EPA's Natural Gas STAR Program Overview

Distribution Technology Transfer Workshop

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Orlando, Florida

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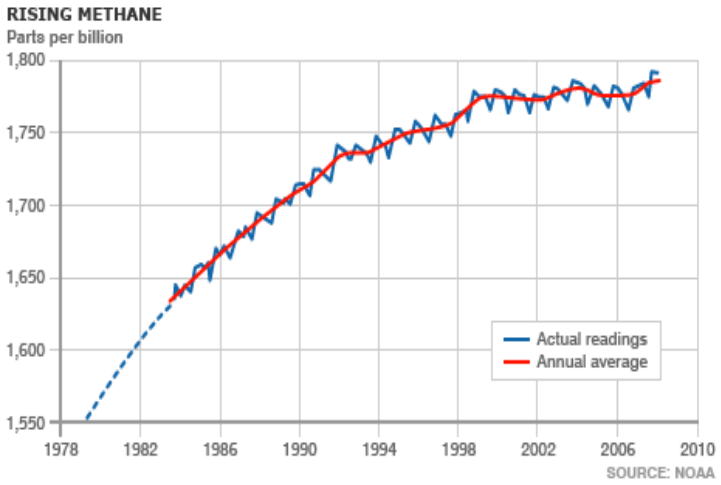
Natural Gas STAR Program

Why Methane?

- Potent greenhouse gas
  - 100 year GWP = 21
  - Lifetime = 12 years
  - Most important short-lived forcer—based on emissions, accounts for >1/3 of current anthropogenic forcing
- Ozone precursor
  - Effects ground-level ozone levels
- Clean energy source – primary component of natural gas
- Many emission sources
  - Oil & gas, agriculture & waste sectors
  - 50 - 70% of which are anthropogenic
- Concentration of methane in the atmosphere has increased by 150% in the last 260 years



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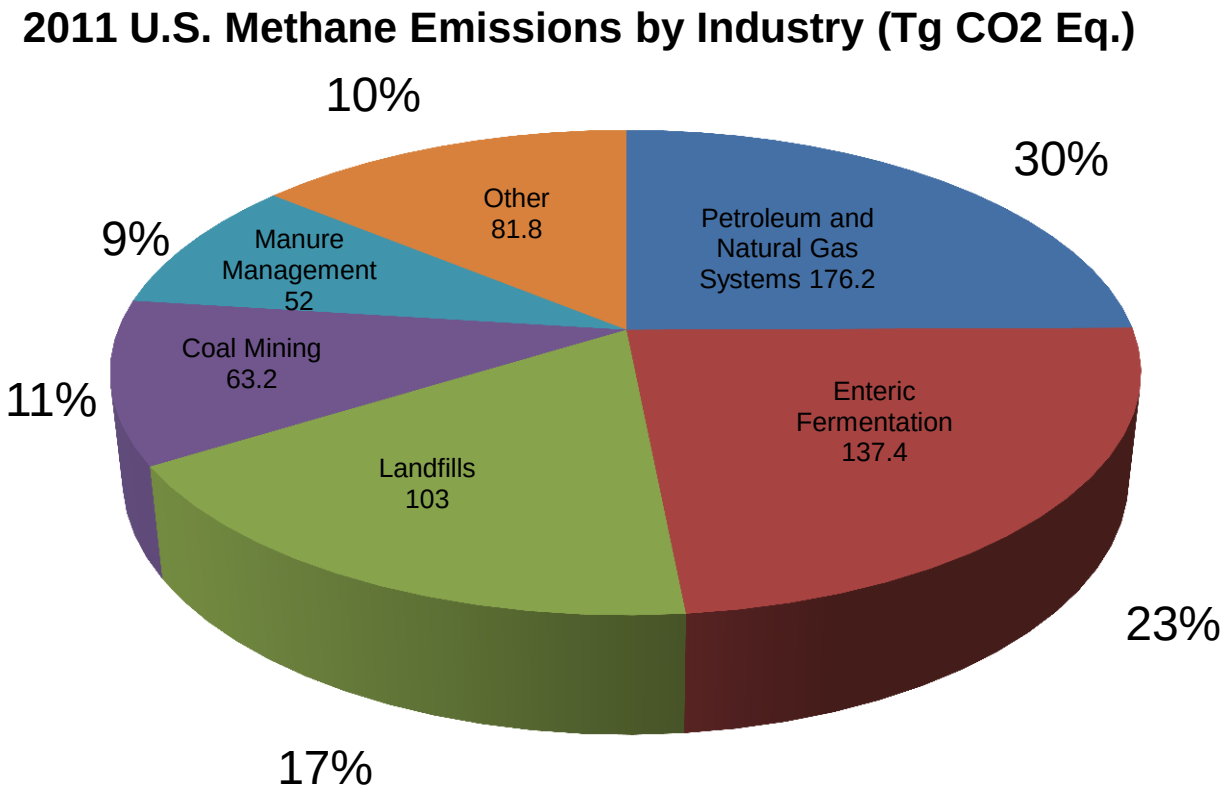
2011 U.S. Human-Made Methane Emissions



Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 (April 2013)

Sources of Methane Emissions from Oil and Gas Operations

Oil Production

59%

Venting of casinghead gas

Flash emissions from crude oil storage tanks

Natural Gas Production & Processing

Well completions, blowdowns and workovers

Reciprocating compressor rod packing

Venting from glycol reboilers on dehydrators

Processing plant leaks

Gas-driven pneumatic devices

Gas Transmission

25%

Venting of gas for maintenance or repair of pipelines or compressors

Leaks from pipelines, compressor stations

Centrifugal compressor seal oil de-gassing

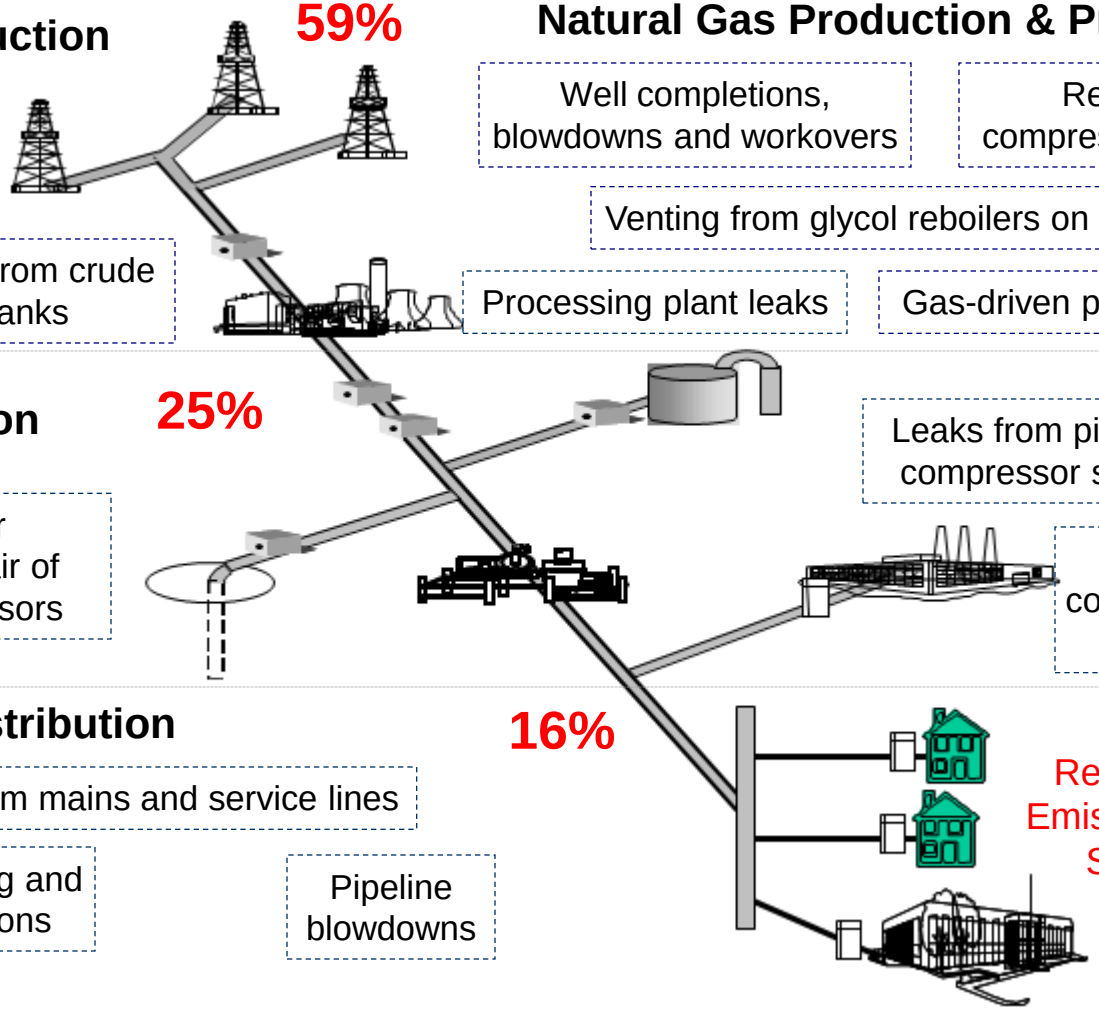
Gas Distribution

16%

Leaks from mains and service lines

Leaks at metering and regulating stations

Pipeline blowdowns



Red Numbers are Emissions from Each Sector in U.S.

Picture courtesy of American Gas Association

Values Source: 2013 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011

Methane Projects Deliver Significant Co-Benefits

- New Sources of Clean Energy
  - Emission capture makes methane available for local energy generation
- Air Quality Improvement
  - Decrease in ground-level ozone
  - Reduction of local emissions of VOCs and HAPs
- Industrial Safety
  - Methane is explosive - improved worker safety

Natural Gas STAR Program

- Started in U.S. in 1993 to increase awareness of methane emission sources and share innovative means of reducing them
  - Expanded internationally in 2006 as part of GMI
- Over 120 domestic and 17 international partners have
  - Identified over 50 cost-effective technologies and practices to reduce methane emissions
  - Reduced methane emissions by nearly 1 trillion cubic feet (Tcf), saving over U.S. $3 billion

Natural Gas STAR 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 50 mitigation options, including analyses of economic, environmental and operational benefits
    - **Workshops** and **Conferences**
  - **Individual assistance** to help companies identify and assess project opportunities
    - Estimated methane **emission inventories**
    - **Measurement studies**
    - **Mitigation project feasibility studies**
- Services and resources provided free of charge and at no obligation

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Over 50 Cost Effective Methane Reduction Opportunities

Pneumatics/Controls

Document Title	Capital Costs	Production	Gathering and Processing	Transmission	Distribution
Estimated Payback: 0-1 year					
Convert Gas Pneumatic Controls to Instrument Air Lessons Learned (PDF) (12 pp, 314K)	> $50,000	X	X	X	X
Estimated Payback: 1-3 years					
Options for Reducing Methane Emissions From Pneumatic Devices in the Natural Gas Industry Lessons Learned (PDF) (12 pp, 201K) Presentation (PDF) (20 pp, 384K) November 2011	< $1,000	X	X	X	X
Convert Pneumatics to Mechanical Controls PRO Fact Sheet #301 (PDF) (3 pp, 204K)					
Convert Natural Gas-Driven Chemical Pumps PRO Fact Sheet #202 (PDF) (3 pp, 130K)					
Replacing Gas-Assisted Glycol Pumps with Electric Pumps Lessons Learned (PDF) (17 pp., 197K)					

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Tanks

Document Title
Convert Water Tank Blanket from Natural Gas to Produced CO... Gas

Screenshot from EPA Gas STAR website

- Low implementation costs
  - 50% cost <$5,000 to implement
  - 25% <$1,000 to implement
- Quick payback times ($3/Mcf)
  - 50% pay back in <1 year
  - 67% pay back in <2 years
- Low cost per Mcf or tCO2e reduced
  - 70% cost <$3 per Mcf reduced
  - 70% cost <$10 per tCO2e reduced

Strategy for Addressing Methane Emissions

Develop Emissions BASELINE

- Develop source- and process-specific methane inventory
- Use emission factors, engineering calculations, software tools, direct measurement

Evaluate Best REDUCTION OPPORTUNITIES

- Prioritize largest sources and most cost-effective reduction projects
- Conduct measurement studies and detailed analyses to confirm volumes and scope reduction projects

IMPLEMENT Reduction PROJECTS

- Implement top reduction projects
- Pilot projects or company-wide
- Document and share lessons learned

Document and SHARE SUCCESSES

- Quantify operational, economic, and environmental results
- Publicize results to stakeholders

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Case Study

- Laclede Gas established a Damage Prevention Department in 2000 to address third party "dig-in" incidents
  - Averaged four dig-in incidents per workday
  - Dig-ins require repairs and result in methane venting to the atmosphere
- Laclede was able to communicate with and educate third parties on:
  - Risk of excavating in and around underground facilities
  - Safe work practices to minimize risk
- Results:
  - 33% reduction in dig-in damages since 2003 through 2008
  - 65,000 Mcf of emission reductions in 2007

Case Study

- Xcel Energy implemented Accelerated Main Renewal Program (AMRP) in Colorado territory
  - Proactive program to renew aging main in Xcel Energy's Colorado territory
  - Focusing on distribution main below 150 psi
    - Bare steel – 110 Mcf/Mile/Yr
    - Cast Iron – 239 Mcf/Mile/Yr
    - PVC – 12 Mcf/Mile/Yr
  - Xcel Energy approached the Colorado Public Utilities Commission (CPUC) about project
    - Xcel has committed to renewal of all cast iron, bare steel, and PVC main
    - Xcel has committed to renew all of the cast iron in Colorado by 2015

Contact and Further Information

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Natural Gas STAR Program:
epa.gov/gasstar/index.html

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

SAVE THE DATE!

Natural Gas STAR

Annual Implementation Workshop

October 28-30, 2013

Grand Hyatt San Antonio

San Antonio, TX