


# Natural Gas STAR Program

## Overview and Accomplishments

Producers Technology Transfer Workshop  
New Orleans, LA  
May 6, 2008



## Agenda

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- 🔥 **Background**
- 🔥 **Natural Gas STAR Program Overview & Highlights**
- 🔥 **Program Resources and Tools**
- 🔥 **Greenhouse Gas Reporting Rulemaking**

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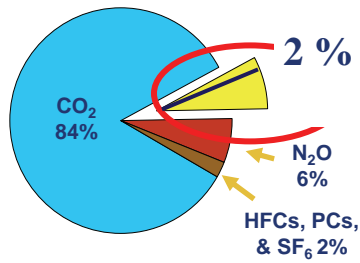


# Background



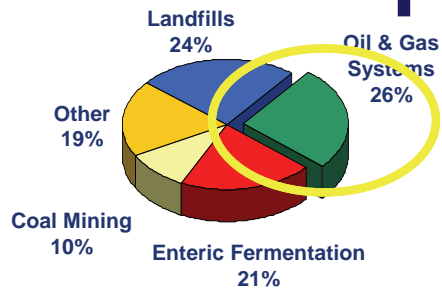
# Current U.S. Greenhouse Gas Emissions Estimates

U.S. Greenhouse Gas Emissions All Sources



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

U.S. Methane Emissions by Sector



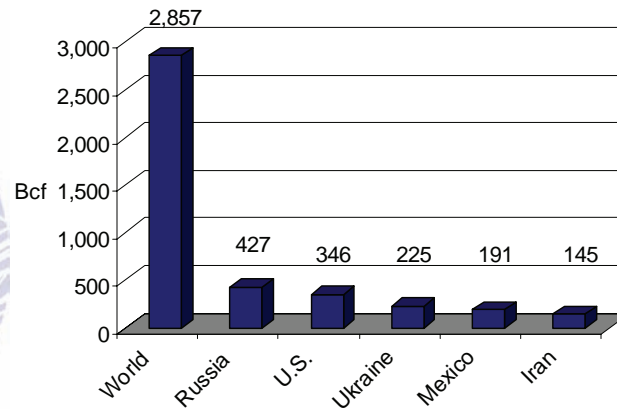
Oil and gas systems are the **largest** man-made source of methane emissions (**26%**)

Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2005, USEPA, April, 2007



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

- U.S. contributes 12% of worldwide methane emissions from oil and gas systems



*Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2005, USEPA, April, 2007  
Global Anthropogenic Non-CO<sub>2</sub> Greenhouse Gas Emissions: 1990 – 2020, USEPA, June 2006*

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## U.S. Oil & Natural Gas Opportunities

- 346 Bcf of methane emissions per year amounts to:
  - \$2.42B in lost revenue at \$7/Mcf natural gas
  - Annual greenhouse gas emissions from 25,630,000 passenger vehicles
  - CO<sub>2</sub> emissions from the electricity use of 18,535,000 home for one year
  - Carbon sequestered annually by 31,804,000 acres of pine or fir forests
- U.S. oil and gas industry has an opportunity to cost-effectively reduce these impacts

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## Overview & Program 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 120 Program Partners across four sectors
- 🔥 Eight International Partners
- 🔥 19 Endorser Associations

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## Participation Matters

The Natural Gas STAR Program only works if our Partners participate. Participation means:

- ⚡ **Don't just check the box:** expand on your existing and future efforts to identify and implement new ways to reduce gas losses, save money, and make an impact on the environment
- ⚡ **Implement robust methods for quantifying leaks and vented emissions:** this will only increase in importance over time
- ⚡ **Report successes to Gas STAR:** which is currently the main knowledge base for the industry's efforts to reduce methane emissions

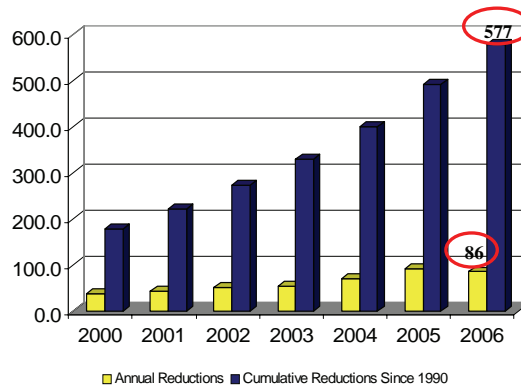
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## 2006 Another Successful Year for Methane Emission Reductions

⚡ Gas STAR Partners reduced methane emissions by 86 Bcf in 2006

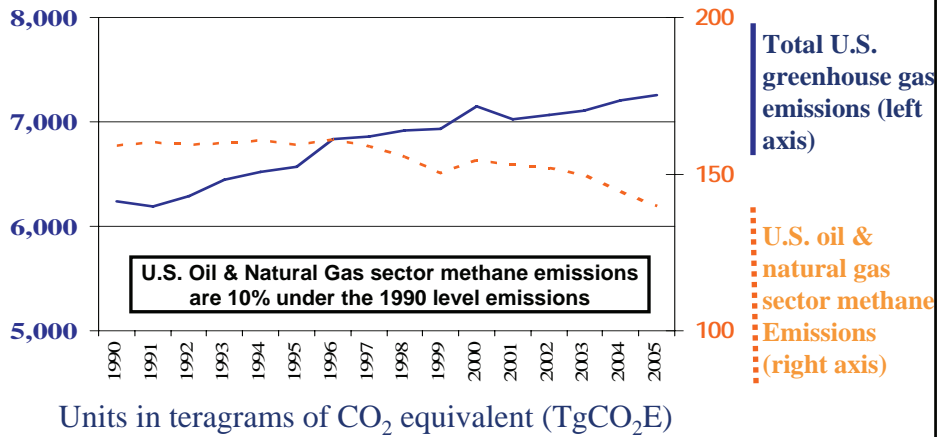
⚡ 577 Bcf in cumulative reductions since 1990



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## Natural Gas STAR Partner Accomplishments (1990 – 2005)



Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2005, USEPA, April, 2007



## Natural Gas STAR International

🔥 Natural Gas STAR International launched September 26, 2006 now has eight partners



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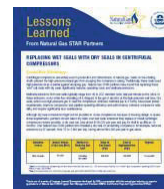


## Program Resources and Tools



## Key Components

- ❖ **Guidance on new technologies & practices**
  - ❖ Technical documents on over 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**



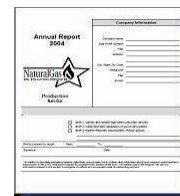
Technical Information



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**

**Answer:** Depends on company specific circumstances.



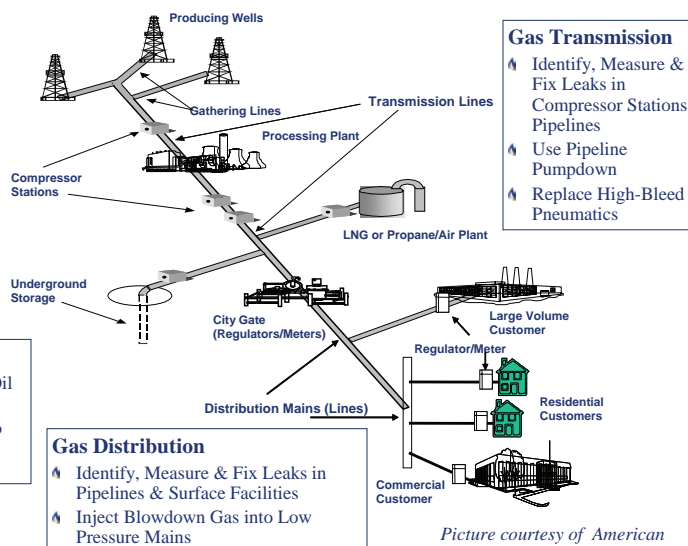
## Methane Emission Reduction Technologies & Practices

### Gas Production & Processing

- 🔥 Reduced Emission Well Completions
- 🔥 Install Plunger Lifts on Gas Wells
- 🔥 Identify, Measure & Fix Leaks in Processing Plants
- 🔥 Install Flash Tank Separators on Dehydrators

### Oil Production

- 🔥 Install VRUs on Crude Oil Storage Tanks
- 🔥 Route Casinghead Gas to VRU or Compressor for Recovery & Use or Sale



### Gas Transmission

- 🔥 Identify, Measure & Fix Leaks in Compressor Stations, Pipelines
- 🔥 Use Pipeline Pumpdown
- 🔥 Replace High-Bleed Pneumatics

### Gas Distribution

- 🔥 Identify, Measure & Fix Leaks in Pipelines & Surface Facilities
- 🔥 Inject Blowdown Gas into Low Pressure Mains

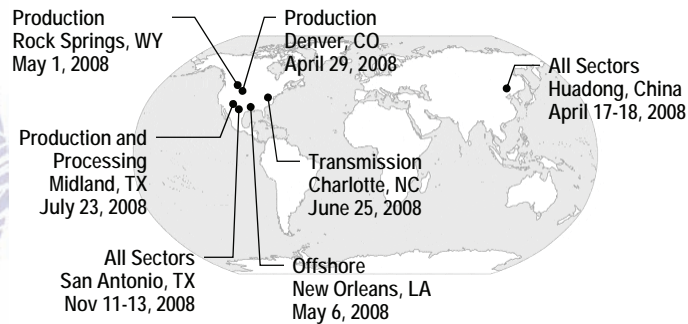
Picture courtesy of American Gas Association





## 2008 Technology Transfer Workshops

Natural Gas STAR will host, with partner organizations, the following Technology Transfer workshops in 2008



For more information, visit <http://www.epa.gov/gasstar/workshops.htm>

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## New Tool: Emission Reduction Calculation Guidance

Guidance for quantifying methane emission reductions from recommended technologies and practices

tp://www.epa.gov/gasstar/docs/quantifying\_nga\_methane\_reductions.xls - Microsoft Internet Explorer

http://www.epa.gov/gasstar/docs/quantifying\_nga\_methane\_reductions.xls

Technology/Prac Line Sector(s)	Quantification Method 1	Quantification Method 2
Composite wrap for non-leaking pipeline defects	<p><b>Engineering Calculation</b></p> <p>Installing composite wrap opposed to replacing pipelines with defects saves the methane that would otherwise be vented to the atmosphere during replacement.</p> <p>Calculate emissions reductions by summing over all pipeline diameters and pressures:  <math display="block">ER = \sum [(D^2 \cdot P \cdot [L/1,000] - 0.372) / 1,000] \cdot XCH_4</math>           Where,            ER = Emissions Reductions (Mc/year)            D = Inside diameter of pipeline (inches)            L = Length of pipeline between shutoff valves (feet)            P = Pipeline pressure (psia for less than 50psia, psig for more than 50psia)            XCH<sub>4</sub> = Mole fraction of methane in the gas (decimal) - default is 0.07 (Processing), 0.934 (Transmission/Distribution)</p> <p><b>References:</b>            Composite Wrap for Non-Leaking Pipeline Defects Lessons Learned  <a href="http://www.epa.gov/gasstar/pdfs/lessons/fl_compwrap.pdf">http://www.epa.gov/gasstar/pdfs/lessons/fl_compwrap.pdf</a></p>	<p><b>Emissions Factor</b></p> <p>The volume of methane emissions saved by composite wrap is very sensitive of the operation - pipeline length, pipeline diameter, and system pressure. If known it is suggested to use the engineering calculation for better accuracy report composite wrap can save 3,960 Mc/Installation.</p> <p>Calculate emissions reductions using the following equation:  <math display="block">ER = AF \cdot 3,960 \text{ Mc/Installation}</math>           Where,            ER = Emissions Reductions (Mc/year)            AF = Activity Factor (number of installations/year)            (EF assumed repair of a 6" defect on a 24" diameter pipeline at 350psig with shutoff valves.)</p> <p><b>References:</b>            Composite Wrap for Non-Leaking Pipeline Defects Lessons Learned  <a href="http://www.epa.gov/gasstar/pdfs/lessons/fl_compwrap.pdf">http://www.epa.gov/gasstar/pdfs/lessons/fl_compwrap.pdf</a></p>
Processing Transmission Distribution	<p><b>Engineering Calculation</b></p> <p>Identify and</p>	<p><b>Emissions Factor</b></p> <p>Identify and</p>

[http://www.epa.gov/gasstar/docs/quantifying\\_nga\\_methane\\_reductions.xls](http://www.epa.gov/gasstar/docs/quantifying_nga_methane_reductions.xls)

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# Communications Tools/Materials

- 🔥 Effort underway to revise and update Gas STAR communications materials and Gas STAR website
  - 🔥 PowerPoint presentations
  - 🔥 Program Implementation Guidance
- 🔥 Goal: Make the tools and resources more useful and accessible
- 🔥 Your feedback is important!



# Feedback to Partners: Post-Reporting Benchmarking

**2005 Reporting Summary & Benchmarking Report**

**Report Summary**  
 Joined Natural Gas STAR Annual 2005 Annual methane emissions reductions achieved cumulative emission reductions.

**EMISSIONS REDUCTIONS ARE APPROXIMATELY EQUIVALENT TO:**

- The carbon offset equivalent of planting this many acres of trees: 90,000 (cumulative) 112,430 (annual)
- Enough natural gas to heat this many homes for one year: 75,000 (cumulative) 13,425 (annual)
- Removing this many cars from the road for one year: 420,000 (cumulative) 82,458 (annual)

**Benchmarking**  
 The Natural Gas STAR Program endeavors to assist partners in achieving full benefit of participation by raising awareness about activities that other partners have undertaken to achieve cost-effective emission reductions.

The following pie charts show methane emission reductions versus the Sector Average and Best Performer in the Processing Sector. Emission reductions are shown as a percentage of each partner's annual gas processing capacity.

**2005 Methane Emissions Reductions**

Bar chart showing methane emissions reductions for various processing sectors. The Best Performer for the Processing Sector achieved emission reductions through the following activities in 2005:

- Helicopter tank surveys
- Replaces pipe
- Optical imaging
- Balance Tagging
- DMM at gas processing stations

**2005 Reductions:**

- 46.87% (20,000,000)
- 46.06% (20,000,000)
- 37.18%
- 2.97%
- 2.92%

**Cumulative Reductions:**

- 29.87% (13,000,000)
- 18.88% (8,000,000)
- 16.14%
- 1.91%
- 1.91%

**Activities implemented or supported at systems:**

- Helicopter tank surveys and other CO2 operations
- Optical imaging operations and balance tag operations
- Replaces pipe and other activities with enhanced activities
- DMM at gas processing stations
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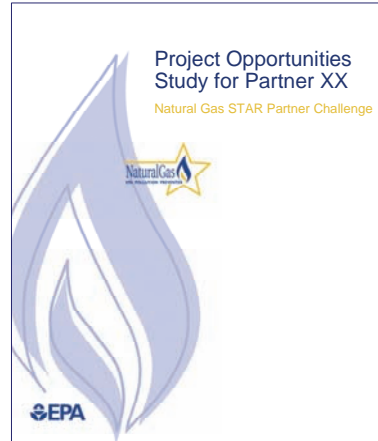
**Based on top technologies and practices employed in the Processing Sector, other activities might want to consider include:**

- Helicopter tank surveys
- Replaces pipe
- Optical imaging
- Balance Tagging
- DMM at gas processing stations



## Natural Gas STAR “Partner Challenge”

- ◆ EPA offers assistance quantifying partners’ methane emissions and corresponding emission reduction opportunities
  - ◆ Uses customized data
  - ◆ Quantifies emission reductions and environmental benefits
  - ◆ Details economic and operational benefits of reduction technologies & practices



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## Overview: Greenhouse Gas Reporting Rulemaking



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## GHG Reporting Rulemaking

### What is the 2008 Omnibus Appropriations Bill (HR 2764)?

The 2008 Omnibus Appropriations Bill (HR 2764) was signed into law in December 2007. The legislation signed by President Bush authorizes EPA to develop and publish a draft rule to **require mandatory reporting of greenhouse gas emissions above appropriate thresholds in all sectors of the economy**

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## Appropriations Language and Legal Authority

### FY2008 Consolidated Appropriations Amendment:

- “... not less than \$3,500,000 shall be provided for activities to develop and publish a draft rule not later than 9 months after the date of enactment of this Act, and a final rule not later than 18 months after the date of enactment of this Act, to require mandatory reporting of greenhouse gas emissions above appropriate thresholds in all sectors of the economy...”

### Legal Authority:

- Sections 114 and 208 of the CAA allow for data collection and measurement and recordkeeping from stationary or mobile related sources
- Appropriations language provides EPA with \$3.5 million in FY 2008 to develop proposed & final rules

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## Purpose and Scope

### Objective(s) of the Program – to provide data that will inform and support development of national climate policy

### Scope of Coverage

- ◊ Define gases- "...to require mandatory reporting of greenhouse gas emissions"
  - ◊ CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFC, PFC, SF<sub>6</sub>
- ◊ Both upstream and downstream sources- "The Agency is further directed to include in its rule reporting of emissions resulting from upstream production and downstream sources..."
  - ◊ Upstream: Fuel and Chemical producers/importers (e.g., oil refineries, natural gas processors, HFC producers)
  - ◊ Downstream: GHG emitters (e.g., power plants, iron and steel plants, cement manufacturers)

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## Purpose and Scope cont.

### Areas of flexibility:

- ◊ Emissions threshold: "The Administrator shall determine appropriate thresholds of emissions above which reporting is required..."
- ◊ Frequency of Reporting: "...and how frequently reports shall be submitted to EPA"

### Methods:

- ◊ "The Administrator shall have discretion to use existing reporting requirements..."
- ◊ Build on methods from existing mandatory and voluntary reporting systems
  - ◊ Federal reporting programs- e.g., Title IV, Climate Leaders, 1605(b)
  - ◊ State Programs- e.g., California, The Climate Registry, RGGI, other state programs
  - ◊ Corporate Programs- e.g., WRI/WBCSD
  - ◊ Industry Protocols- e.g., API Compendium, CSI Protocol (cement), International Aluminum Institute

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## Timing and Process

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- ♣ Proposed rule by September 2008, final rule by June 2009
- ♣ An ambitious timetable but we will work towards these deadlines
- ♣ EPA welcomes stakeholder input and plans to reach out to stakeholders
- ♣ EPA will involve agency and interagency expertise
  - ♣ Have already worked extensively with interagency counterparts on measurement and reporting issues (e.g., US GHG inventory, IPCC guidelines)

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## Contact Information

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- ♣ Jerome Blackman  
202-343-9630  
[blackman.jerome@epa.gov](mailto:blackman.jerome@epa.gov)
- ♣ Carey Bylin  
202-343-9669  
[bylin.carey@epa.gov](mailto:bylin.carey@epa.gov)
- ♣ Roger Fernandez  
202-343-9386  
[fernandez.roger@epa.gov](mailto:fernandez.roger@epa.gov)
- ♣ Suzie Waltzer  
202-343-9544  
[waltzer.suzanne@epa.gov](mailto:waltzer.suzanne@epa.gov)

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

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