




**Natural Gas STAR Program**


**Program Overview**

Marcellus Shale Basin Producers  
Technology Transfer Workshop  
State College, PA  
November 18, 2009



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**Overview & Highlights**



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## Natural Gas STAR Program

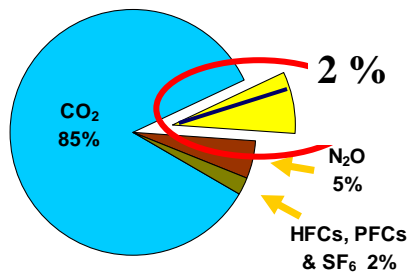
The Natural Gas STAR Program is a *flexible, voluntary partnership* between EPA and the oil and natural gas industry designed to *cost-effectively* reduce methane emissions from natural gas operations.

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



## Current U.S. Greenhouse Gas Emissions Estimates

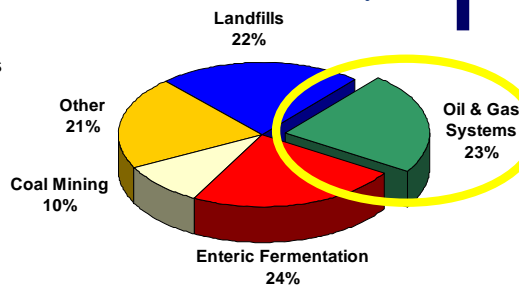
U.S. Greenhouse Gas Emissions All Sources



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

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





## Why Focus on Methane?

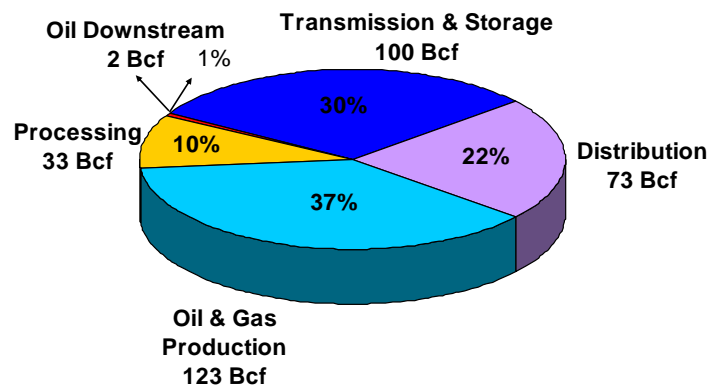
- ⚡ A potent greenhouse gas (GHG) with 100-year global warming potential of 25; atmospheric lifetime of ~12 years
- ⚡ The 2nd most important GHG accounting for ~18% of total climate forcing
- ⚡ A primary component of natural gas and a valuable, clean-burning energy source
  - ⚡ Proven, viable technologies 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.

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## 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)



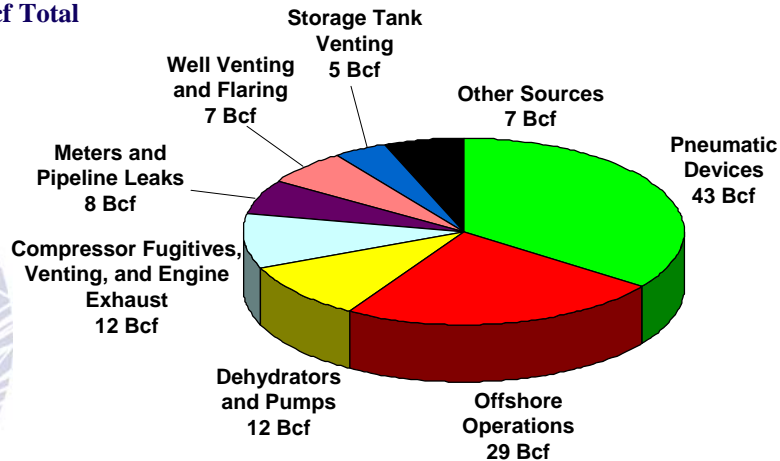
Source: EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007*. April, 2009.  
Note: Natural Gas STAR reductions from gathering and boosting operations are reflected in the production sector.

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## 2007 Production Sector Methane Emissions

123 Bcf Total



EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2007*. April, 2009. Available on the web at: [epa.gov/climatechange/emissions/usinventoryreport.html](http://epa.gov/climatechange/emissions/usinventoryreport.html)  
Natural Gas STAR reductions from gathering and boosting operations have been moved to the production sector.

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

🔥 331 Bcf of methane emissions per year amounts to:

- 💠 \$1.49B worth of gas lost (at \$4.50/Mcf)
- 💠 CO<sub>2</sub> 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:

- 💠 Improved safety
- 💠 Increased operational efficiency
- 💠 Increased domestic natural gas supply
- 💠 Increased revenue/profits
- 💠 Improved environmental performance



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## Cost-Effective Methane Mitigation Opportunities

### Oil Production

Route casinghead gas to VRU or compressor for recovery & use or sale

Install VRUs on crude oil storage tanks

### Natural Gas Production & Processing

Reduced emissions well completions

Aerial leak detection using laser and/or infrared technology

Install plunger lifts

Identify, measure & fix leaks in processing plants

### Gas Transmission

Use pipeline pumpdown

Install vapor recovery units on pipeline liquid/condensate tanks

Identify, measure & fix leaks in compressor stations & pipelines

Re-route gas to fuel system or sales line or flare

Replace wet seals with dry in centrifugal compressors

### Gas Distribution

Identify, measure & fix leaks in pipelines & metering and regulating stations

Inject blowdown gas into low pressure mains

Picture courtesy of American Gas Association



## 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)

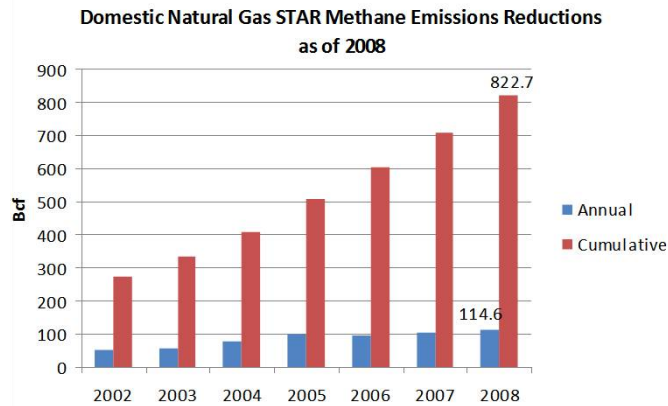
Payback within 10 years	87%	Percentage of over 80 Gas STAR Recommended Technologies and practices at each payback level
Payback within 3 years	77%	
Payback within 12 months	47%	
Immediate payback	1%	



## 2008 Another Successful Year Domestic Methane Emission Reductions

Gas STAR Partners reduced methane emissions by 114.6 Bcf in 2008

822.7 Bcf in cumulative reductions since 1990



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## Natural Gas STAR International

EPA expanded Program to include international operations in 2006 under the Methane to Markets Partnership.

Currently 12 International Partners

Participation involves:

- Developing an implementation plan
- Identifying and implementing cost-effective projects
- Reporting your success

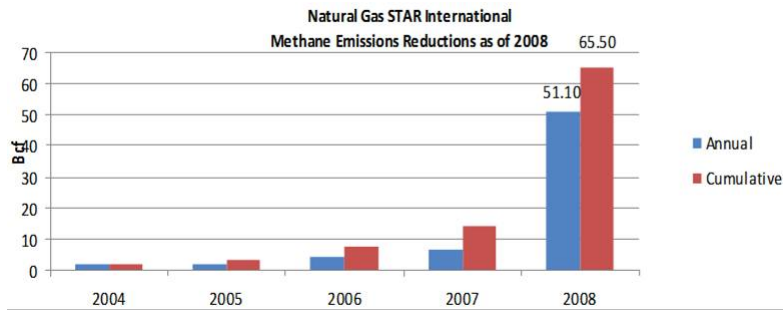
Support from Gas STAR International is available:

- Identify top cost-effective methane reduction project opportunities
- Conduct project pre-feasibility analysis
- On-site training and workshop development

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## Natural Gas STAR International Methane Emissions Reductions



## Program Resources and Services





# Web site: [www.epa.gov/gasstar](http://www.epa.gov/gasstar)

U.S. ENVIRONMENTAL PROTECTION AGENCY

**Natural Gas STAR Program** Bookmark

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The Natural Gas STAR Program is a flexible, voluntary partnership that encourages oil and natural gas companies—both domestically and abroad—to adopt cost-effective technologies and practices that improve operational efficiency and reduce emissions of methane, a potent greenhouse gas and clean energy source.

**Methane Home**

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Natural Gas STAR Home

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Partners

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Natural Gas STAR International

Frequent Questions

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**Highlights**

HEARING AND VENTING REDUCTION & NATURAL GAS UTILISATION FORUM  
 AMSTERDAM, 3-5 DECEMBER 2008  
BY GREGORY W. WATSON/EPIC

» **Nov 11-13** - 15th Annual Natural Gas STAR Implementation Workshop

» The Natural Gas STAR Partner Update - Fall 2008

» [Other Current News](#)





# Key Program Resources

- 🔥 Lessons Learned and PRO documents available in several languages!
  - 🔥 Russian
  - 🔥 Spanish
  - 🔥 Chinese
  - 🔥 Arabic
- 🔥 Service Provider Directory
- 🔥 Partner Challenge

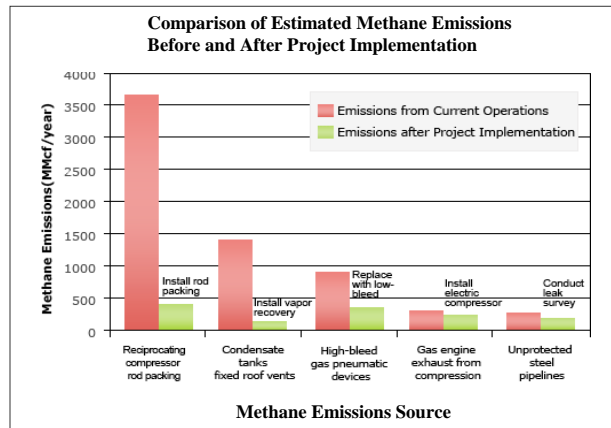




## Natural Gas STAR “Partner Challenge”

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

- 🔥 Uses company-specific data
- 🔥 Quantifies Partners’ methane emissions and identifies corresponding emission reduction opportunities
- 🔥 Details economic and operational benefits of reduction technologies & practices



[www.epa.gov/gasstar/tools/partner-challenge.html](http://www.epa.gov/gasstar/tools/partner-challenge.html)



## Opportunities for Involvement

- 🔥 Technology Transfer Workshops
- 🔥 Webcasts
- 🔥 Study Tours
- 🔥 Annual Implementation Workshop

For more information and workshop announcements:  
[www.epa.gov/gasstar/workshops/index.html](http://www.epa.gov/gasstar/workshops/index.html)



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[www.epa.gov/gasstar](http://www.epa.gov/gasstar)