Production Technology Experience in the U.S.: Priorities

Seminar with Russian Independent Oil and Gas Producers on Methane Mitigation Technologies and Strategies
October 4, 2010, Moscow, Russia

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Agenda

- Top 5 Production Sector Fugitive and Vented Methane Emission Sources
- Contact Information and Further Information
2008 Oil and Gas Industry Methane Emissions (310 Bcf)

Bcf = billion cubic feet

- **Oil Downstream**, 2 Bcf, 1%
- **Processing**, 34 Bcf, 11%
- **Distribution**, 74 Bcf, 24%
- **Transmission and Storage**, 97 Bcf, 31%
- **Oil and Gas Production**, 103 Bcf, 33%

2008 Production Sector Methane Emissions (103 Bcf)

- Offshore Operations: 23 Bcf
- Pneumatic Devices: 37 Bcf
- Storage Tank Venting: 4 Bcf
- Other Sources: 6 Bcf
- Well Venting and Flaring: 6 Bcf
- Meters and Pipeline Leaks: 6 Bcf
- Compressor Fugitives, Venting, and Engine Exhaust: 10 Bcf
- Dehydrators and Pumps: 11 Bcf

Bcf = billion cubic feet

Why Do Companies Lose This Gas?

- Vented emissions are not readily visible or identifiable without specialized equipment yet they represent significant natural gas losses, reduced operational efficiency, greenhouse gas emissions, and potential safety risks.
Top Five Production Sector Fugitive and Vented Emission Sources

- **Tank Venting**
  - Install vapor recovery units and micro turbine generators

- **Pneumatic Instrument Venting**
  - Replace high bleed with low bleed or instrument air

- **Compressor Methane Losses**
  - Replace centrifugal compressor wet seals with dry seals
  - Route seal oil degassing vent and blowdown gas vent to fuel line
  - Economic rod packing replacement in reciprocating compressors

- **Gas Well Venting**
  - Reduced emissions completions for gas wells
  - Smart automation plunger lifts for liquids unloading

- **Fugitive Emissions**
  - Leak detection, quantification, and repair program with infrared technology
Tank Venting

- Problem: Gas is vented from low-pressure crude oil and gas condensate storage vessels due to flashing, working, and standing losses

- Best Management Practices (BMPs): Vapor recovery towers (VRT) and units (VRU) capture tank vapors using compressors

Source: Anadarko, VRT
Source: Hy-Bon Engineering, VRU
Pneumatic Instrument Venting

- Problem: Process controllers, chemical pumps, and glycol pumps often vent pressurized natural gas used for pneumatic actuation.

BMPs:
- Retrofit high-bleed devices to low-bleed
- Replace natural gas with compressed air
- Use electric or solar powered pumps

Source: Anadarko, Solar chemical pump
Compressor Methane Losses

- Problem: Compressor seals are designed to leak gas, shutdown depressuring vent large volumes of gas

- BMPs:
  - Economic replacement of rod packing
  - Replace wet seals with dry seals
  - Route blowdown vent to the fuel line

Source: CECO, Rod packing

Source: EPA, Dry seal schematic
Gas Well Venting

- Problem: Well completion and liquids unloading vent large volumes of gas

- BMPs:
  - Recover completion gas with portable separation and treatment equipment
  - Smart automation plunger lift reduces operational venting

Source: Weatherford, Plunger lift diagram
Source: Williams, Completion skid
Fugitive Emissions

- Problem: Natural gas is odorless and colorless so leaks from valves, connectors, and open ended lines go unnoticed.

- BMPs:
  - Regular leak inspection, quantification, and repair surveys using leak detection and measurement technologies.
  - Infrared remote leak detection technologies.

Source: Leak Surveys, Hand-held camera.
Source: ANGEL, Aerial image.
Contact Information and Further Information

- More detail is available on these practices and over 80 others online at: epa.gov/gasstar/tools/recommended.html
- For further assistance, direct questions to:

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