf of methane emissions per year amounts to:**
  - $2.32B worth of gas lost (at $7/Mcf)
  - CO_2 emissions from the electricity use of 17.7 million homes for one year
  - Annual greenhouse gas emissions from 24.5 million passenger vehicles
- **U.S. oil and natural gas industry has an opportunity to cost-effectively reduce methane emissions resulting in:**
  - Increased operational efficiency
  - Increased profits
  - Increased domestic natural gas supply
  - Improved safety
  - Improved environmental performance
  - Better public relations

Overview & Program Highlights

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 natural gas operations.

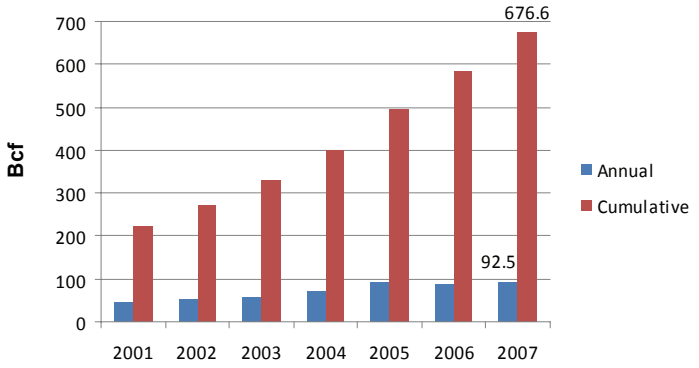
- **Over 130 Program Partners across four sectors**
  - 10 International Partners
  - 20 Endorser Associations

For a complete listing of Natural Gas STAR partner companies and industry association endorsers, visit epa.gov/gasstar/partners/index.html

Accomplishments

- **Through participation in the Natural Gas STAR Program, partners reduced methane emissions by 92.5 Bcf in 2007**
  - 677 Bcf in cumulative reductions since 1993

Domestic Natural Gas STAR Methane Emission Reductions as of 2007



Natural Gas STAR International

- Natural Gas STAR International launched September 26, 2006 now has 12 partners

Comgas

ConocoPhillips Canada Ltd.

Devon Energy Corporation

Empresa Nacional del Petroleo (ENAP)

ENAP Sipetrol S.A.

Enbridge

ExxonMobil Corporation

GAZ-SYSTEM S.A.

Marathon Oil Corporation

Occidental Oil and Gas Corporation

Oil and Natural Gas Corporation Ltd. (ONGC)

TransCanada

Program Resources and Tools

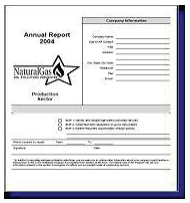
Natural Gas STAR Key Components

- **Guidance on new technologies and practices**
  - Technical documents on more than 80 **cost-effective** technologies and practices
  - Free Technology Transfer workshops
  - One-on-one technical assistance to identify and prioritize cost-effective methane emission reduction opportunities
- **Annual record of partner voluntary actions and methane savings**

Technical Information

Project Demonstrations

Workshops



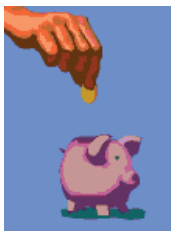
Annual Reports

What is Cost Effective?

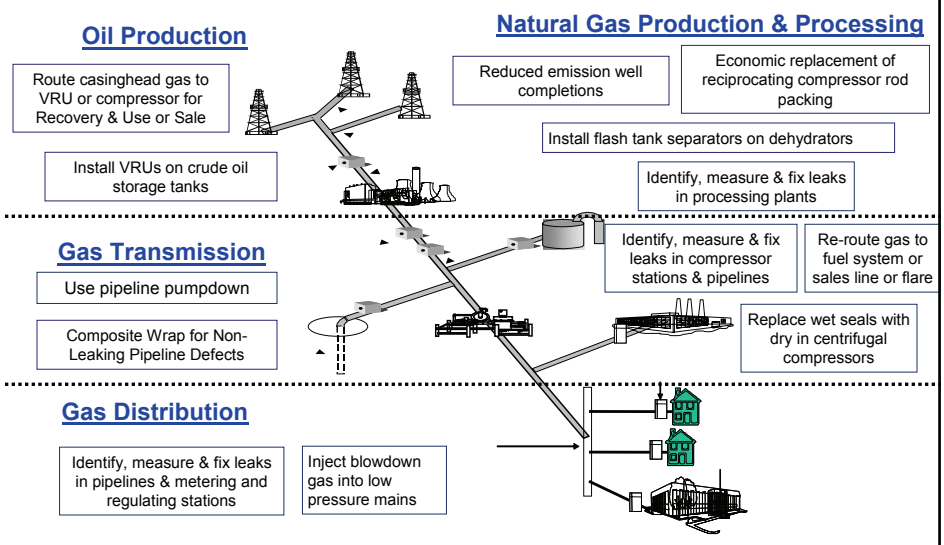
The simple payback is the number of years it takes to pay back the capital cost of a project (based on $3/Mcf)

- **Payback within 10 years** — **87%**
- **Payback within 3 years** — **77%**
- **Payback within 12 months** — **47%**
- **Immediate payback** — **1%**

Percentage of over 80 Gas STAR Recommended Technologies and practices at each payback level



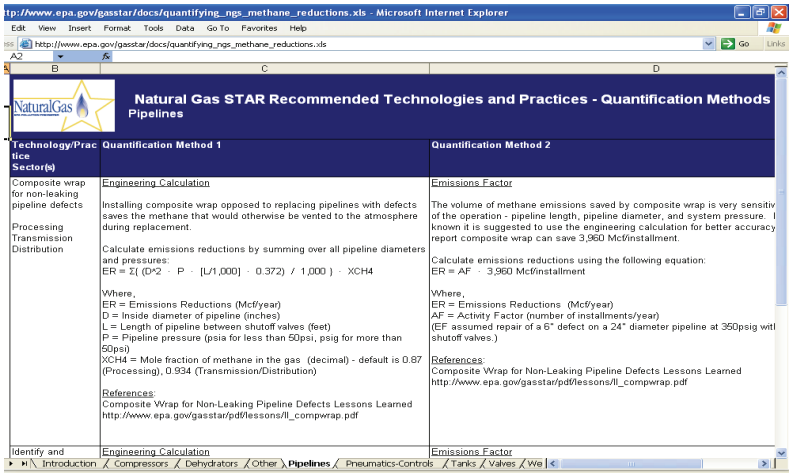
Cost-Effective Methane Mitigation Opportunities



Picture courtesy of American Gas Association

Emission Reduction Quantification Guidance

- **Guidance for quantifying methane emission reductions from recommended technologies and practices**

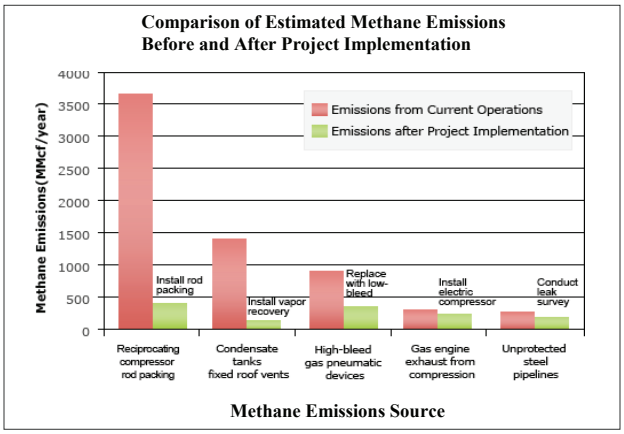


http://www.epa.gov/gasstar/docs/quantifying_ngs_methane_reductions.xls

Natural Gas STAR "Partner Challenge"

- EPA offers one-on-one technical assistance to partners in identifying and prioritizing cost-effective methane emission reduction opportunities

- Uses customized data
- Quantifies partners' methane emissions and identifies corresponding emission reduction opportunities
- Details economic and operational benefits of reduction technologies & practices



http://www.epa.gov/gasstar/tools/partner-challenge.html

2009 Technology Transfer Workshops

Production and Processing
Billings, MT
Aug 31, 2009

Production
Oklahoma City, OK
May 14, 2009

Annual Implementation Workshop
San Antonio, TX
Oct 19 to 21, 2009

Methane to Markets
Oil and Gas Subcommittee Meeting
Lake Louise, Alberta, Canada
Sept 14 to 17, 2009

For more information, visit www.epa.gov/gasstar/workshops

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