EPA United States Environmental Protection Agency

PARTNER UPDATE

SUMMER 2006

NaturalGas EPA POLLUTION PREVENTER

In This Issue:

The Program Grows—Announcing Natural Gas STAR International!

Now in its 13th year, the Natural Gas STAR Program shows little sign of slowing. Natural Gas STAR Partner companies have realized more than 400 billion cubic feet (Bcf) in cumulative methane emission reductions. These results are being prompted by realized revenue generation as well as increased interest in the potential effects of methane on the environment. Accordingly, many partners are challenging themselves to identify and report additional methane savings by fully involving all aspects of their company operations worldwide. Responding to this challenge and in support of partner needs, Natural Gas STAR is launching Natural Gas STAR International. Gas STAR International expands the scope of the Program internationally, allowing operators to realize Program benefits globally. Natural Gas STAR International aims to combine expertise and experience from domestic U.S. partners, international operations of U.S. companies, and non-U.S. oil and gas companies. Like U.S. partners, international operators can join the Program by signing a Memorandum of Understanding and formulating an Implementation Plan, and sharing methane-saving activities through annual reports to Gas STAR. In return, Gas STAR offers technology transfer, support for possible co-funding opportunities for pre-feasibility studies and pilot projects in Methane to Markets countries, offers recognition for environmental stewardship, and maintains a record of voluntary actions to reduce methane emissions.

Natural Gas STAR International is part of the U.S. contribution to the Methane to Markets Partnership, an international initiative with 17 member countries that advances cost-effective, near-term methane recovery and use as a clean energy source. More information about the Methane to Markets Partnership is available online at methanetomarkets.org.

Why Join Natural Gas STAR International?

- ★ Gas STAR Partners have the opportunity to expand emission reduction activities and gain positive press about their *global* environmental efforts.
- ★ Join the international Program as a founding partner and attend the high profile launch ceremony on September 26, 2006, in Washington, D.C. Founding partner companies are invited to join the EPA Administrator [invited] for this momentous occasion.

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Summary of Recent Methane to Markets Meeting In Mexico

Methane to Markets

Date: April 25-26, 2006

Location: Camino Real Hotel, Villahermosa, Mexico

Hosted By: PEMEX, SEMARNAT, USAID, and U.S. EPA

Production and Processing Technology Transfer Workshop and Plant Tour

The workshop provided attendees with information on proven economic means to reduce methane emissions from oil and natural gas operations. PEMEX outlined its methane emission reduction plans and described, in detail, its demonstration projects focused on replacing wet seals with dry seals in compressors and targeting vapor recovery projects from oil and gas tank batteries. The workshop ended on Wednesday with a tour of a local PEMEX gas processing facility.

For more information and to review the presentations, visit the Methane to Markets Web page at methanetomarkets.org.

Oil and Natural Gas Subcommittee Meeting

The semiannual Methane to Markets Oil and Natural Gas Subcommittee meeting was held in conjunction with the Technology Transfer Workshop in Villahermosa, Mexico. Each Partner country provided the subcommittee with its short, medium, and long term plans for activities related to the Methane to Markets Partnership. By sharing their plans, all Partner countries and Partner Network members are now able to leverage each member's skills, resources, and technologies such that cost-effective emission reduction projects in the oil and gas sector can move forward more efficiently.

In addition, the subcommittee discussed the upcoming Partnership Expo in Beijing, China (Fall 2007). The primary outcome of the discussion was a consensus that it is vital for Methane to Markets to gain the participation and interest of the Chinese national oil and gas companies. As a result, subcommittee members will be working with the Chinese government to encourage involvement of the country's oil and gas industry in the event.

Upcoming Events

The next Oil and Natural Gas Subcommittee Meeting will be held in Aberdeen, Scotland, in Spring 2007.

Save the Date!

13th Annual Natural Gas STAR Implementation Workshop
InterContinental Hotel—Houston, Texas
October 23-25, 2006

The 13th Annual Natural Gas STAR Implementation Workshop will provide Gas STAR partners with an opportunity to obtain information about the most current and cost-effective methane emission reduction technologies and practices and exchange ideas with more than 100 other Natural Gas STAR partners. This year's meeting will focus on leak detection through optical and laser imaging, measurement, and technologies to reduce methane emissions in all areas of the natural gas industry. Technology sessions will be conducted concurrently for production, processing, and transmission and distribution. If you are interested in exhibiting or being a sponsor of this event, please contact Sheri Lausin at slausin@icfi.com or (703) 934-3396. Further information is online at epa.gov/gasstar/workshops/imp_workshops.htm.

Partner Profile

ConocoPhillips Alaska Joins the Natural Gas STAR Program

ConocoPhillips Alaska joined the Natural Gas STAR Program on May 23, 2006. The new partner is evaluating a number of methane emission reduction opportunities, including those at its liquefied natural gas (LNG) operations at the Kenai Liquefaction Plant. In addition to the Kenai plant, the company also operates the Greater Kuparuk Area, the Alpine oil fields, the North Cook Inlet platform, and the Beluga River Unit gas field, and has identified potential opportunities at many of these areas.

Producing LNG at Kenai

On June 8, 1969, Phillips Petroleum Company and Marathon Oil Company collaborated to produce the first and only LNG in Alaska. That fall, the first tanker loaded with LNG left the Kenai plant and, after a nine-day voyage, discharged its cargo in Yokohama, Japan, marking the first commercial LNG export from the Western hemisphere. Since 1969, ConocoPhillips Alaska, Inc. has operated the Kenai plant continuously, 24 hours a day. The facility is scheduled to continue service through at least 2009.

Image provided by ConocoPhillips Alaska.

The Kenai LNG project originally stemmed from Marathon's discovery of the Kenai gas field in 1959, and Phillips' (and partner companies') discovery of the North Cook Inlet gas field in 1962. At the same time, Tokyo Gas Company Ltd. and the Tokyo Electric Power Company Inc. recognized the value of LNG to help reduce Japan's air pollution problems, diversify their fuel base, and provide much-needed energy (together, these utilities consume all of the LNG exported from Kenai). What followed was the largest joint project in both Phillips' and Marathon's history. The endeavor called for construction of a liquefaction plant, two LNG tankers, pipelines, and a receiving and regasification facility in Japan. The activities resulted in a comprehensive system that produced 68.3 trillion British Thermal Units (Btus) annually in the mid-1990s—enough energy to provide heat and power to the greater Tokyo region for 11 days.

Potential Methane Emission Reduction Opportunities in Alaska

- Reducing venting during planned facility shut downs.
- Installing automated monitoring of the flare pilot.
- Utilizing infrared optical imaging.
- Increasing vapor recovery.
- More extensive utilization of dry gas seals.

At the Kenai facility, raw gas is received as more than 99 percent pure methane and is processed to remove the remaining water, carbon dioxide, and other impurities. Next, the purified gas enters three chilling cycles, which use cooling agents, including propane, ethylene, and methane. Each cycle further reduces the temperature until the gas liquefies. Once cooled, the liquid is subjected to a reduced pressure, which produces LNG at approximately atmospheric pressure. The LNG is then transferred to three 225,000-barrel storage tanks, where a small amount boils off, or evaporates, cooling the tank and helping to keep the remaining LNG in its liquid state. ConocoPhillips Alaska maintains a system to capture the boiled-off gas and uses it as fuel for the plant's refrigeration compressors.

Overall, the market for LNG is growing: according to the Department of Energy,

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LNG now accounts for 6 percent of the world's natural gas consumption (eia.doe.gov/oiaf/analysispaper/global/lngtrade.html). Since LNG occupies only a fraction (1/600) of the volume of natural gas, it is more economical to transport and can be stored in larger quantities. Thus, for companies with scarce land resources but extensive energy needs, LNG represents a valuable and necessary commodity. As the industry continues to expand, economic production practices and environmental controls will be all the more important. Therefore, ConocoPhillips Alaska has identified some areas in the production process where potential methane emissions can be reduced.

Improving Environmental Performance in LNG Operations

When the Kenai facility was constructed in 1969, it was considered to have state-of-the-art environmental controls. In recent years, awareness regarding the global warming potential of methane has increased. Through the Natural Gas STAR program scoping process, the Core Team realized it would be valuable knowledge sharing to use the facility to demonstrate future emission reduction opportunities for modern day installations. Toward this end, the company hosted a Technology Transfer workshop on May 25, 2006, with two goals in mind: showcasing potential methane emissions reductions opportunities at LNG facilities and increasing awareness of the Gas STAR

Image provided by ConocoPhillips Alaska.

Program throughout Alaska. During the workshop, the Kenai LNG facility served as a real-life demonstration location for infrared optical imaging. Although ConocoPhillips Alaska uses forward looking infrared radar (FLIR) mounted

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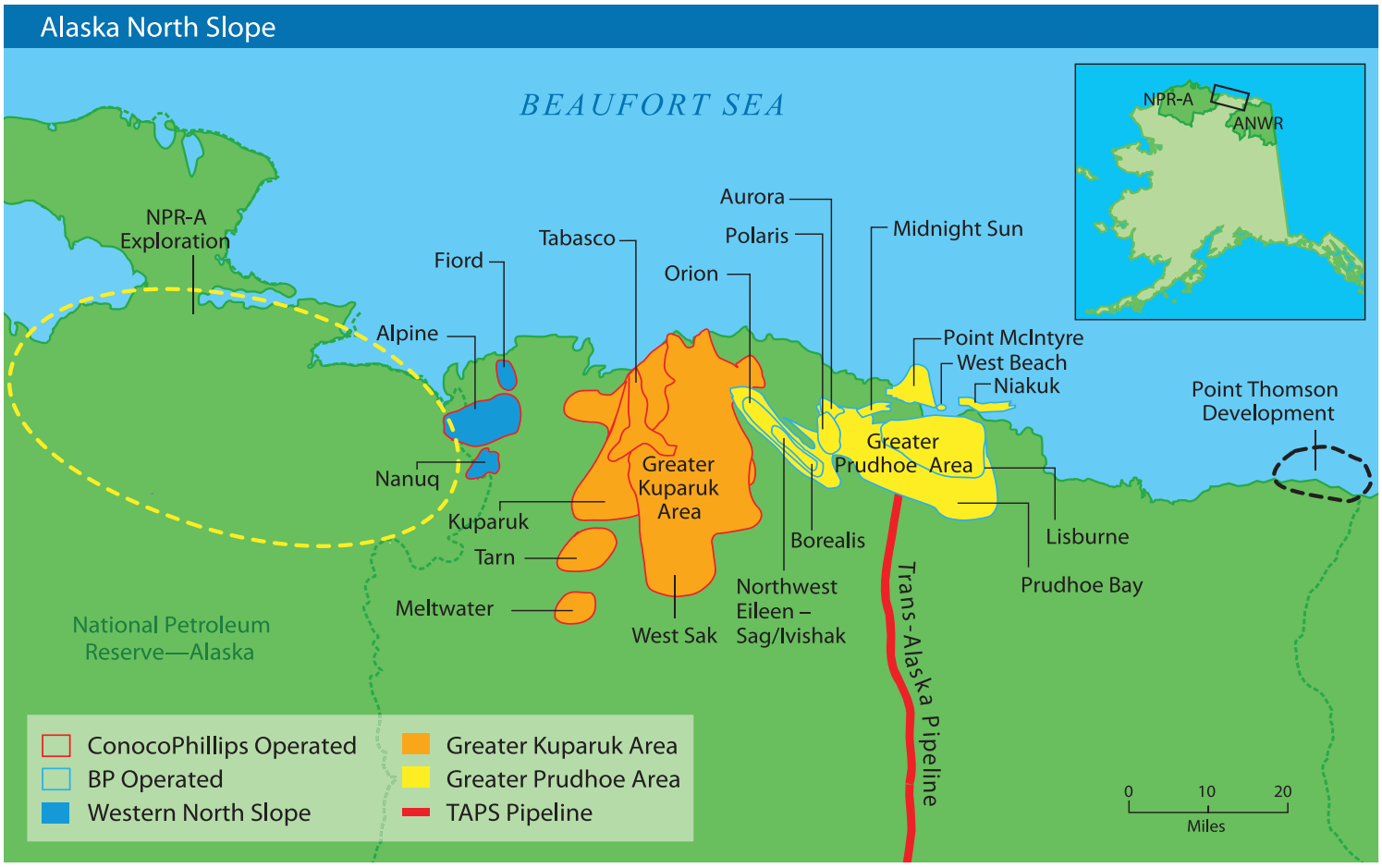

Image provided by ConocoPhillips Alaska.

New Partners

EPA would like to welcome three new partners and three new endorsers to the Gas STAR Program.

Partners

Targa Resources, Inc.

Targa is an independent midstream company formed in 2003, to pursue gas gathering, processing, and pipeline asset acquisition opportunities. Targa recently purchased Gas STAR Partner, Dynegy Midstream Services, which includes natural gas gathering and processing, natural gas liquids (NGL) fractionation, terminalling, storage, transportation, distribution, and marketing assets. Since the acquisition, Targa now has operations in West Texas, North Texas, Southeast New Mexico, Southwest Louisiana, and on the Texas-Louisiana Gulf Coast. The company operates more than 9,500 miles of pipeline with more than 15 operating plants and various other facilities. For more information, please visit the company's Web site at targaresources.com.

CDX Gas

CDX is an on-shore natural gas exploration and production company, focused primarily on unconventional resources, such as coal, shale and tight sands. CDX, formed in 1991, and its affiliated companies operate in numerous states, Alberta, Canada, and in several international countries. CDX and its affiliate companies employ approximately 450 people in offices throughout the United States and Canada. For further information on the company, please visit cdxgas.com.

Southern Union Gas Company

Southern Union Company is one of the nation's leading diversified natural gas companies, focusing on the transportation, storage, gathering, processing, and distribution of natural gas. The company owns and operates the nation's second largest natural gas pipeline system—more than 22,000 miles. Through Panhandle Energy, Southern Union's interstate pipeline interests operate in the San Juan, Anadarko, and Permian Basins, the Rockies, the Gulf of Mexico, Mobile Bay, South Texas and the Panhandle regions of Texas and Oklahoma to major markets in the Southeast, West, Midwest and Great Lakes region. Through Southern Union Gas Services, the company is engaged in the gathering, transmission, treating, processing, and redelivery of natural gas and natural gas liquids in Texas and New Mexico. Through its local distribution companies, Missouri Gas Energy, PG Energy, and New England Gas Company, Southern Union also serves approximately 1 million natural gas end-user customers in Missouri, Pennsylvania, Rhode Island, and Massachusetts. For further information, visit www.sug.com.

Endorsers

Air and Waste Management Association (A&WMA)

A&WMA is a nonprofit, nonpartisan professional organization that enhances knowledge and expertise by providing a neutral forum for technology exchange, professional development, networking opportunities, public education, and outreach to more than 9,000 environmental professionals in 65 countries. A&WMA also promotes global environmental responsibility and increases the effectiveness of organizations to make critical decisions that benefit society. For more information, visit the association's Web site at awma.org.

The Independent Petroleum Association of America (IPAA)

IPAA is a national trade association representing thousands of independent crude oil and natural gas explorers and producers in the United States. It also operates in close cooperation with more than 40 unaffiliated independent national, state, and regional associations, which together represent thousands of royalty owners and the companies that provide services and supplies to the domestic industry. For further information, visit the IPAA's Web site at ipaa.org.

Northeast Gas Association (NGA)

NGA was formed in 2003 as a regional trade association that focuses on education and training, technology research and development, operations, planning, and increasing public awareness of natural gas in the Northeast U.S. The association represents natural gas transmission and distribution companies, liquefied natural gas importers, and associate member companies. These companies provide natural gas to 8.6 million customers in eight states (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont). For more information, visit the association's Web site at northeastgas.org.

Partner Profile—ConocoPhillips Alaska

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on airplanes to survey liquid transmission pipelines for spill detection purposes on the North Slope, the demonstration represented the first time this technology was used at the facility for methane detection. (See the *Spring 2006 Partner Update* for more information on this technology.)

For ConocoPhillips' sustainable development is about conducting our business to promote economic growth, a healthy environment and vibrant communities, now and into the future—in Alaska and the lower 48 states. The goals of EPA's Natural Gas STAR program are well aligned with the company commitment to sustainable development. Participation in the program will further company efforts to profitably deliver clean-burning natural gas to the public while protecting the environment"

— Bruce Wilcoxon, ConocoPhillips

Two methane emission reduction opportunities that have been identified and implemented at the LNG plant include reducing venting during planned facility shut downs, and installing automated monitoring of the flare pilot. One strategy for reducing venting during planned shut downs is utilizing gas generated from pipeline depressurization in the facility defrost process. This affords a process benefit and ultimately results in the gas being flared rather than vented. With regard to the flare pilot, it has been automated to ensure an alarm sounds when the flame is extinguished, which helps minimize the duration of venting from the flare tip. Prior to installing the alarm, venting would continue until operations personnel visually identified the problem. Greenhouse gas and specific methane emission reduction opportunities for future installations might also focus on strategies such as turbine efficiency, vapor recovery, and more extensive utilization of dry gas seals.

Incorporating Gas STAR Into Alaska Operations

In mid-2005, ConocoPhillips Alaska assembled a core team of professionals consisting of subject matter experts from all business functions. The team's goal was to evaluate the coupling of the Gas STAR Program with the company's operational objectives, and determined that the Alaska operations as a whole were positioned to make a meaningful contribution to the program.

Leading up to this decision, team members from each discipline and operating asset carefully considered the list of production Best Management Practices (BMPs) and Partner Reported Opportunities (PROs) and conducted a three-part gap analysis. The intent was to determine which methane emission reduction practices (or equivalents) were already in place, identify best practices that ConocoPhillips Alaska could share with other partners, and identify areas for implementation of the

Image provided by ConocoPhillips Alaska.

BMPs and PROs. The findings of this evaluation were very useful and, not surprisingly, the company learned that many of the suggested practices were already in place. For instance, Alaska operations tend to be conducted within closed modules for weather protection, so safety concerns are a key driver in controlling fugitive losses. However, the team also identified opportunities that warrant further evaluation, such as voluntary tank vapor recovery, increased use of low emission flow backs, and use of low emission rod and pump packing. During the first year of Gas STAR participation, the core team will focus on a detailed economic and engineering evaluation of the potential opportunities and select specific opportunities to incorporate throughout the next several years.

Overall, the team realized that many of Gas STAR's recommended opportunities offer win-win benefits, whether in terms of emission reductions, safety, product recovery, or eliminating nuisances (such as odors). ConocoPhillips Alaska is now looking to the future and planning to capitalize on these opportunities and expand its participation in the Program that is in-line with the company's progressive approach to health, safety, and environmental performance.

Natural Gas STAR International

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An international discussion at a recent Methane to Markets event.

Although Methane to Markets has 17 Partner countries, all companies with oil and gas operations are welcome to join Gas STAR International—regardless of location. Discussions at previous Methane to Markets events have helped to shape the direction for Natural Gas STAR International. Different world regions have different market outlets and incentives for recovered methane and in some cases different methane sources to capture. Natural Gas STAR International aims to apply the successful U.S. concept of economical methane emission reduction to these differing market conditions.

In many instances, projects proven profitable by domestic Gas STAR partners are even more attractive to implement in other markets where demand might be higher and associated implementation or operating costs lower.

Groundwork for Gas STAR International

Natural Gas STAR has been reaching out to stakeholders around the world for a number of years, beginning by sending representatives to the 2nd and 3rd International Methane Mitigation Conferences in Novosibirsk, Russia, and Beijing, China, to discuss cost-effective applications for saving methane. More recently, the Program has been inviting methane emission mitigation experts from outside the United States to speak at domestic Technology Transfer Workshops. The Program also translated the majority of Gas STAR technical documents into Spanish and Russian, which can be found online at epa.gov/gasstar. Natural Gas STAR has also been propagating the message that methane mitigation can be a profitable investment opportunity through workshops and meetings organized by the Methane to Markets Partnership.

Current Activities for Gas STAR International

As a result of these efforts, the Natural Gas STAR Program created a new Memorandum of Understanding allowing international operators to participate. This has established new ties with international stakeholders, and has prompted the Program to develop strategies for implementing projects outside the United States. Natural Gas STAR welcomes feedback from

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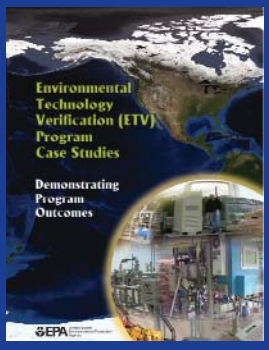
Methane to Markets Partner Countries

Argentina	Italy
Australia	Japan
Brazil	Mexico
Canada	Nigeria
China	Republic of Korea
Colombia	Russia
Ecuador	Ukraine
Germany	United Kingdom
India	United States

First ETV Case Study Booklet Published

EPA's Environmental Technology Verification (ETV) Program recently announced that its first ETV case study booklet (117 pages) has been released. This booklet contains copies of the case studies on various topics from clean air to water quality. The topic that might interest Gas STAR partners is "Eductor Vapor Recovery Unit (EVRU)" in Section 2.2.

This booklet can be accessed in its entirety online at epa.gov/etv/pdfs/publications/600r06001/600r06001.pdf.



What Is EPA's ETV Program?

The ETV Program develops testing protocols and verifies the performance of innovative technologies that have the potential to improve protection of human health and the environment. ETV was created to accelerate the entrance of new environmental technologies into the domestic and international marketplace. ETV is also verifying monitoring and treatment technologies relevant for water security. For further information, visit ETV's Web site at epa.gov/etv.

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Employees of TransCanada work to update a natural gas line.

international operators and environmental personnel about the Gas STAR International reporting process, technology transfer, and other resources. Natural Gas STAR is reaching out to partner companies with operations outside the United States for partnership participation. Those partners' current Implementation Managers are in a unique position to shape the future of Natural Gas STAR International by providing insight and suggestions based on their own companies' international investments. Comments on structuring the international Program or requests for international partnership enrollment can be directed to the Gas STAR Program Managers.

Outlook for Gas STAR International

The Natural Gas STAR International Program commencement will officially take place on September 26, 2006, in Washington, D.C. A charter international partner signing ceremony in conjunction with an International Petroleum Industry Environmental Conservation Association (IPIECA)/ Methane to Markets Technology Transfer Workshop will be held at the Key Bridge Marriott Hotel.

The international Program is one way in which many U.S. partners can maintain or increase their current level of methane emissions savings. Natural Gas STAR will begin accepting annual emissions reductions reports from international partners in 2007. Partners may report historical savings if desired. Additionally, Natural Gas STAR International will continue to support other Methane to Markets workshops in the future and focus on the core tasks of identifying and supporting specific methane emission reduction projects with measurable methane savings.

Please contact Gas STAR Program Managers, Carey Bylin or Roger Fernandez for more information on Natural Gas STAR International.

2006 Technology Transfer Workshops

★ **Producers Technology Transfer Workshop**
June 6, 2006
Petroleum Club of Fort Worth
Ft. Worth, Texas
Co-sponsored by EPA, Devon Energy Corporation, and the Petroleum Technology Transfer Council.

★ **Producers Technology Transfer Workshop and Field Visit**
June 8-9, 2006
Occidental Petroleum Corporation Offices
Midland, Texas
Co-sponsored by EPA, Occidental Petroleum Corporation, and the Petroleum Technology Transfer Council.

★ **Processors Technology Transfer Workshop**
July 27, 2006
Holiday Inn Express
Hobbs, New Mexico
Co-sponsored by EPA, Targa Resources, the Gas Processors Association, and New Mexico Oil and Gas Association.

Calendar

13th Annual Natural Gas STAR Implementation Workshop

★ **October 23-25, 2006**
InterContinental Houston
Houston, Texas

This workshop will provide Gas STAR partners and other interested parties with an opportunity to obtain information about the most current and cost-effective methane emissions reduction technologies and practices and exchange ideas with more than 150 other Natural Gas STAR partners. This year's meeting will focus on More Methane to Markets in an Era of High Gas Prices. Included will be concurrent sessions focusing on all areas of the natural gas industry: production, processing, transmission, and distribution.

Information and online registration information is available at epa.gov/gasstar/workshops.

Methane to Markets Workshops

★ **Natural Gas as a Climate Change Solution: Breaking Down the Barriers to Methane's Expanding Role**
September 26, 2006
Key Bridge Marriott Hotel
Washington, D.C.
Co-sponsored by IDECA and Methane to Markets. Further information and registration will be available online at methanetomarkets.org.

Miscellaneous Events

★ **International Gas Union (IGU) World Gas Conference**
June 5-9, 2006
Amsterdam, The Netherlands
More information is available online at wgc2006.nl.

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