



Natural Gas STAR Program

Overview and Accomplishments

Producers Technology Transfer Workshop
Durango, Colorado
September 13, 2007





Agenda

🔥 **Background**

🔥 **Natural Gas STAR Program Overview & Highlights**

🔥 **Program Resources and Tools**

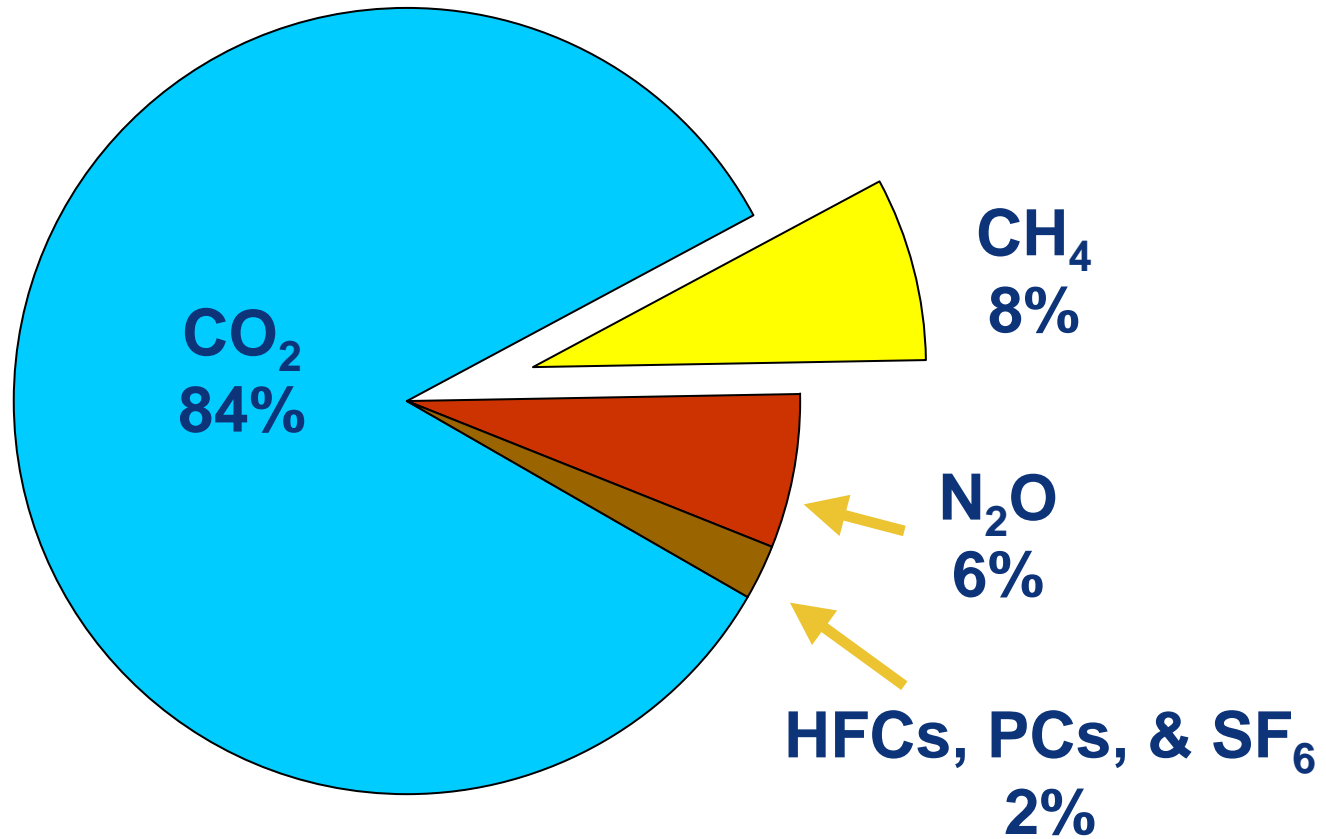


Background



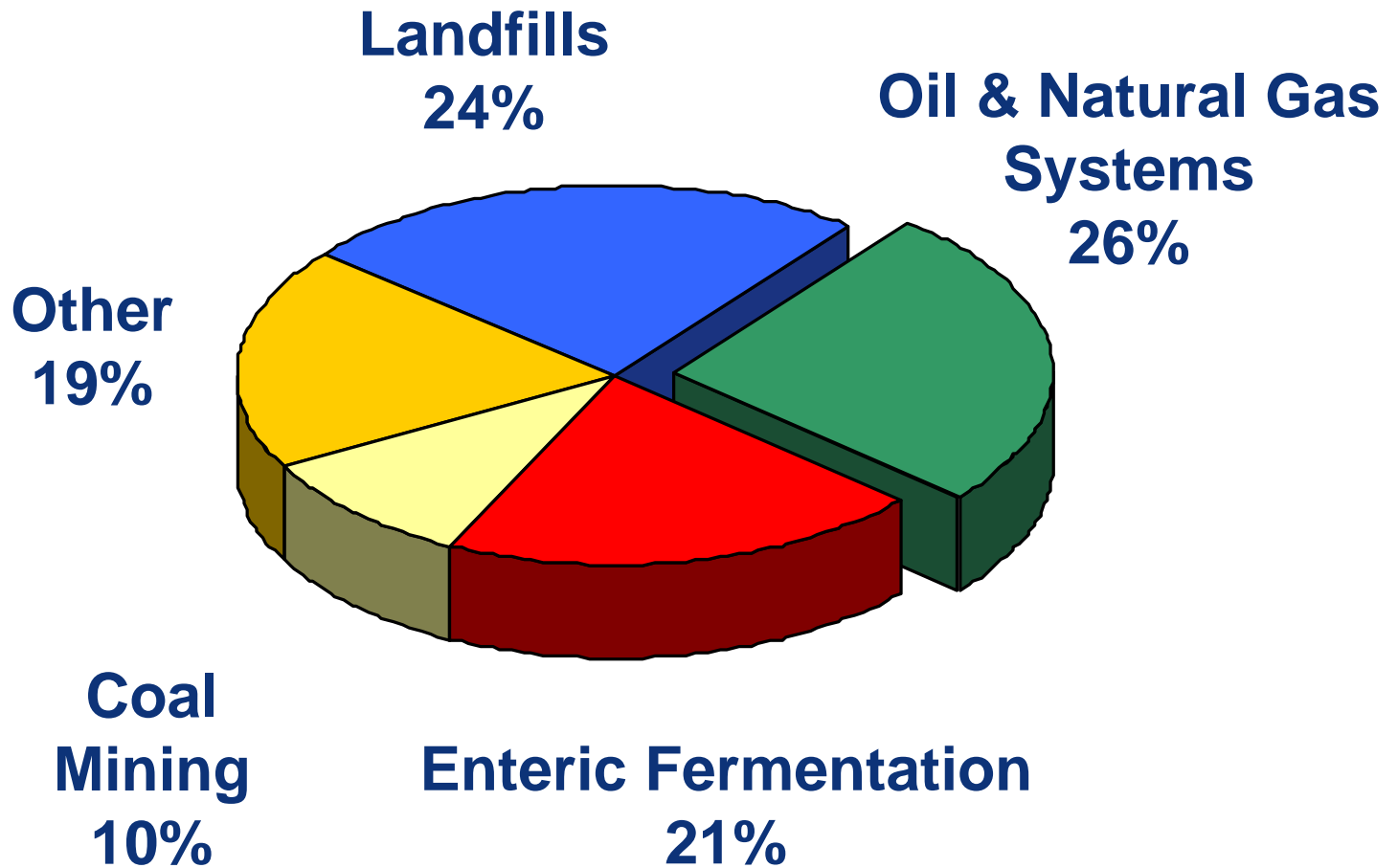


U.S. Greenhouse Gas Emissions All Sources





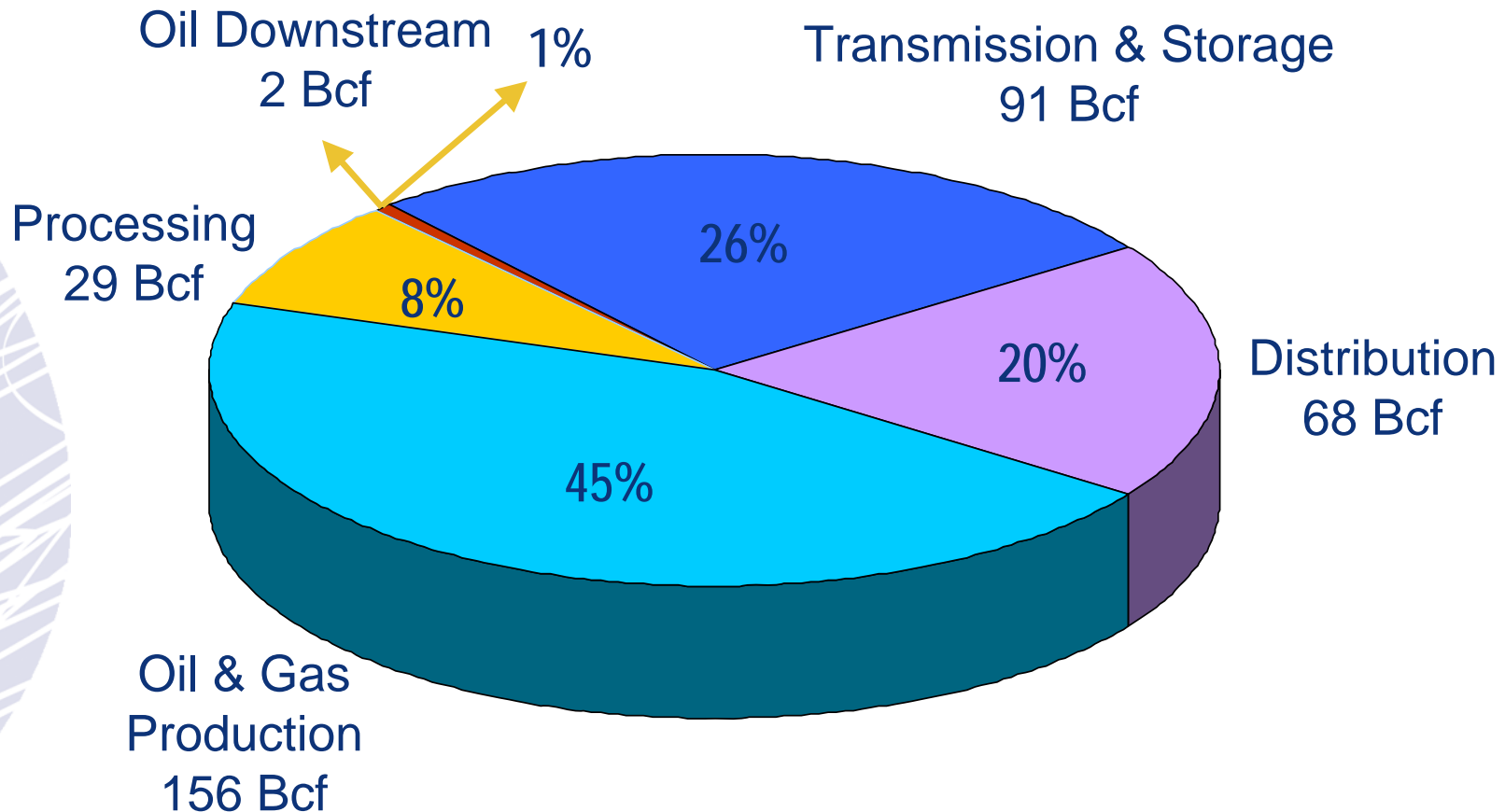
U.S. Methane Emissions





U.S. Oil and Gas Methane Emissions Breakdown by Sector

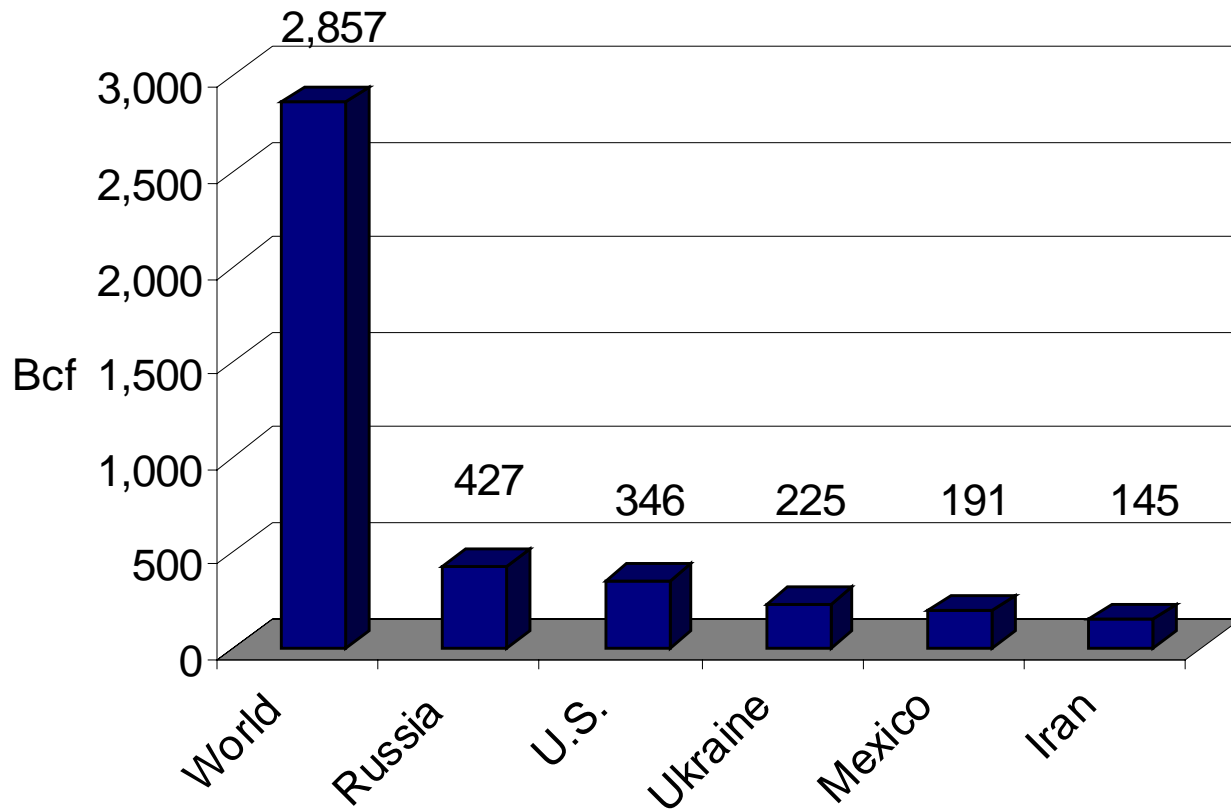
- 2005 U.S. methane emissions from oil and natural gas industry: 346 Bcf (2% of total U.S. greenhouse gas emissions)





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

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



Inventories of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2005, USEPA, April, 2007
Global Anthropogenic Non-CO₂ Greenhouse Gas Emissions: 1990 – 2020, USEPA, June 2006



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
 - 🔥 Greenhouse gas emissions of approximately 30,250,000 average passenger cars over a period of one year
 - 🔥 Carbon equivalent of electricity used by 17,943,906 homes for one year
 - 🔥 116,486,782 acres of pine or fir forests storing carbon for one year
- 🔥 U.S. oil and gas industry has an opportunity to *cost-effectively* reduce these impacts



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 110 Program Partners across four sectors
 - 🔥 Eight International Partners
 - 🔥 19 Endorser Associations

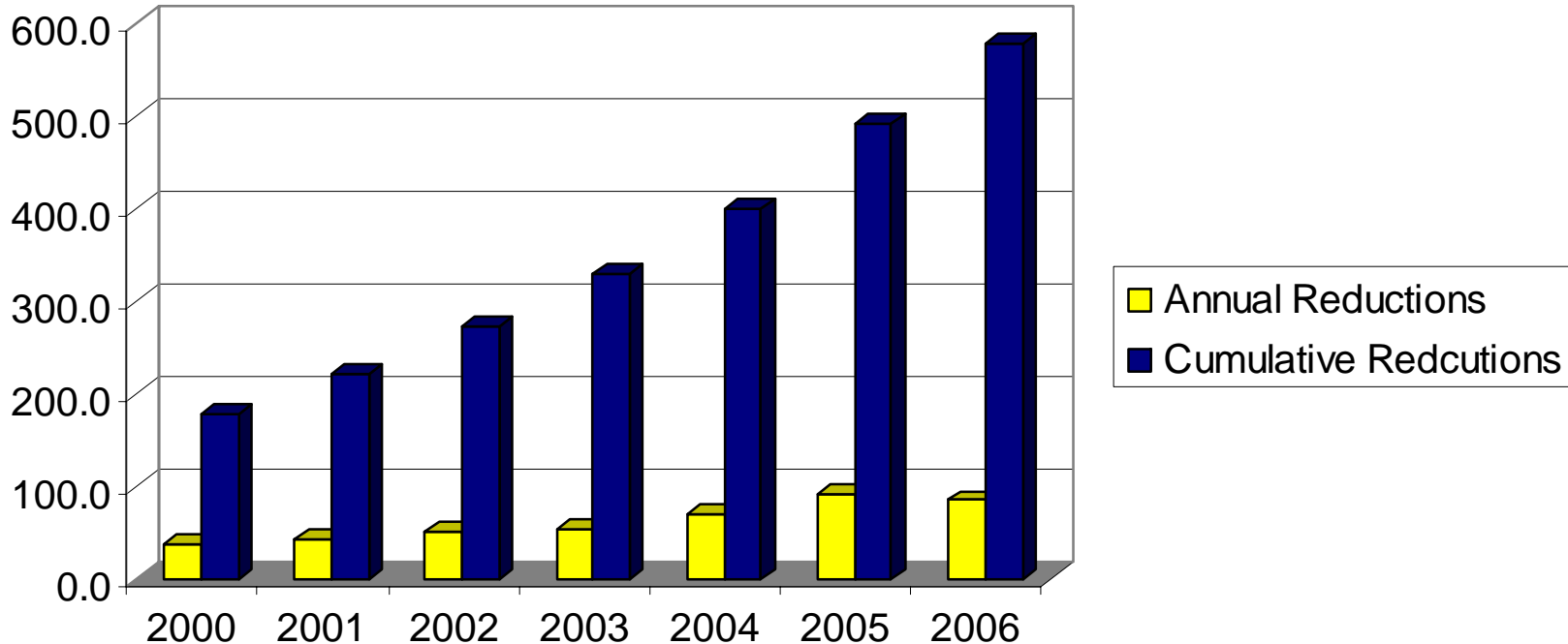


2006 Another Successful Year for Methane Emission Reductions

Gas STAR Partners reduced methane emissions by 86 Bcf in 2006

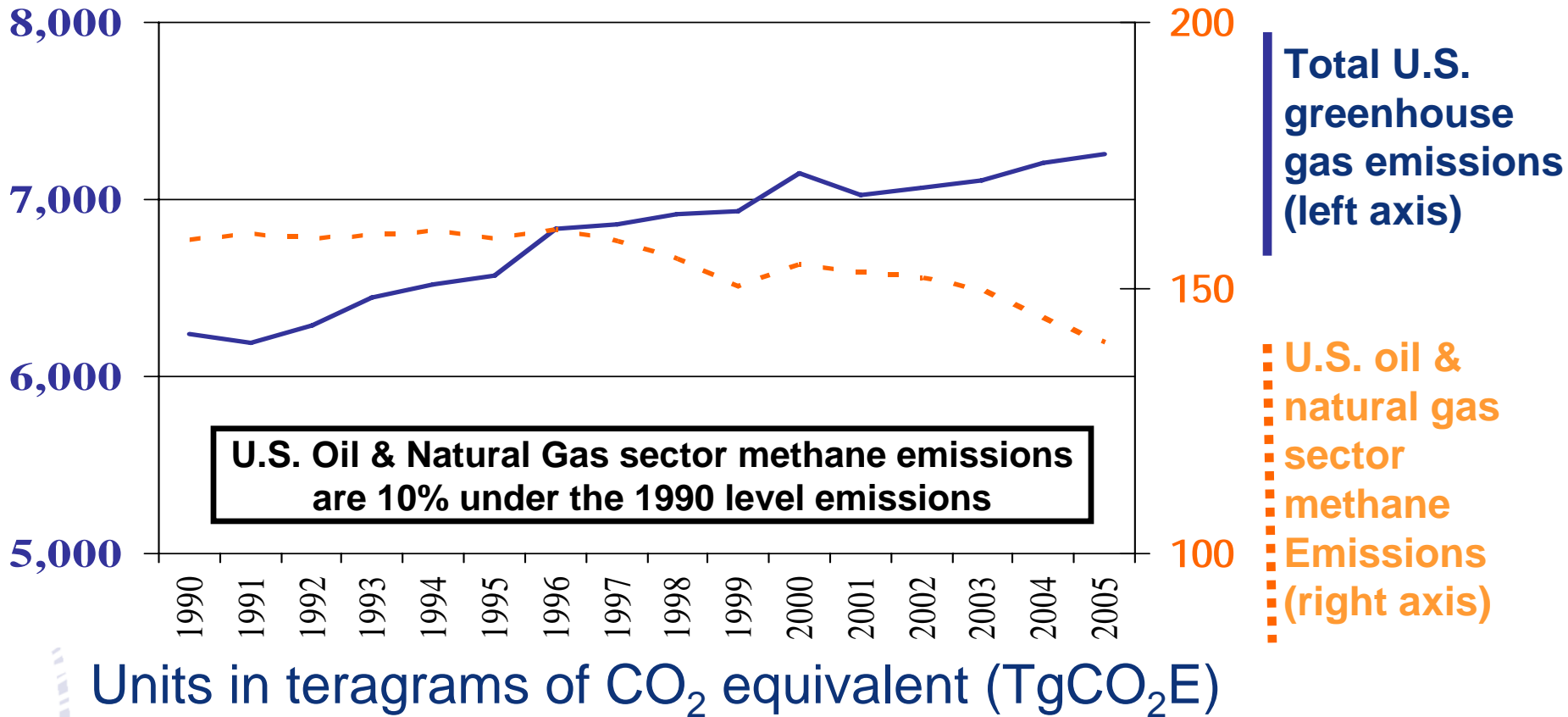
578 Bcf in cumulative reductions since 1990

Natural Gas STAR Methane Reductions (Bcf)





Natural Gas STAR Partner Accomplishments (1990 – 2005)





International Activities: White House “Methane to Markets” Initiative

- 🔥 Initiative to develop verifiable methane emissions reduction projects at landfills, coal mines and natural gas systems
- 🔥 Goal is to build long-term capacity within developing countries and economies in transition
- 🔥 Natural Gas STAR will lead natural gas system-related activities, including launch of Natural Gas STAR International

🔥 20 partner countries

Argentina	Japan
Australia	Korea
Brazil	Mexico
Canada	Poland
Colombia	Nigeria
China	Russia
Ecuador	Ukraine
Germany	United K
India	United S
Italy	Vietnam





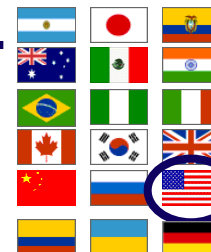
Natural Gas STAR International

- Under the Methane to Markets Partnership, U.S. EPA is expanding Natural Gas STAR internationally
- EPA is encouraging existing partners to engage their international operations to voluntarily reduce methane emissions
- Companies world-wide are welcome to join Gas STAR International



Methane to Markets

Oil and Gas Subcommittee





Natural Gas STAR International

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





Program Resources and Tools





Natural Gas STAR Resources

- 🔥 Guidance on new practices & technologies
 - 🔥 Technical information and training
 - 🔥 Assistance identifying cost-effective methane emission reduction opportunities
- 🔥 Technology Transfer workshops
 - 🔥 Free and open to the public
- 🔥 Annual record of Partner voluntary actions and methane savings
- 🔥 One-on-one technical assistance



Technical Information



Project Demonstrations

Workshops



Annual Reports



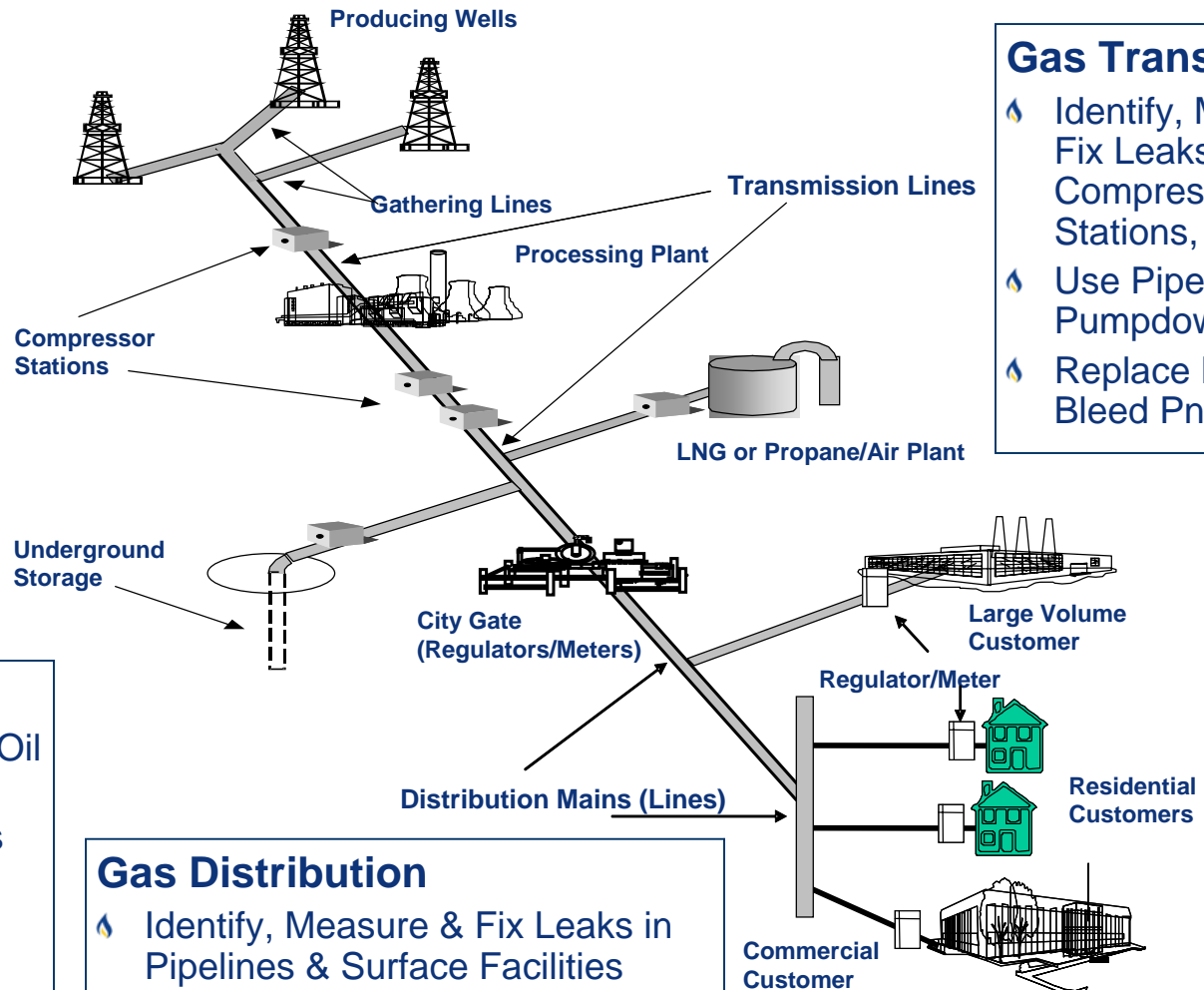
Methane Emission Reduction Technologies & Practices

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

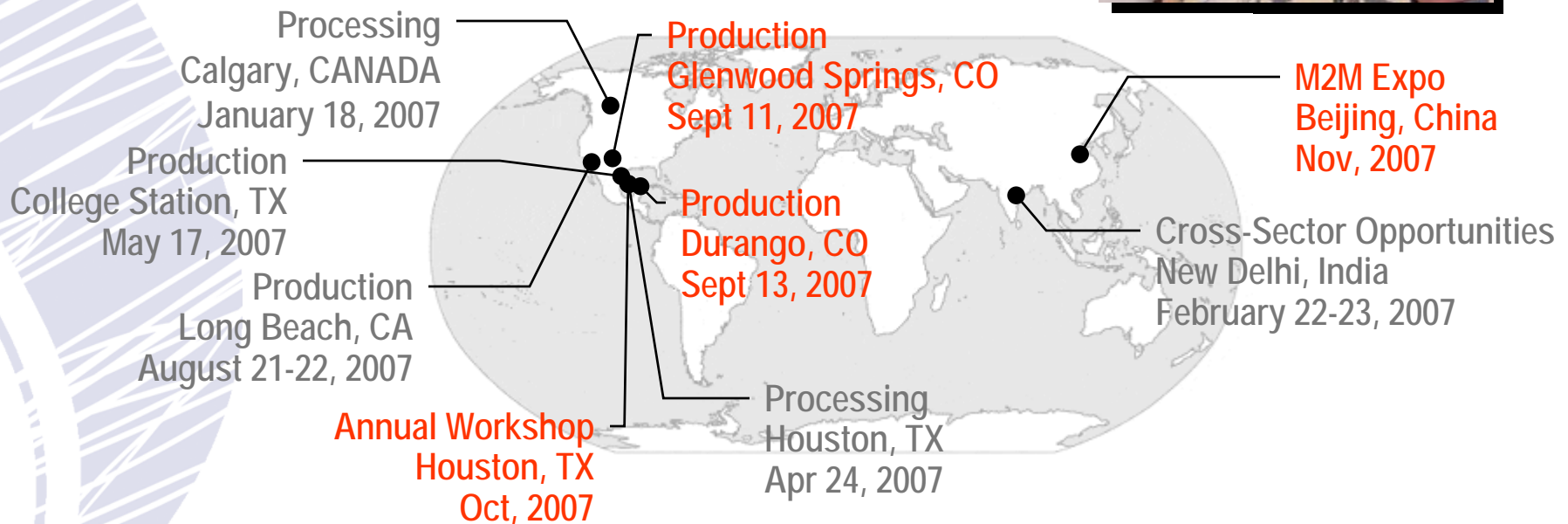
Gas Distribution

- Identify, Measure & Fix Leaks in Pipelines & Surface Facilities
- Use Pipeline Pumpdown Techniques to Minimize Venting



2007 Technology Transfer Workshops

Natural Gas STAR will host, with partner organizations, the following Technology Transfer workshops in 2007



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



New Tool: Emission Reduction Calculation Guidance

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

http://www.epa.gov/gasstar/docs/quantifying_ngs_methane_reductions.xls - Microsoft Internet Explorer

Edit View Insert Format Tools Data Go To Favorites Help

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

A2

Natural Gas STAR Recommended Technologies and Practices - Quantification Methods Pipelines		
Technology/Practice Sector(s)	Quantification Method 1	Quantification Method 2
Composite wrap for non-leaking pipeline defects Processing Transmission Distribution	<p><u>Engineering Calculation</u></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: $ER = \sum (D^2 \cdot P \cdot [L/1,000] \cdot 0.372) / 1,000 \cdot XCH4$</p> <p>Where, ER = Emissions Reductions (Mcf/year) D = Inside diameter of pipeline (inches) L = Length of pipeline between shutoff valves (feet) P = Pipeline pressure (psia for less than 50psi, psig for more than 50psi) XCH4 = Mole fraction of methane in the gas (decimal) - default is 0.87 (Processing), 0.934 (Transmission/Distribution)</p> <p><u>References:</u> Composite Wrap for Non-Leaking Pipeline Defects Lessons Learned http://www.epa.gov/gasstar/pdf/lessons/ll_compwrap.pdf</p>	<p><u>Emissions Factor</u></p> <p>The volume of methane emissions saved by composite wrap is very sensitive of the operation - pipeline length, pipeline diameter, and system pressure. I know it is suggested to use the engineering calculation for better accuracy report composite wrap can save 3,960 Mcf/installment.</p> <p>Calculate emissions reductions using the following equation: $ER = AF \cdot 3,960 \text{ Mcf/installment}$</p> <p>Where, ER = Emissions Reductions (Mcf/year) AF = Activity Factor (number of installments/year) (EF assumed repair of a 6" defect on a 24" diameter pipeline at 350psig with shutoff valves.)</p> <p><u>References:</u> Composite Wrap for Non-Leaking Pipeline Defects Lessons Learned http://www.epa.gov/gasstar/pdf/lessons/ll_compwrap.pdf</p>
Identify and	<u>Engineering Calculation</u>	<u>Emissions Factor</u>

Introduction / Compressors / Dehydrators / Other / Pipelines / Pneumatics-Controls / Tanks / Valves / We



Communications Tools/Materials

- Effort underway to revise and update Gas STAR communications tools and materials
 - PowerPoint presentations
 - Program Implementation Guidance
 - Press releases
- Goal: to make the tools and resources more useful to Partners
- Your feedback is important!

The screenshot shows the EPA Gas STAR website. The browser window title is "US EPA - Gas STAR - Windows Internet Explorer". The address bar shows "http://www.epa.gov/gasstar/". The page header includes the "U.S. Environmental Protection Agency" logo and the "Natural Gas STAR Program" title. A navigation menu on the left lists: Methane Home, Gas STAR Home, Basic Information, Accomplishments, Partners, Join the Program, Documents, Tools & Resources, Newsroom, Workshops/Conferences, International Activities, and Frequent Questions. The main content area describes the program as a flexible, voluntary partnership between EPA and the oil and natural gas industry. It lists several links for more information: Basic Information, Accomplishments, Partners, Join the Program, Documents, Tools, and Resources, Newsroom, Workshops/Conferences, International Activities, and Frequent Questions. The right sidebar features a video player titled "Natural Gas STAR Releases Video Highlighting Remote Sensing Leak Detection Technologies" and a link to "Download PDF version (PDF, 2 pp., 14 KB)".



Feedback to Partners: Post-Reporting Benchmarking

2005 Reporting Summary & Benchmarking Report

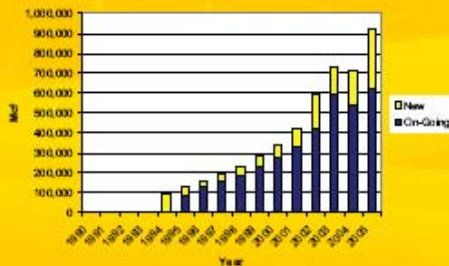
Report Summary

Joined Natural Gas STAR

Annual

2005 Annual methane emissions reductions

Since joining the Natural Gas STAR Program in 2001, [redacted] has achieved cumulative emission reductions



To achieve these reductions, [redacted] employed the following Natural Gas STAR methane emission reduction technologies and practices.*

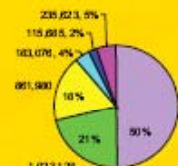
2005 Reductions:



- Eliminate unnecessary equipment or systems
- Replace glycol dehydration units with methanol injection
- Use IR camera/optical imaging for leak detection
- Use hot taps for in-service pipeline connections
- Other*

* Other includes: Use IR camera/optical imaging for leak detection, Replace gas-assisted glycol pumps with electric pumps, Reduce Glycol Drift from Gas, Hydraulic valves, Use inert gases and pigs to perform pipeline purges.

Cumulative Reductions:



- Eliminate unnecessary equipment or systems
- Replace glycol dehydration units with methanol injection
- Replace gas pneumatic with electric pumps
- Use IR camera/optical imaging for leak detection
- Use hot taps for in-service pipeline connections
- Other*

* Other includes: Use IR camera/optical imaging for leak detection, Replace gas-assisted glycol pumps with electric pumps, Reduce Glycol Drift from Gas, Hydraulic valves, Use inert gases and pigs to perform pipeline purges.

* Annual emissions reductions include new reductions plus ongoing reductions.

EMISSIONS REDUCTIONS ARE APPROXIMATELY EQUIVALENT TO:



The carbon offset equivalent of planting this many acres of trees: 585,000 (cumulative) 112,430 (annual)



Enough natural gas to heat this many homes for one year: 70,000 (cumulative) 13,425 (annual)



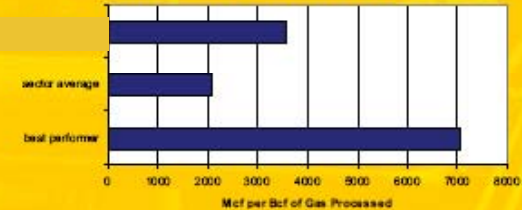
Removing this many cars from the road for one year: 430,000 (cumulative) 82,450 (annual)

Benchmarking

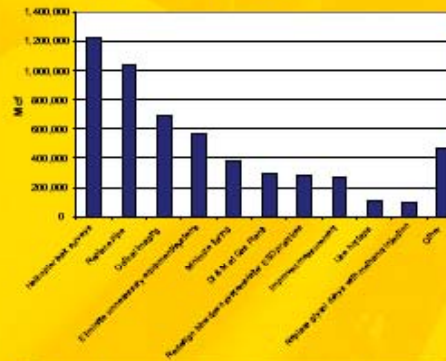
The Natural Gas STAR Program endeavors to assist partners in achieving full benefit of participation by raising awareness about activities that other partners have undertaken to achieve cost-effective emission reductions.

The following show [redacted] 1 reductions versus the Sector Average and Best Performer in the Processing Sector. Emission reductions were normalized against each partner's annual gas processing capacity.

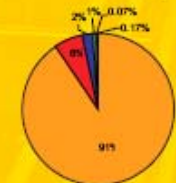
2005 Methane Emissions Reductions



Top 10 technologies and practices employed in the Processing Sector in 2005. Sector reductions totaled 5,424,568 in 2005.



The Best Performer for the Processing Sector achieved emission reductions through the following activities in 2005.



- Helicopter leak surveys
- Use hot taps for in-service pipeline connections
- Replace gas pneumatic with electric pumps
- Use hot taps for in-service pipeline connections
- Optical imaging
- Eliminate unnecessary equipment or systems
- Other*

* Other includes: Replace gas-assisted glycol pumps with electric pumps.

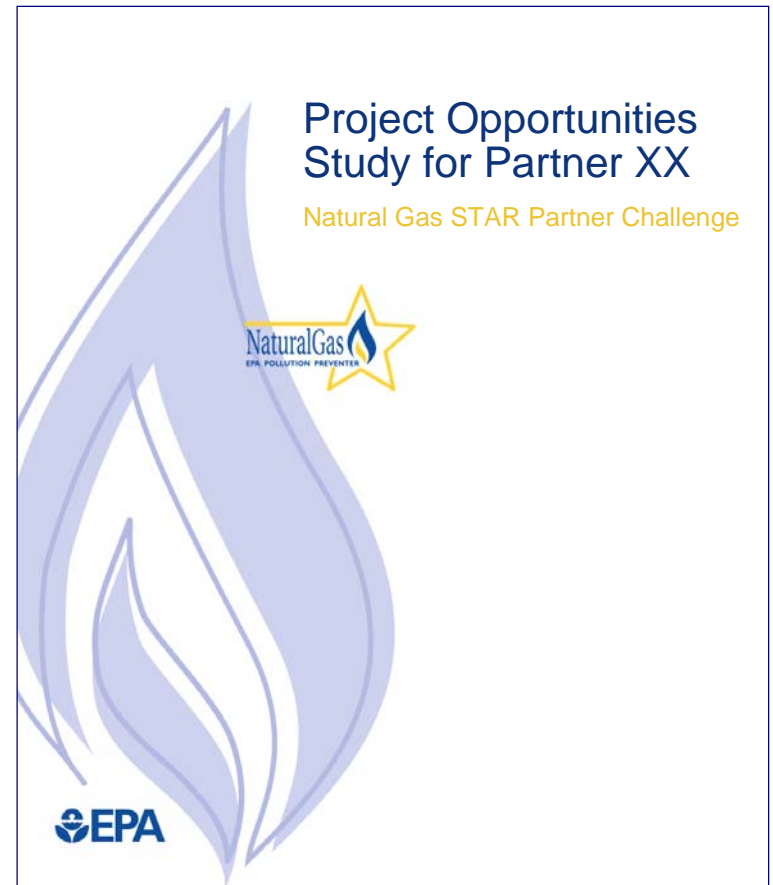
Based on top technologies and practices employed in the Processing Sector, other activities [redacted] might want to consider include:

- Helicopter leak surveys
- Replace pipe
- Optical imaging
- Minimize flaring
- 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





Contact Information

- 🔥 Jerome Blackman
202-343-9630
blackman.jerome@epa.gov
- 🔥 Carey Bylin
202-343-9669
bylin.carey@epa.gov
- 🔥 **Roger Fernandez**
202-343-9386
fernandez.roger@epa.gov
- 🔥 Suzie Young
202-343-9544
young.suzanne@epa.gov
- 🔥 www.epa.gov/gasstar
- 🔥 www.methanetomarkets.org