Natural Gas STAR Program

Producers Technology Transfer Workshop

Casper, WY
August 30, 2005

epa.gov/gasstar
The 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.
111 Program Partners
- 62% of transmission assets
  - 22 partners
- 60% of distribution assets
  - 45 partners
- 51% of production assets
  - 32 partners
- 63% of processing assets
  - 12 partners
Production Sector Gas STAR Partners

- Amerada Hess Corporation
- Anadarko Petroleum Corporation
- Apache Corporation
- BP p.l.c
- Burlington Resources, Inc
- ChevronTexaco Corporation
- ConocoPhillips Company
- Devon Energy Corporation
- Dominion E & P
- El Paso Production Company
- EnCana Corporation
- Energen Resources Corporation
- ExxonMobil Production Company
- Houston Exploration Company
- Hunt Oil Company
- Kerr-McGee Corporation
- Marathon Oil Company
- Murphy Oil Corporation
- Newfield Exploration Company
- Noble Energy
- Occidental Oil & Gas Corporation
- Pioneer Natural Resources
- Pogo Producing Company
- Quicksilver Resources, Inc.
- Shell Exploration and Production
- Southwestern Energy Company
- Torch Energy Services
- TotalFinaElf
- Unocal Corporation
- Williams Production RMT
- Venoco, Inc.
- XTO Energy, Inc.
Natural Gas STAR Program
Endorsers

★ American Gas Association (AGA)
★ American Institute of Chemical Engineers (AIChE) Institute for Sustainability
★ American Petroleum Institute (API)
★ Domestic Petroleum Council (DPC)
★ Gas Processors Association (GPA)
★ Gulf Coast Environmental Affairs Group (GCEAG)
★ Independent Producers Association of Mountain States (IPAMS)
★ Interstate Natural Gas Association of America (INGAA)
★ Interstate Oil and Gas Compact Commission (IOGCC)
★ National Association of Regulatory Utility Commissioners (NARUC)
★ Natural Gas Supply Association (NGSA)
★ New York State Energy Research and Development Authority (NYSERDA)
★ Southern Gas Association (SGA)
January 10, 2003

From: Mr. Red Cavaney
To: Hon. Spencer Abraham

The American Petroleum Institute

To: The Honorable Spencer Abraham
From: Mr. Red Cavaney

January 10, 2003

Dear Mr. Secretary,

The American Petroleum Institute (API) is committed to reducing greenhouse gas (GHG) emissions through a variety of initiatives aimed at both the oil and gas sectors and the transportation sector. As you are aware, API has launched several initiatives, including the Climate Action Challenge, to address climate change.

As part of API’s Climate Action Challenge, we have developed a comprehensive strategy that includes the following key components:

1. **Energy Efficiency**: Increasing energy efficiency in all sectors through the development and implementation of technologies and practices that reduce energy consumption.
2. **Clean Fuels**: Transitioning to cleaner fuels and alternative energy sources to reduce GHG emissions.
3. **Carbon Capture and Storage (CCS)**: Implementing technologies to capture and store CO2 emissions from power plants and other industries.
4. **Public Awareness**: Enhancing public awareness about the importance of climate change and the role that the energy sector plays in addressing it.

API’s Climate Action Challenge programs contain broad goals such as 20% of all oil and gas sector emissions by 2020. In addition, the challenge includes more targeted goals for key sectors, such as 100% participation in the Natural Gas Star and CHP Challenge programs. Expanding participation in the Natural Gas Star program would further reduce methane emissions from natural gas production.

We believe that the API’s initiative is a crucial step in addressing climate change and reducing GHG emissions. We are committed to working collaboratively with all stakeholders to achieve our goals.

Sincerely,

[Signature]

President and CEO

American Petroleum Institute
Methane Emissions in the Oil and Gas Industry
U.S. Greenhouse Gas Emissions
Methane

- Oil & Natural Gas Systems: 26%
- Landfills: 24%
- Enteric Fermentation: 21%
- Coal Mining: 10%
- Other: 19%

Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2003, USEPA, April, 2005
U.S. Oil and Gas Industry Methane Emissions (Annual)

- Oil Downstream: 2 Bcf (0.5%)
- Transmission & Storage: 101 Bcf (28.5%)
- Processing: 36 Bcf (10%)
- Oil & Gas Production: 148 Bcf (42%)
- Distribution: 68 Bcf (19%)

U.S. oil and natural gas industry methane emissions account for 2% of total U.S. greenhouse gas emissions.

Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2003, USEPA, April, 2005
Natural Gas STAR Partner Accomplishments

★ 403 Bcf in methane emissions reductions since 1990!

Methane Saved in Bcf/Year
Natural gas sector reduced emissions while increasing throughput.

Units in teragrams of CO$_2$ equivalent (TgCO$_2$E)

Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2003, USEPA, April, 2005
Best Management Practices (BMPs)

★ BMP 1: Identify and replace high bleed pneumatic devices
★ BMP 2: Install flash tank separators on glycol dehydrators
★ BMP 3: Partner Reported Opportunities (PROs)
  - 83% of production sector reductions came from PROs
Methane emissions (solid) and reductions (italics) in each sector of the U.S. natural gas industry.

Natural Gas Industry Emissions

Production 148 Bcf

Processing 36 Bcf

Transmission / Storage 101 Bcf

Distribution 68 Bcf

Oil Downstream 2 Bcf

Emissions

Reductions

Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2003, USEPA, April, 2005
Highly Implemented PROs

- The Gas STAR program has identified 42 PROs that are applicable to the production sector
- Ten “top” PROs:
  - PROs most reported by production Gas STAR partners
  - All target major emissions sources
  - Responsible for over 2/3 of PRO emissions reductions
Top PROs

★ Determine which top PROs are not currently implemented at your company
★ Revisit economics of top PROs using current gas price

<table>
<thead>
<tr>
<th>Partner Reported Opportunities</th>
<th>Methane Savings in 2004 (Mcf)</th>
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<tbody>
<tr>
<td>Install vapor recovery units (VRUs)</td>
<td>4,187,078</td>
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<tr>
<td>Install flares</td>
<td>2,231,586</td>
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<tr>
<td>Install instrument air systems</td>
<td>410,214</td>
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<tr>
<td>Install plunger lifts</td>
<td>4,441,645</td>
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<td>Eliminate unnecessary equipment and/or systems</td>
<td>313,731</td>
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<td>Conduct leak surveys</td>
<td>14,081</td>
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<td>Install electric compressors</td>
<td>116,947</td>
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<td>Perform green completions</td>
<td>6,497,087</td>
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<tr>
<td>Consolidate crude oil production and water storage tanks</td>
<td>709,404</td>
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<tr>
<td>Alter blowdown piping</td>
<td>198,419</td>
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## Top PROs Currently Reported

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<th>BP</th>
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<th>ChevronTexaco</th>
<th>ConocoPhillips</th>
<th>Devon Energy</th>
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Implementation of Top PROs

- These PROs have been proven to reduce emissions economically
- Top PROs target the largest sources of methane emissions in the production sector
- Room for a great deal of further emissions reductions
Emissions Targeted by Top PROs

★ BMPs and top PROs target over 75% of production sector emissions but have only reduced emissions by 20%

★ This means:
  ▪ Partners that report PROs recognize major sources of methane losses and are taking steps to mitigate emissions
  ▪ Partners not practicing all BMPs and top PROs may have further opportunities to profit from methane savings
Workshops

★ Technology Transfer Workshops (5 to 6 per year)
- Production: Oklahoma City, OK – April 20, 2005
  Casper, WY – August 30, 2005
  Houston, TX – October 26, 2005
- Processing: Oklahoma City, OK – April 22, 2005
- Transmission: Midland, TX – June 8, 2005
- Distribution: Teleconference, May 17, 2005

★ Annual Implementation Workshop
- Houston, TX – October 24 to 26, 2005
Five year activity 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.

Countries include: Argentina, Australia, Brazil, Canada, China, Colombia, India, Italy, Japan, Mexico, Nigeria, Russia, South Korea, Ukraine, UK and US.

Gas STAR will lead natural gas system-related activities. The Program welcomes Gas STAR Partner participation.
Contact Information

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epa.gov/gasstar