EPA United States Environmental Protection Agency

PARTNER UPDATE

SPRING 2009

NaturalGas EPA POLLUTION PREVENTER

In This Issue:

Prospective Projects Spotlight

Potential New Opportunity: Seal Oil Degassing Vent Recovery and Use

Older centrifugal compressor designs that use "wet" seals with seal oil are still used prevalently and can release a large quantity of methane to the atmosphere from their seal oil systems. Though cost-effective solutions currently exist, such as retrofitting to dry seals, a significant capital investment is typically required. The Natural Gas STAR Program recently learned of a new project idea with strong potential to reduce emissions from this significant

The Partner Update typically addresses project ideas that have been reported to the Natural Gas STAR Program. Occasionally the Program hears about methane emissions reduction activities that are technically feasible but have not yet been reported. This new column highlights these opportunities and seeks feedback from Partners on this and other potential ideas.

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Partner Profile

Methane to Markets Project Network Member Eni Shares Experiences and Goals in Reducing Methane Emissions

As a project network member, Eni demonstrates its commitment to the Methane to Markets Partnership (M2M) by actively supporting the goal of reducing methane emissions through cost-effective, near-term methane recovery and use.

Eni is an integrated energy company with assets in oil and natural gas market segments that include exploration, production, transportation, and distribution. Eni is based in Italy, is active in 70 countries, and has been participating in Methane to Markets since 2005 in the oil and gas subcommittee.

Last Spring the Italy-based energy company shared information on several methane emission reduction projects underway during the M2M Oil & Gas Subcommittee Meeting in Rome, Italy. In this way, Eni is one entity contributing to the Methane to Markets project network. The project network facilitates the involvement of key non-governmental organizations, such as the private sector and development banks, to participate in M2M meetings and engage in project development in coordination with Partner countries.

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Taking Credit for Your Accomplishments: Annual Reporting Key Dates and Resources

The 2009 annual reporting cycle for Natural Gas STAR Partners is underway, and Implementation Managers can take advantage of Program resources to streamline the process. The annual report is the capstone of each year's Natural Gas STAR participation, providing a permanent record of the voluntary efforts undertaken by each Partner and informing EPA of new methane emission reduction technologies and practices.

Annual reporting is a major driver for Natural Gas STAR to support Partners. It is the source of new project ideas and the way the Program communicates the collective success of Partner companies. Reporting is an essential activity for each Partner because it documents emission reduction achievements, demonstrates to company staff the value of participation over the last year, and brings new ideas to the technology transfer process. Annual reports require a signature this year.

Support Natural Gas STAR activities by submitting new and innovative ideas within or in addition to your annual reports

- ★ Do you have an idea for a new methane emissions reduction method?
- ★ Can you share your new ideas or past experiences at an upcoming workshop?

Partner companies are our biggest advocates. By sharing thoughts and ideas, companies can help Natural Gas STAR to diversify Program support products, reach new, existing and potential Partners, and strengthen the overall Program.

Timeline

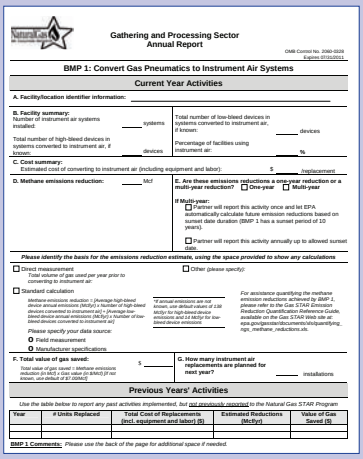
In early 2009, Partners begin organizing methane emission reduction data for the 2008 calendar year—identifying locations with voluntary project work and listing specific projects undertaken. Partners are free to use any convenient reporting format including hardcopy annual reporting forms available for download from the Natural Gas STAR web site, online annual reporting forms, worksheets, or text documents. If you do choose to submit your data in a custom format, please ensure that it includes all of the data that is requested in our standard forms.

In late-March, Partners receive an annual reporting package in the mail which provides detailed reporting instructions. Reports are due to Natural Gas STAR by April 30, 2009, and can be sent via email, fax, standard mail, or using the secure, password-protected online annual reporting forms.

Natural Gas STAR reviews each annual report after it is submitted and makes a record of methane emissions reductions for each Partner. In the fall, Partners who submitted annual reports on time will receive a Natural Gas STAR summary report. This report is based on the Partner's annual report data throughout participation in Natural Gas STAR and is designed to help Partners assess their accomplishments and explore additional technologies and practices for implementation. Annual report content is also a factor for the achievement awards given in the fourth quarter of each year at the annual implementation workshop.

Reporting Resources

Reporting Templates


Gathering and Processing Sector
Annual Report

BMP 1: Convert Gas Pneumatics to Instrument Air Systems

Current Year Activities

A. Facility/location identifier information:

B. Facility summary:
Number of instrument air systems installed: ____ systems
Total number of high-bleed devices in systems converted to instrument air, if known: ____ devices
Total number of low-bleed devices in systems converted to instrument air, if known: ____ devices
Percentage of facilities using instrument air: ____ %

C. Cost summary:
Estimated cost of converting to instrument air (including equipment and labor): $ ____ /replacement

D. Methane emissions reduction: ____ Mcf

E. Are these emissions reductions a one-year reduction or a multi-year reduction? ☐ One-year ☐ Multi-year

If Multi-year:
☐ Partner will report this activity once and let EPA automatically calculate future emission reductions based on sunset date duration (BMP 1 has a sunset period of 10 years).
☐ Partner will report this activity annually up to allowed sunset date.

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

☐ Direct measurement
Total volume of gas used per year prior to converting to instrument air:
☐ Other (please specify):
☐ Standard calculation
Methane emissions reduction = [Average high-bleed device annual emissions (Mcf/yr)] x Number of high-bleed devices converted to instrument air] + [Average low-bleed device annual emissions (Mcf/yr)] x Number of low-bleed devices converted to instrument air]
Please specify your data source:
O Field measurement
O Manufacturer specifications
*If annual emissions are not known, use default values of 130 Mcf/yr for high-bleed device emissions and 14 Mcf/yr for low-bleed device emissions.
For assistance quantifying the methane emission reductions achieved by BMP 1, please refer to the Gas STAR Emission Reduction Quantification Reference Guide, available on the Gas STAR Web site at: epa.gov/gasstar/documents/voluntaryimp_ngs_methane_reductions.xls.

F. Total value of gas saved:
Total value of gas saved = Methane emissions reduction (in Mcf) x Gas value (in $/Mcf) [if not known, use default of $7.00/Mcf]: $ ____

G. How many instrument air replacements are planned for next year? ____ installations

Previous Years' Activities

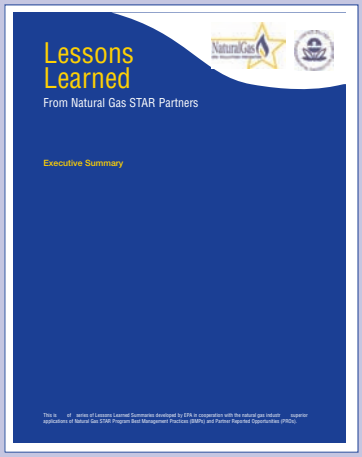
Use the table below to report any past activities implemented, but not previously reported to the Natural Gas STAR Program

Year	# Units Replaced	Total Cost of Replacements (incl. equipment and labor) ($)	Estimated Reductions (Mcf/yr)	Value of Gas Saved ($)

BMP 1 Comments: Please use the back of the page for additional space if needed.

epa.gov/gasstar/tools/program-forms.html

Technical Documents



epa.gov/gasstar/tools/recommended.html

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Submittal Options

★	**Online**	db2.erg.com/gasstar/login.asp
★	**Email or hard copy**	Find your designated EPA Program Manger Click their name for contact info at epa.gov/gasstar/partners/index.html

Annual Reporting

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Resources

Partners can take advantage of a suite of Program resources to expedite annual reporting. Reporting templates provide an existing format and default values for different project types. The emission reduction quantification reference guide provides a comprehensive list of recommended reduction methods and different approaches for calculating methane savings from each project type. Natural Gas STAR technical documents describe specific reduction methods in detail, including methods for estimating costs, cost savings, and methane savings.

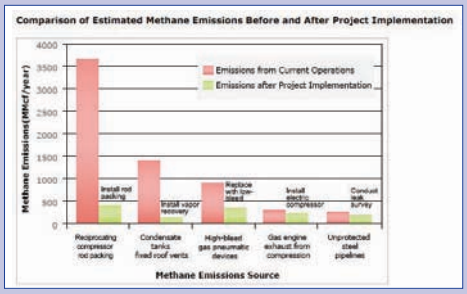
Reporting Tips

Partners have developed several strategies for gaining the most benefit from the annual reporting process. Some Partners use custom reporting formats such as spreadsheets that complement the format of other internal data systems such as greenhouse gas inventories. Partners have used annual report data as a centerpiece to publicize, either internally or externally, company efforts to reduce methane emissions. The annual report has also served as a rally point and roadmap from which Partners begin to plan reduction projects for the upcoming year.

Finally, Partners have taken advantage of Program services to organize the annual reporting process. For example, the Partner Challenge service offered by the Program helps companies to inventory methane emissions reductions, identify previously implemented projects to include in annual reports, and study the feasibility of selected new project types.

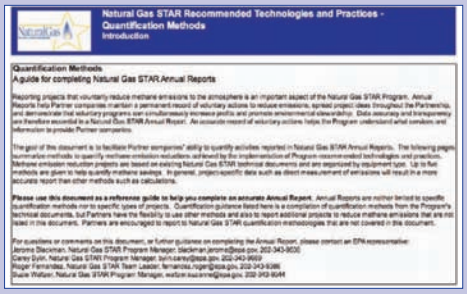
Reporting Resources

Partner Challenge service for the upcoming reporting year



epa.gov/gasstar/tools/partner-challenge.html

Quantification Guide



epa.gov/gasstar/documents/xls/quantifying_ngs_methane_reductions.xls

University of Texas Leading Study to Update Selected Natural Gas Emission Factors

In 2008, EPA awarded a $500,000 cooperative agreement to the University of Texas at Austin (UT) for the project "GHG Emission Factor Development Project for Selected Sources in the Natural Gas Industry." The awarding of this cooperative agreement was the result of a multi-year collaborative process between the EPA, the American Petroleum Institute, the Interstate Natural Gas Association of America and the American Gas Association, to identify existing methane emission factors that were high priorities for future study and revision. The sources under study were selected due to such factors as their relative size in the U.S. inventory of methane emissions from the oil and gas industry, the uncertainty bounds of existing emission factors, and known changes in common practice in the natural gas industry. Table 1 lists the factors under study.

The project team at UT, working with URS Corporation, initiated the work by completing a literature review of existing emission factors, with the goal of identifying any new data sources and

Table 1. Priority List of Emission Sources for the Development of Default Methane Emission Factors

Industry Segment	Emissions Sources
Production	Well Clean Ups
	Completion Flaring
	Well Workovers
	Pipeline Leaks
Processing	Reciprocating Compressors (fugitive)
	Centrifugal Compressors (fugitive)
Transmission and Storage	Reciprocating Compressors (fugitive)
	Pneumatic Devices (vent)
	Centrifugal Compressors – Transmission (fugitive)
	Centrifugal Compressors – Storage (fugitive)
Distribution	Meter and Regulating Stations
	Residential Customer Meters
	Mains – Plastic
	Services – Plastic

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Climate Policy Update

EPA Proposes First National Reporting on Greenhouse Gas Emissions

On March 10, 2009, the U.S. Environmental Protection Agency (EPA) proposed the first comprehensive national system for reporting emissions of greenhouse gases (GHGs) produced by major sources in the United States. The proposed rule (40 CFR 98) would apply to suppliers of fossil fuel and industrial chemicals, manufacturers of motor vehicles and engines, as well as large direct emitters of greenhouse gases with emissions equal to or greater than a threshold of 25,000 metric tons of carbon dioxide equivalent per year. This threshold is roughly equivalent to the annual greenhouse gas emissions from just over 4,500 passenger vehicles. The vast majority of small businesses would not be required to report their emissions because their emissions fall well below the threshold. Approximately 13,000 facilities, accounting for about 85 percent to 90 percent of greenhouse gases emitted in the United States, would be covered under the proposal.

For more information on how the proposed rulemaking affects the oil and natural gas industry, please visit EPA's web site at epa.gov/climatechange/emissions/ghgrulemaking.html. The following information is available on the web site:

- ★ Preamble and Proposed Mandatory GHG Reporting Rule text;
- ★ Information sheets for each of the source categories covered in the proposed rule;
- ★ Frequently Asked Questions;
- ★ Information on the public comment period including direction for submitting written comments as well as location, dates, and registration for two upcoming hearings.

Public Comment Period

The public comment period is open for 60 days following publication in the *Federal Register*. There are instructions on the web site for how to submit written comments. There will also be two public hearings for the proposed rule:

- ★ April 6 and 7, 2009, at EPA Potomac Yard Conference Center, Arlington, VA;
- ★ April 16, 2009, at Sacramento Convention Center, Sacramento, CA.

EPA encourages those who wish to attend or give public comments, to visit the web site and register on-line in advance of the hearing.

University of Texas

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studies that had been developed since the publication of a comprehensive set of factors for natural gas industry equipment and operations in 1996 by EPA and the Gas Research Institute (GRI, now the Gas Technology Institute, GTI). The literature review found that, in many cases, the GRI study is still the primary source for emission factors. The full review is posted on the project web site, utexas.edu/research/ceer/GHG.

Based on this review, the team developed a plan for the first round of new data acquisition, which will seek to study emissions from reciprocating compressors in the processing sector. UT is working collaboratively with industry on this effort and in January held several conference calls to review findings of the literature study and solicit feedback on the initial data gathering plan.

The next steps in this work will be to test the preliminary sampling plan for compressors with a field trial, and to assemble equipment population data to develop sampling plans that will lead to representative field measurements. To enhance this work, UT welcomes industry input on this process. In particular, anyone with specific information on equipment populations for processing sector reciprocating compressors (or other selected sources under study) or oil and gas companies that are willing to offer their sites for participation in sampling are encouraged to contact David Allen of UT at allen@che.utexas.edu.

New Projects Spotlight

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source through a basic design change with low capital costs. This project type could turn large releases of methane into an energy supply for fueling onsite heaters and boilers.

This article describes the potential new method to capture emissions from wet seal compressors and seeks feedback from Partners on the feasibility of implementing this type of project. It is estimated that recovery, treatment, and use of these emissions in low pressure fuel systems could pay back the investment within one month by displacing fuel gas.

Background: Methane Emissions from Wet Seal Centrifugal Compressors

Figure 1 shows methane emissions from a typical centrifugal compressor using seal oil. These wet seal centrifugal compressors circulate oil under high pressure between three rings around the compressor shaft, forming a barrier against the compressed gas to prevent its escape to the atmosphere. The center ring is attached to the rotating shaft, while the two rings on each side are stationary in the seal housing, pressed against a thin film of oil flowing between the rings to both lubricate and act as a leak barrier. Very little gas escapes through the oil barrier, but a significant amount of gas is absorbed by the oil on the compressor side of the seal at the oil interface with high pressure gas, thus contaminating the seal oil. Seal oil must be purged of the absorbed gas to maintain viscosity and lubricity when recirculated. This is done in a flash drum or oil sump. The methane degassed from the seal oil is typically emitted to the atmosphere through an open ended line.

Methane emissions from seal oil degassing of one typical centrifugal compressor range from 40 to 200 standard cubic feet (scf) methane per minute. Given an average methane emissions of 120 scf per minute, the volume of methane lost represents $442,000 per year at an average gas value of $7 per thousand scf (Mcf).

New Opportunity: Seal Oil Degassing Vent Recovery and Use

A new, less capital intensive solution could be to reduce emissions from seal oil degassing through capture and use of the methane. A diagram illustrating this new method is shown in Figure 2. Seal oil contaminated with gas that is typically sent to the atmospheric degassing drum is instead degassed at a new drum operating at fuel pressure.

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Previously Reported Reduction Method: Replace Wet Seals with Dry Seals

One existing mitigation option reported by many Natural Gas STAR Partners is to retrofit a compressor with dry seals, which replaces the wet seal system with spring-loaded, grooved seals that create hydrodynamic gas pressure as a barrier to prevent gas leaks along the shaft. Depending on the size and pressure of the compressor, dry seals typically leak at a rate of 0.5 to 3 scf per minute, resulting in a substantial reduction in methane emissions as compared to wet seal configurations. This substantial methane savings technology requires a high initial capital investment but has a lower operating cost than wet seals and pays back within 8 to 24 months. Dry seal retrofits might not be possible on some compressors due to compressor housing design or operational requirements. Companies can evaluate whether retrofitting centrifugal compressors makes sense based on individual operating conditions and corporate resources. For more information, visit epa.gov/gasstar/documents/ll_wetseals.pdf.

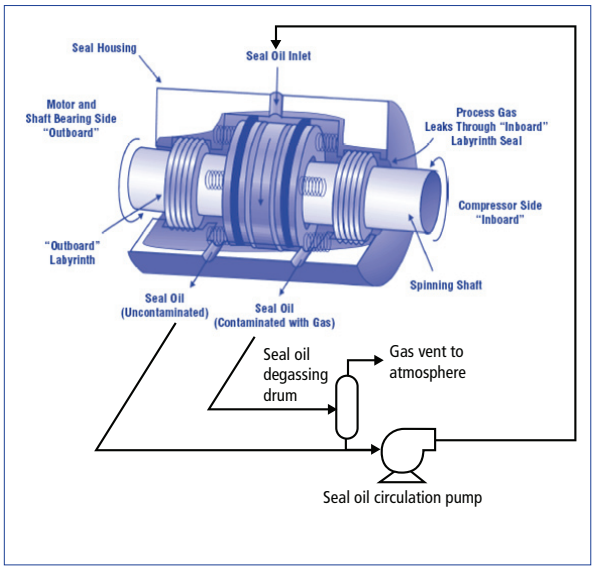

Figure 1. Wet Seal Centrifugal Compressor

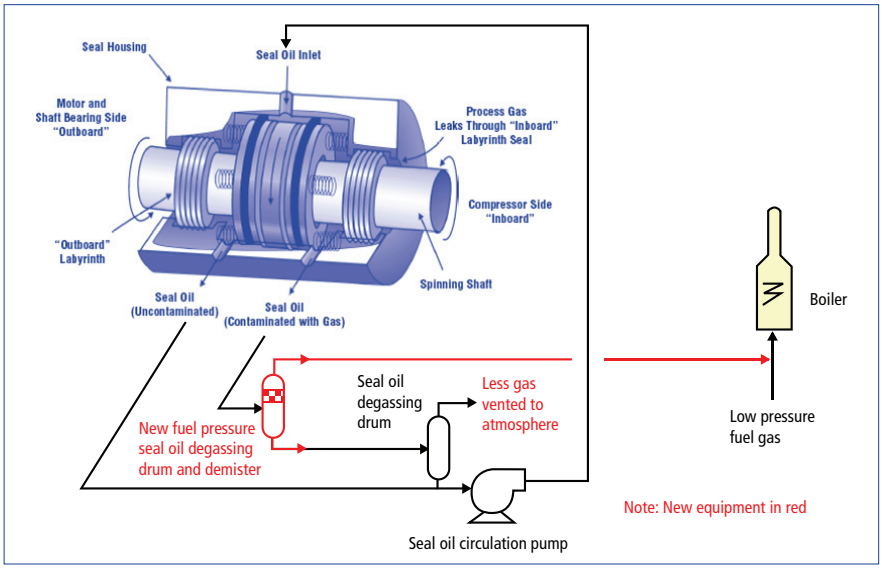

Figure 2. Centrifugal Compressor Seal Oil Flash Gas Recovery and Use

Partner Profile

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Managing Fugitive Emissions from Transmission and Distribution Systems

A focus of Eni's methane emissions reduction program is fugitive monitoring and repair. Eni began this effort by identifying emissions sources and estimating fugitive emissions at selected compressor stations. The next step was the development of a tool to prioritize and plan work and maintenance activities for significant emissions sources. The results from monitoring three compressor stations were generally consistent, showing instrumentation and flanges as having the highest emissions of the four categories of sources monitored, accounting for 80 percent of total emissions.

Eni also studied its natural gas distribution system and determined that methane leaks primarily occur at pipe joints as a result of traffic stress and third party damage. To address this, Eni identified the main ways it could reduce leaks, specifically through:

★ replacement of aged in-service pipe with steel or plastic pipe;

★ "conditioning" of aged in-service lead / yarn jointed pipes that have become unsealed by adding water vapor or monoethylene glycol into the pipe;

★ prevention of third party damage through outreach and education.

Through these measures, Eni hopes to reduce emissions from *Italgas*—Eni's distribution system for Rome—by approximately 60 percent from1990 levels by the year 2014.

2007 Results and Plans for the Future

Although Eni reported a 10 percent increase in greenhouse gas emissions in 2007 (including methane) largely due to the acquisitions of new assets (e.g. in Congo and Russia), over the last five years emissions of carbon dioxide equivalents (CO_2e) in exploration and production, refining and marketing and gas and power business units have registered substantial emissions reductions.

In addition to ongoing fugitive methane emissions reduction activities, long-term flaring projects are expected to

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Utilizing Leak Detection Technologies

Eni uses the Sherlock® infrared leak imaging camera to remotely monitor emissions. Leak imaging has been a means for Eni to identify and locate leaks, to prioritize maintenance and repair work, and for demonstrating the effectiveness of methane emission reduction activities. Additionally, video imaging has given Eni the ability to detect emissions in areas that are not easily accessible.

Eni estimates its greenhouse gas emissions following an international monitoring and reporting protocol[1] and simultaneously carries out several field measurement campaigns to evaluate and control the estimation uncertainty level. To do this, Eni uses the Fourier Transform Infrared Spectroscopy (FT-IR) remote sensing. FT-IR is a way to characterize point source emissions without an actual sampling port (chimney, stack or flare).

Currently, Eni is using FT-IR at its offshore and onshore facilities worldwide to estimate the effectiveness of emission reduction activities.

The FT-IR remote sensing system can be used in either a passive or active mode to detect criteria pollutants and greenhouse gases. It works on the principle of absorption of infrared radiation to measure the concentration of gas pollutants. The system uses algorithms to account for background (meteorological and atmospheric) conditions and other factors (geometric parameters) that influence the results. Through all these activities, Eni has noted an element of uncertainty associated with emissions measurements and has recognized the need for protocols and validation to reduce this uncertainty. The Methane Emissions Leaks Detection and Recovery program is supported by a experts group of the Eni Research Center for Environmental Technologies.

New Projects Spotlight

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The absorbed methane vaporizes out of solution in the intermediate pressure drum and is used in a facility's fuel gas system. The seal oil then flows to the final degassing stage where a minimal volume of methane is degassed to the atmosphere and the regenerated seal oil is recirculated to the compressor. Seal oil exits a compressor at a typical pressure of 400 pounds per square inch gauge (psig). Operating the degassing drum at 50 psig results in nearly all of the seal oil degassing emissions to be recovered to fuel gas. At an average seal emissions rate of 120 scf per minute this steady supply of gas is sufficient to meet the fuel requirements of a boiler or other equipment with an input heat duty of about 7 million British thermal units (Btu) per hour assuming a gas heat content of 1,000 Btu per scf.

Sites must meet several operating requirements to implement this recovery and use of seal oil flash gas. On-site equipment or a low pressure fuel gas system must be nearby that can accept and use the low pressure gas stream. The flash gas stream will entrain small amounts of seal oil, requiring a demister/filter or fuel gas knock-out vessel to remove this entrained oil and yield an acceptable fuel gas specification.

Example Implementation and Economics

The investment to recover seal oil degassing emissions in this way would include the cost of the intermediate pressure degassing drum, new piping, gas demister/filter, and possibly a pressure regulator for the fuel gas line. Using Guthrie's modular method of equipment cost estimation[1], and assuming a typical seal oil flow rate of 3.75 gallons per minute, the installed cost of equipment would be about $22,000 if suitable combustion equipment is already in place. Operating and maintenance costs are expected to be minimal.

Operating cost savings for capturing seal oil degassing emissions are realized by reducing consumption of site fuel gas. For one wet seal compressor, potential savings can be estimated at 63 MMcf methane per year, displacing this same volume in fuel gas. At $7 per Mcf, savings from reduced site fuel gas consumption will approach 100 percent of the seal oil emissions or $442,000. Example project economics are shown in the project summary box showing an estimated payback period of 1 month.

Conclusion

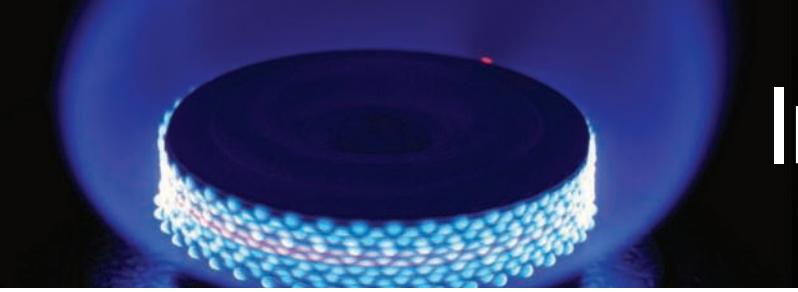
Capture and use of seal oil degassing emissions is a project option less capital intensive than the alternative of retrofitting centrifugal compressors with dry seals. Routing seal oil methane emissions to fuel gas is an opportunity to convert a potential climate change liability into a site efficiency improvement as well as a project with positive cash flow after the first month.

We would like to hear from you on the feasibility of implementing this type of project. Or if your company has already implemented this practice and is willing to share your experiences with the Natural Gas STAR Program, please contact Suzie Waltzer, EPA [Waltzer.Suzanne@epamail.epa.gov or (202) 343-9544].

PROJECT SUMMARY: CAPTURE AND USE OF SEAL OIL DEGASSING EMISSIONS

Operating Requirements	• Centrifugal compressor with seal oil system • Nearby use for low pressure fuel gas • New intermediate pressure flash drum, fuel filter, pressure regulator		
Capital & Installation Costs	$22,000		
Annual Labor & Maintenance Costs	Minimal		
Methane saved	63 MMcf per year		
Gas Price per Mcf	$3	$7	$10
Value of Gas Saved	$189,000	$442,000	$631,000
Payback Period in Months	2	1	0.5

1 Biegler, et al. "4.3.1 Guthrie's Modular Method." *Systematic Methods of Chemical Process Design*. Ed. Neal R. Amundson. Saddlewood: Pearson, 1997. pages 133 to 135



In the News

Satellite Launched to Observe Methane from Oil and Gas Systems

The Japan Aerospace Exploration Agency (JAXA) launched the Greenhouse Gases Observing Satellite (GOSAT), on January 23, 2009. GOSAT is dedicated to detecting greenhouse gases from space. It collects data on the presence of greenhouse gases within an observation area by detecting the infrared radiation absorbed by both methane and carbon dioxide. For the oil and natural gas industry, GOSAT can periodically monitor emissions from infrastructure such as pipelines, compressor stations, and other facilities. According to JAXA, the GOSAT satellite will be the first dedicated observation station capable of monitoring greenhouse gases, and it will monitor 56,000 observation points over the entire globe from a polar orbit with a three day repeat. The system can observe methane and carbon dioxide releases with a spatial resolution of ten kilometers compared with widely used technologies today that have a spatial resolution of about 100 kilometers. Data from GOSAT will be made accessible to the public free of charge through a dedicated web site starting around September 2009. For more information about the GOSAT program, visit jaxa.jp/countdown/f15/index_e.html.

New Partners

EPA is excited to announce the addition of several new Partners to the Natural Gas STAR Program.

DOMESTIC PARTNERS

HighMount Exploration & Production LLC

HighMount Exploration & Production, headquartered in Houston, Texas, is a subsidiary of Loews Corporation and one of the 20 largest holders of domestic natural gas reserves. With assets located in the Permian Basin in Texas, the Antrim Shale of the Michigan Basin, and the Black Warrior Basin in Alabama, HighMount has 4.7 trillion cubic feet equivalent of proved, probable, and possible natural gas reserves. HighMount's 645 employees are focused on the development and production of natural gas. For further information on the Partner, please visit highmountep.com.

Prism Gas Systems I, LP

Prism Gas Systems I, LP and its subsidiaries provide midstream natural gas services, including gathering, processing, and treating of natural gas, as well as treating, fractionation, and stabilization of natural gas liquids. Headquartered in Bedford, Texas, Prism has ownership interests in approximately 659 miles of gathering and transmission pipelines located in the natural gas producing regions of Central and East Texas, Northwest Louisiana, and the Texas Gulf Coast and operates a 265 million cubic feet per day natural gas processing plant in East Texas. For more information, please visit the Partner's Web site at prismgas.com.

INTERNATIONAL PARTNER

GAZ SYSTEM S.A.

GAZ-SYSTEM S.A., headquartered in Warsaw, is a state company that operates Poland's domestic gas transmission pipelines. Established in 2004, the company transports natural gas through networks with 973 exit points. As of January 2009, GAZ SYSTEM operated a 9,803 kilometer transmission network transporting 14.7 billion cubic meters (519 billion cubic feet) of gas annually. The company has an agreement for use of 1.66 billion cubic meters (58.6 billion cubic feet) of gas storage capacity for peak shaving and other purposes. GAZ SYSTEM S.A. joins nine other Natural Gas STAR International Partners in the effort to identify and implement cost-effective methane emission reduction projects in the oil and natural gas industry. For further information on the company, visit www.gaz-system.pl

In the News

Report Discusses Emissions and Control Technologies for Barnett Shale Production

In January, the Environmental Defense Fund released a report quantifying emissions from the Barnett Shale production area and summarizing emissions control measures.

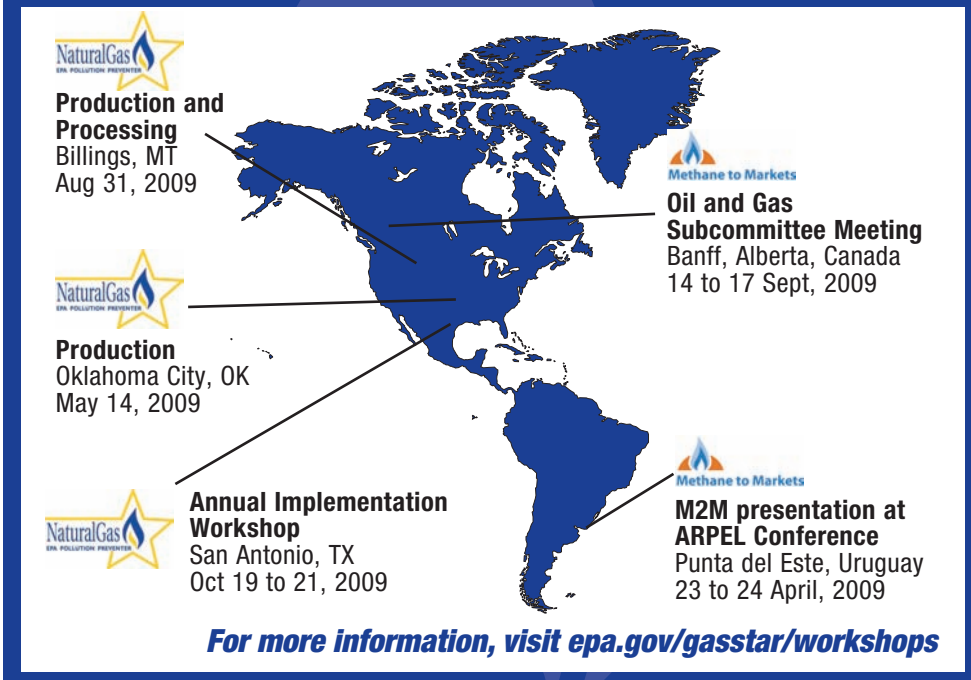
The report entitled, "Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements" quantifies both greenhouse gas emissions and criteria pollutants for 2007 and for 2009 in the 21-county Barnett Shale area.

The study constructed emissions estimates using data from the Texas Railroad Commission, Texas Commissions on Environmental Quality, EPA AP-42, the API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry, the 1996 EPA/GRI report Methane Emissions from the Natural Gas Industry, and Natural Gas STAR Program technical documents. The report discusses several Barnett Shale emissions reduction opportunities based on established types of reduction technologies. The report is available at edf.org/documents/9235_Barnett_Shale_Report.pdf.

Calendar

2009 Upcoming Events

Below are scheduled Natural Gas STAR Program events. For updates and further information, visit epa.gov/gasstar/workshops or contact Suzie Waltzer at Waltzer.Suzanne@epa.gov or (202) 343-9544. Additionally, are you a Natural Gas STAR endorser and have an event you would like listed here? Please notify Natural Gas STAR.



For more information, visit epa.gov/gasstar/workshops

Partner Profile

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result in a 60 percent emissions reduction by 2011 compared to 2007 levels. The reduction of emissions from natural gas flaring is particularly difficult in areas where there is an absence of adequate infrastructure, posing barriers to use of the natural gas produced from oil extraction. Eni promotes the continuous reduction of flaring and venting by means of developing natural gas pipelines and LNG terminals and using the associated natural gas for generating electricity to satisfy local demand. Over the next few years, Eni hopes to significantly reduce greenhouse gas emissions from flaring in several regions including the Congo, Nigeria, Libya, Tunisia and Algeria.

Moreover Eni promotes company knowledge management through a virtual *Community of Practice* on "Air Emissions" with the following main objectives: share experiences and collaborate in the development of new initiatives, support these activities with new tools and the application of best available technologies.

To view Eni's presentations from the Methane to Markets Oil and Gas Subcommittee Meeting in Rome, Italy, please visit: methanetomarkets.org/events/2008/oilgas/oilgas-20may08.htm

1 American Petroleum Institute (API), *The API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry*;

Intergovernmental Panel on Climate Change (IPCC). *Greenhouse Gas Inventory Reference Manual: IPCC Guidelines for National Greenhouse Gas Inventorie*

E&P Forum. *Methods for Estimating Atmospheric Emissions from E&P Operations*;

GRI, *GRI-GHGCalc™*;

US Environmental Protection Agency (EPA). *Compilation of Air Pollutant Emission Factors*;

US Environmental Protection Agency (EPA). *Protocol for Equipment Leak Emission Estimate – TANKS*;

Others similar protocol references

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