



Methane to Markets



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

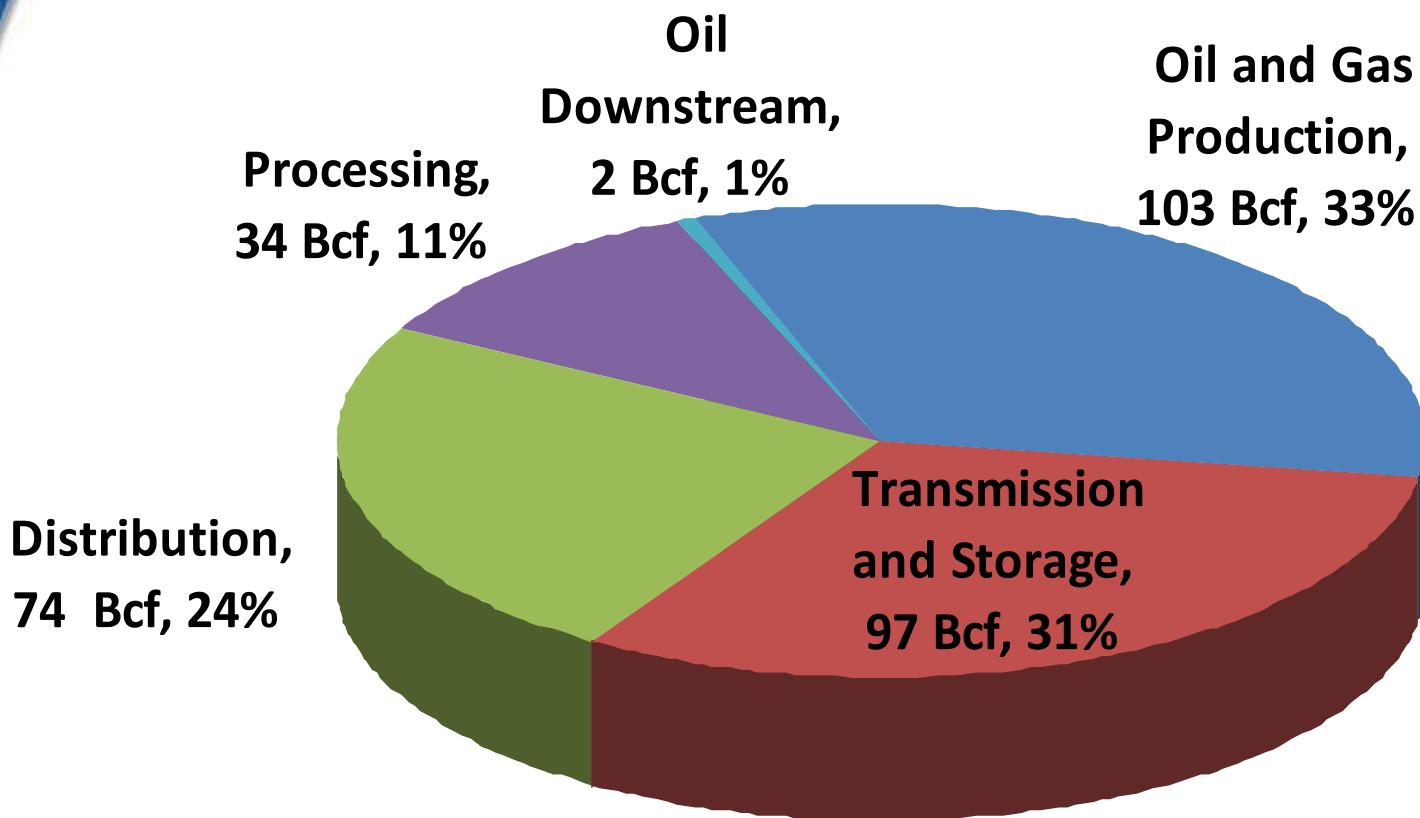
Don Robinson, Vice President
ICF International

Agenda

- Top 5 Production Sector Fugitive and Vented Methane Emission Sources
- Contact Information and Further Information

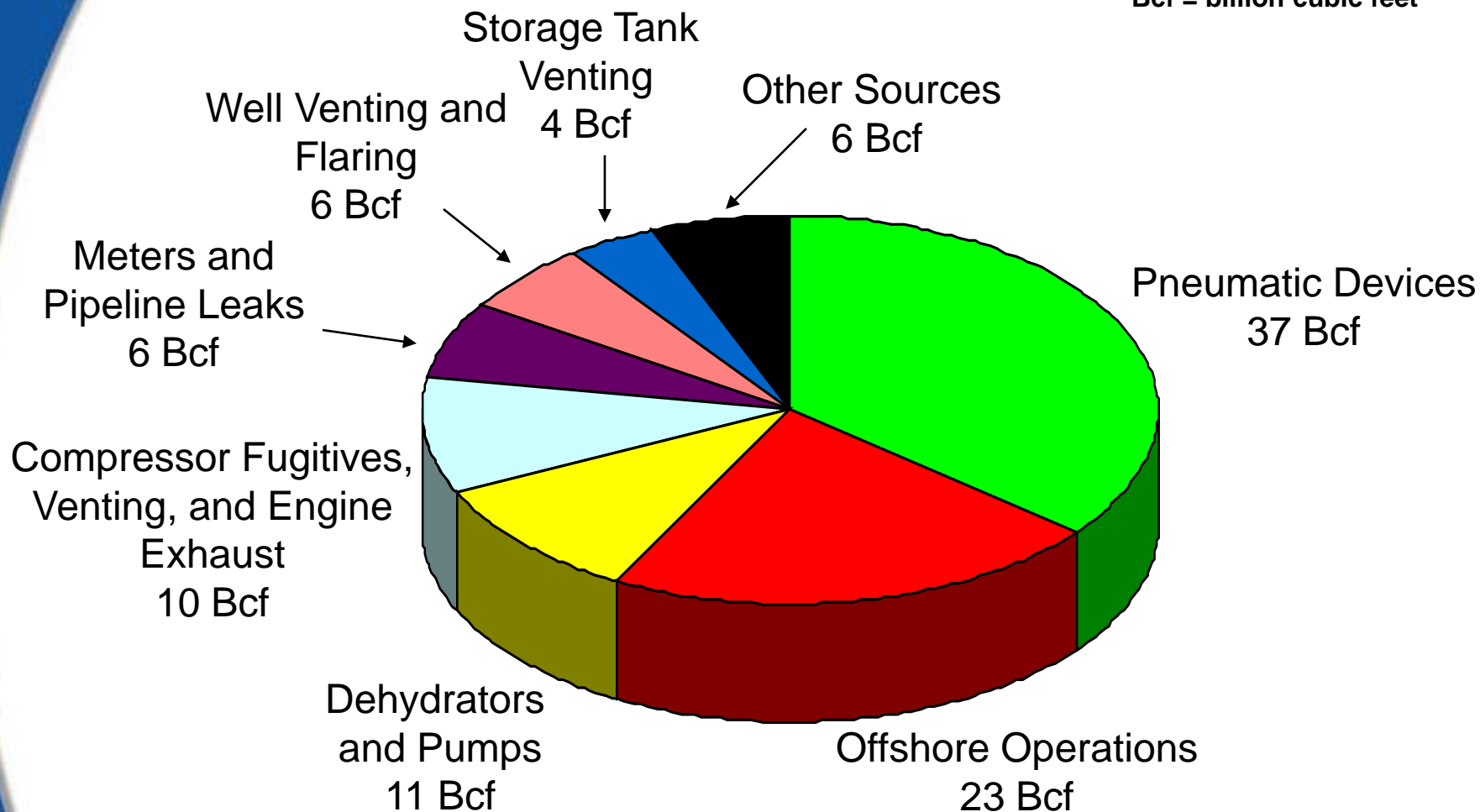
2008 Oil and Gas Industry Methane Emissions (310 Bcf)

Bcf = billion cubic feet



2008 Production Sector Methane Emissions (103 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



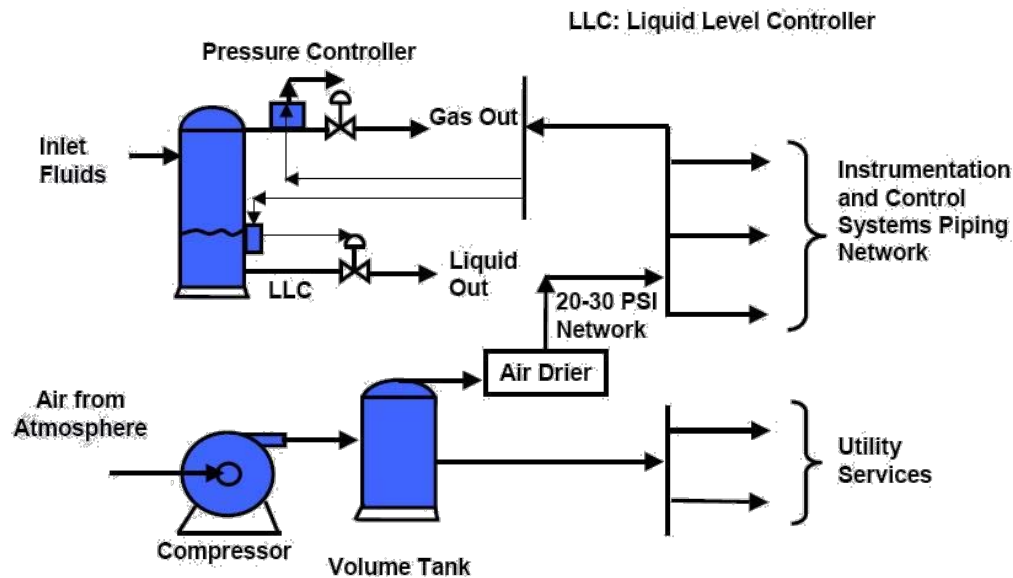
Source: Anadarko, VRT



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



Source: EPA, Instrument air schematic

BMPs:

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



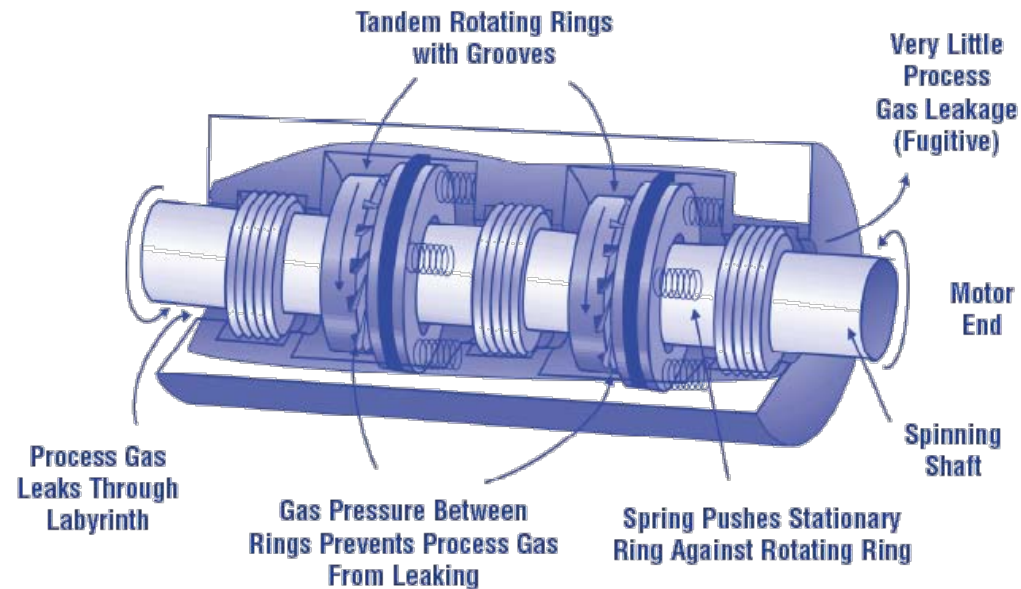
Source: Anadarko, Solar chemical pump

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



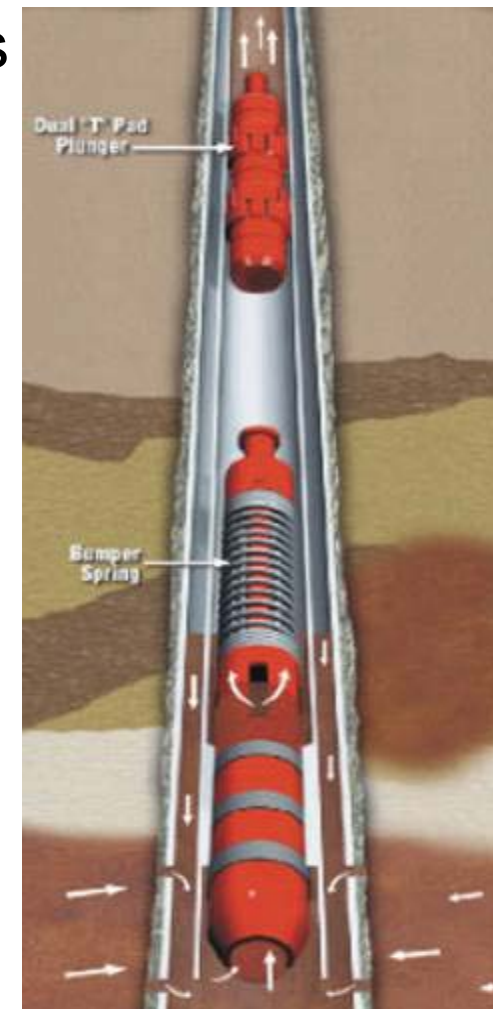
Source: EPA, Dry seal schematic

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: Williams, Completion skid



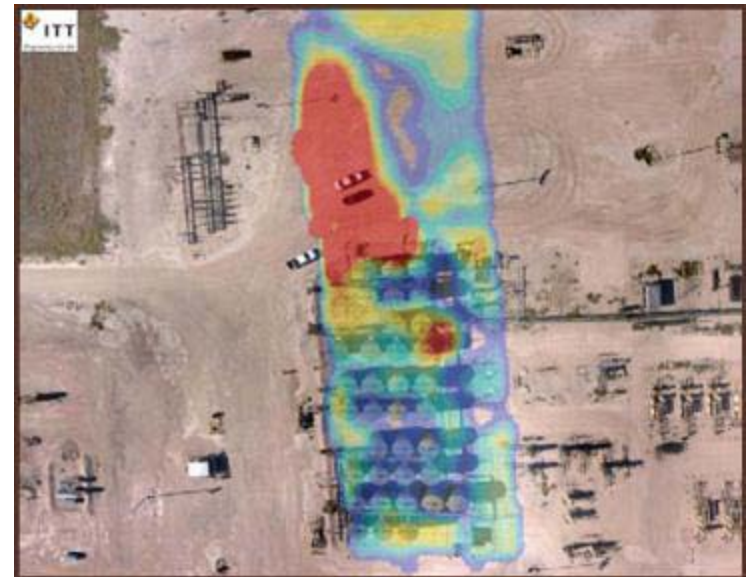
Source: Weatherford, Plunger lift diagram

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:

Suzie Waltzer
EPA Natural Gas STAR Program
waltzer.suzanne@epa.gov
(202) 343-9544

Don Robinson
ICF International
drobinson@icfi.com
(703) 218-2512

