Natural Gas STAR Program

Innovative Technologies for the Oil & Gas Industry: Product Capture, Process Optimization, and Pollution Prevention

Producers and Processors Technology Transfer Workshop

Western Gas Resources and EPA’s Natural Gas STAR Program
Gillette & Rock Springs, WY
May 9 & 11, 2006

Agenda

- Background – U.S. Methane Emissions
- Methane Emissions in the U.S. Oil and Gas Industry
- Gas STAR Program Overview & Accomplishments
- Gas STAR Program Resources
The “So What” – Why are we here?

- Reducing methane emissions from the U.S. oil and gas industry has cross-cutting impacts
  - Addressing environmental and global warming concerns
  - Potential for increased profits and operational efficiency in the oil & gas sector
  - Increasing domestic natural gas supply

U.S. Greenhouse Gas Emissions – All Sources

- **CO₂**: 85%
- **CH₄**: 8%
- **N₂O**: 5%
- **HFCs, PCs, & SF₆**: 2%

*Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2003, USEPA, April, 2005*
U.S. Methane Emissions

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

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

U.S. Oil & Natural Gas Industry

- Methane losses from the U.S. oil & natural gas industry total 355 Bcf
- Accounts for 2% of total U.S. greenhouse gas emissions

- Oil & Gas Production: 148 Bcf
- Processing: 36 Bcf
- Transmission & Storage: 101 Bcf
- Distribution: 68 Bcf
- Oil Downstream: 2 Bcf

Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2003, USEPA, April, 2005
U.S. Oil & Natural Gas Opportunities

- 355 Bcf of methane emissions per year amounts to
  - $2.49B in lost revenue at $7/Mcf natural gas
  - Global warming equivalent of putting over 31 million additional cars on the road in the U.S.
  - Gas supply capable of heating over 5 million U.S. households for a year
- U.S. oil and gas industry has an opportunity to cost effectively reduce these impacts

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.
Gas STAR Partners & Endorsers

- 112 Program Partners across all four sectors
  - Recommended technologies and practices come directly from partner companies and industry experts
- 18 endorser associations, including
  - American Petroleum Institute (API)
  - Domestic Petroleum Council (DPC)
  - Gas Processors Association (GPA)
  - Independent Producers Association of Mountain States (IPAMS)
  - Interstate Oil & Gas Compact Commission (IOGCC)
  - Southern Gas Association
  - Colorado Oil & Gas Association (COGA)
  - Petroleum Association of Wyoming (PAW)
  - Petroleum Technology Transfer Council (PTTC)
  - Independent Producer’s Association of America (IPAA)

Natural Gas STAR Partner Accomplishments

- Natural Gas STAR Partners have reduced methane emissions by 403 Bcf
- Methane emissions from U.S. oil and gas sector below 1990 levels
### Oil & Gas Methane Emissions Without Gas STAR Program (2003)

<table>
<thead>
<tr>
<th>Category</th>
<th>Emissions (Bcf)</th>
<th>Reductions (Bcf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>148</td>
<td>24</td>
</tr>
<tr>
<td>Distribution</td>
<td>68</td>
<td>7</td>
</tr>
<tr>
<td>Transmission / Storage</td>
<td>101</td>
<td>18</td>
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<tr>
<td>Processing</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>Oil Downstream</td>
<td>2</td>
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</tbody>
</table>

### Methane Emission Reduction Opportunities

- Partners have reported over 80 technologies and practices for achieving cost effective methane emission reductions

<table>
<thead>
<tr>
<th>Best Practices - Production</th>
<th>Best Practices - Processing</th>
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<tbody>
<tr>
<td>Perform reduced emission completions</td>
<td>Conduct helicopter leak surveys</td>
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<tr>
<td>Install vapor recovery units</td>
<td>Conduct infrared leak surveys</td>
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<tr>
<td>Install plunger lifts</td>
<td>Replace glycol dehydration units with methanol injection</td>
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<tr>
<td>Install instrument air systems</td>
<td>Install electric compressors</td>
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<tr>
<td>Eliminate unnecessary equipment and/or systems</td>
<td>Use hot taps for in-service pipeline connections</td>
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<tr>
<td>Install electric compressors</td>
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Program Resources

- Guidance on recommended practices & technologies
  - Detailed implementation guides, including partner case studies
  - Economic analysis tools
  - Communication tools
- Available on www.epa.gov/gasstar
- Technology Transfer workshops
  - Free and open to the public
- Annual record of Partner methane savings
- One-on-one technical assistance

Workshops

- Upcoming Technology Transfer Workshops (5 to 6 per year)
  - Producers and Processors Technology Transfer Workshop
    Sponsored by ConocoPhillips
    May 25, 2006
    Kenai, Alaska
  - Producers Technology Transfer Workshop
    Sponsored by Devon Energy and PTTC
    June 6, 2006
    Fort Worth, TX
  - Producers Technology Transfer Workshop
    Sponsored by Occidental Oil and Gas, PTTC, and NMOGA
    June 8 & 9, 2006
    Midland, TX
  - Processors Technology Transfer Workshop
    Sponsored by Targa Resources, GPA, and NMOGA
    July 27, 2006
    Hobbs, NM
**White House “Methane to Markets” Initiative**

- 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, China, Colombia, India, Italy, Japan, Mexico, Nigeria, Russia, Ukraine and UK.
- Gas STAR will lead natural gas system-related activities, including upcoming launch of international program
- [www.methanetomarkets.org](http://www.methanetomarkets.org)

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