
Meeting of Canadian Flaring and Venting Regulators Forum
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Agenda

- EPA methane emissions reduction opportunities
  - Regulatory
    - U.S. GHG Reporting Program
    - U.S. Oil and Gas New Source Performance Standards
  - Voluntary
    - Global Methane Initiative
    - Example case studies
U.S. GHG Reporting Program

- 40 Code of Federal Regulations (CFR) Part 98 requires reporting of greenhouse gas (GHG) emissions and other relevant information from certain source categories in the United States
  - Better understand relative emissions of specific industries, and of individual facilities within those industries
  - Better understand factors that influence GHG emission rates and actions facilities could take to reduce emissions

- **Primary purpose:** to collect data to guide development of policies and programs to reduce emissions

- Does not require control of GHG emissions
U.S. GHG Reporting Program

* Approximate (first reports due Sep 2012)

- Stationary Combustion: 2871
- Petroleum and Natural Gas Systems: 2800
- Electricity Generation: 1260
- Municipal Landfills: 1200
- Fuel and Industrial GHG Suppliers: 888
- Industrial Wastewater Treatment: 358
- Fluorinated GHG Processes: 259
- Industrial Waste Landfills: 200
- Petroleum Refineries: 145
- Underground Coal Mines: 128
- Iron and Steel: 123
- Pulp and Paper: 110
- Glass: 108
- Other: 457

Other pollutants:
- Silicon Carbide: 63
- Adipic Acid: 70
- Soda Ash: 93
- HCFC-22: 96
- Zinc: 102
U.S. GHG Reporting Program

- Direct emitters of GHGs with emissions equal to or greater than 25,000 metric tons CO$_2$e/year

- Annual reporting of GHG by:
  - Direct emitting source categories
  - Suppliers of certain products that would result in GHG emissions if released, combusted or oxidized.

- Requires reporting by 41 industrial categories.

- Direct reporting to EPA electronically

- EPA verification of emissions data
U.S. GHG Reporting Program

- **Petroleum & Natural Gas Systems** (Subpart W)
  - Estimated to cover 2,800 U.S. facilities

  - Onshore petroleum and natural gas production
  - Offshore petroleum and natural gas production
  - Natural gas processing
  - Natural gas transmission compressor stations
  - Underground natural gas storage
  - Liquefied natural gas (LNG) storage
  - LNG import and export terminals, and
  - Natural gas distribution

  - Reporting for 2011 emissions are due in September 2012.
U.S. GHG Reporting Program

- Each facility must report:
  - CO₂ and CH₄ emissions from equipment leaks and vented emissions
  - CO₂, CH₄, and N₂O emissions from gas flares by following the requirements of Subpart W
  - CO₂, CH₄, and N₂O emissions from stationary and portable fuel combustion sources in the onshore production industry segment following the requirements in Subpart W
  - CO₂, CH₄, and N₂O emissions from stationary combustion sources in the natural gas distribution industry segment following the requirements in Subpart W
  - CO₂, CH₄, and N₂O emissions from all other applicable stationary combustion sources following the requirements of 40 CFR 98 Subpart C (General Stationary Fuel Combustion Sources)
U.S. GHG Reporting Program

- Onshore petroleum and natural gas production (18 source types):
  - Natural gas pneumatic device venting
  - Natural gas driven pneumatic pump venting
  - Acid gas removal vent
  - Dehydrator vent
  - Well venting for liquids unloading
  - Gas well venting during well completions and workovers with hydraulic fracturing
  - Gas well venting during well completions and workovers without hydraulic fracturing
  - Onshore production storage tanks
  - Well testing venting and flaring
  - Associated gas venting and flaring
  - Flare stacks
  - Centrifugal compressor venting
  - Reciprocating compressor rod packing venting
  - Other emissions from equipment leaks
  - Population Count and Emissions Factor
  - Enhanced Oil Recovery hydrocarbon liquids dissolved CO₂
  - Enhanced Oil Recovery injection pump blowdown
  - Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions
U.S. GHG Reporting Program

- Offshore petroleum and natural gas production (1 source type):
  - Vented, Equipment Leaks and Flare Emissions Identified in BOEMRE GOADS Study

- Onshore natural gas processing plants (7 source types):
  - Acid gas removal vent
  - Dehydrator vent
  - Blowdown vent stacks
  - Flare stacks
  - Centrifugal compressor venting
  - Reciprocating compressor rod packing venting
  - Other emissions from equipment leaks

- Onshore natural gas transmission compression (6 source types):
  - Natural gas pneumatic device venting
  - Blowdown vent stacks
  - Transmission storage tanks
  - Centrifugal compressor venting
  - Reciprocating compressor rod packing venting
  - Other emissions from equipment leaks
U.S. GHG Reporting Program

- Underground natural gas storage (5 source types):
  - Natural gas pneumatic device venting
  - Centrifugal compressor venting
  - Reciprocating compressor rod packing venting
  - Other emissions from equipment leaks
  - Population Count and Emissions Factor

- Liquefied natural gas (LNG) storage (4 source types):
  - Centrifugal compressor venting
  - Reciprocating compressor rod packing venting
  - Other emissions from equipment leaks
  - Population Count and Emissions Factor

- LNG import and export equipment (5 source types):
  - Blowdown vent stacks
  - Centrifugal compressor venting
  - Reciprocating compressor rod packing venting
  - Other emissions from equipment leaks
  - Population Count and Emissions Factor

- Natural gas distribution (3 source types):
  - Other emissions from equipment leaks
  - Population Count and Emissions Factor
  - Onshore Petroleum and Natural Gas Production and Natural Gas Distribution Combustion Emissions
U.S. Oil and Gas New Source Performance Standards

- EPA finalized **New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP)** for the oil and natural gas industry on April 17, 2012
- Standards would:
  - Reduce emissions of smog-forming volatile organic compounds (VOCs), and air toxics including the carcinogen benzene.
  - Significant environmental co-benefit by reducing methane emissions from new and modified wells
- Updated standards based on existing, cost-effective technology
  - Will institutionalize best practices already in place in some states and in use by several companies
- Technologies will allow US operators to save between US.$11 and $19 million per year even as they cut emissions of benzene and other air toxics, as well as volatile organic compounds – pollutants that form ground-level ozone (smog), which can cause asthma and adversely affect emphysema
U.S. Oil and Gas New Source Performance Standards

- Rules will also yield co-benefits by reducing methane from natural gas wells. Methane is a potent greenhouse gas – more than 20 times as potent as carbon dioxide.
- Includes the first federal air standards for hydraulically fractured wells (i.e., well completions)
- Rules also set requirements for several types of equipment that may vent or leak VOCs or air toxics
  - Storage tanks
  - Reciprocating compressors
  - Centrifugal compressors
  - Pneumatic controllers
  - Glycol dehydrators
  - Leaks from valves at gas processing plants
  - Sweetening units at gas processing plants
U.S. Oil and Gas New Source Performance Standards--Requirements

- **Well completions:**
  - Phased-in requirements for capturing natural gas; provides time for equipment to be manufactured and operators to be trained to capture gas through a process known as a “green completion”
  - Owners/operators of fractured and refractured wells may reduce pollution through flaring until Jan. 1, 2015; after that, gas capture is required
  - Wells that are refractured will not be considered affected facilities if they use green completions and meet recordkeeping/reporting requirements as of the effective date of the rule
  - Exploratory, delineation, and low-pressure wells are exempt from green completion requirements; will have to flare
  - Well completion notification and reporting requirements were streamlined to reduce burden to industry and states, while ensuring transparency and accountability
U.S. Oil and Gas New Source Performance Standards--Requirements

- **Storage tanks:**
  - Phased-in requirements to reduce VOC emissions from new & modified tanks over one year, to ensure enough combustion devices are available to reduce the emissions
  - Requirement applies to both oil and natural gas production
  - Did not change air toxics standards for storage tanks; however, emissions storage tanks in natural gas production sector will be counted toward determining a major source under the air toxics standards for oil & natural gas production

- **Reciprocating compressors:**
  - Rule requires replacement of rod packing, which can leak VOCs as it wears
  - Rule provides an alternative schedule for rod packing replacement that does not require monitoring and documentation of operating hours

- **Centrifugal compressors:**
  - VOC reduction required for compressors with wet seal systems only; requirements do not apply in the natural gas transmission and storage segments, where VOC emissions generally are low
U.S. Oil and Gas New Source Performance Standards--Requirements

- **Pneumatic controllers:**
  - Used to regulate conditions such as pressure and temperature
  - Rule affects high-bleed controllers, allows use only for critical applications, such as emergency shutoff valves
  - Requirements apply to controllers used in both oil and gas sectors (in natural gas sector, applies only to sources upstream of the transmission line)

- **Glycol dehydrators:**
  - Covered under two air toxics standards (oil and natural gas production; natural gas processing plants)
  - Both standards retain existing standards for large dehydrators at major sources, set new standards for small dehydrators (not “area sources”)

- **Leaks from valves at gas processing plants:**
  - Strengthened requirements for detection and repair for VOCs and air toxics

- **Sweetening units at gas processing plants:**
  - Must reduce sulfur dioxide emissions by 99 percent
Key Changes Since Proposal

- Based on comments received during the public comment period, the final rule:
  - Includes an updated definition for a “reduced emissions completion”
  - Eliminates state permitting “trigger” when wells are refractured if operators choose to use green completions (instead of flaring)
  - Does not finalize requirements for compressors and pneumatic controllers in the transmission segment of this industry
The Global Methane Initiative (GMI)

- The Global Methane Initiative is an international effort that advances cost-effective, near-term methane recovery and use as a clean energy source in five sectors:

- The goals of the Partnership are to reduce global methane emissions to:
  - Enhance economic growth
  - Strengthen energy security
  - Improve air quality and industrial safety
  - Reduce emissions of greenhouse gases
GMI Global Participation

- **Membership:**
  - 41 Partner governments
  - 1200+ public and private organizations

- **Impact:** Since 2004, GMI has facilitated project development at more than 600 sites around the globe and reduced 151 million tCO$_2$e of methane (Saved over U.S.$1.1 Billion)
GMI and the Natural Gas STAR International Program

- Started in U.S. in 1993, expanded internationally in 2006
- Over 120 domestic and 14 international partners have
  - Identified over 50 cost effective technologies and practices to reduce methane emissions
  - Reduced methane emissions 27.8 billion m³
Global Methane Initiative Resources

- Resources to advance cost-effective oil & gas sector methane emission reductions
- General technology transfer, training, and capacity building:
  - Technical documents and research outlining over 80 mitigation options, including analyses of economic, environmental and operational benefits
  - Meetings
  - Study tours
Global Methane Initiative Resources, cont.

- Individual technical assistance to help companies identify and assess cost-effective methane emission reduction opportunities
  - Analysis of estimated methane emission sources and corresponding project opportunities
  - Pre-feasibility and feasibility studies
  - Leak detection and measurement studies
- The following case studies provide examples of ways GMI has collaborated with international oil and gas companies to advance cost-effective methane emission reductions
Case Study 1: Gazprom Replace Centrifugal Compressor Wet Seals with Dry Seals

Gazprom recognized the clear benefits of compressor dry gas seals. Throughout 2006-2008, Gazprom completed dry seal upgrades of 60 compressors and plan to continue these upgrades system wide.

- Other benefits of compressor dry seals include:
  - Elimination of combustible gas contamination by seal oil, which had resulted in pipeline discharge capacity reduction of 1-2%.
  - Decrease in compressor’s capacity losses by reducing friction in seals. Friction in wet seals causes substantial reductions in capacity of the compressor (10 times and more).
  - Increase in compressor seal operational life. Results in lower maintenance costs, higher overall reliability and less compressor downtime.
  - Improved energy efficiency. Wet systems require 50 to 100 kiloWatt/hour, while dry seal systems need about 5 kiloWatt of power per hour.
Case Study 2: ONGC Technology Transfer

- GMI and ONGC conducted a series of successful technology transfer meetings at four sites to promote methane mitigation opportunities (December 2007)

- Based on the success of the meetings:
  - Conducted desktop prefeasibility analyses to estimate emissions sources at seven sites
  - GMI and ONGC conducted four onsite measurement studies to assess key methane emission sources and potential mitigation measures (May 2008)
  - Presented measurement study results and recommendations to ONGC Board of Directors (September 2008)
Contact and Further Information

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Oil and Gas Greenhouse Gas Reporting Rule:
epa.gov/airquality/oilandgas

New Source Performance Standards:
epa.gov/airquality/oilandgas

Global Methane Initiative:
globalmethane.org

Recommended Technologies:
epa.gov/gasstar/tools/recommended.html