



## **Petroleum and Natural Gas Fugitive and Vented GHG Emissions Reporting Proposed Rulemaking (Subpart W)**

Gas STAR Production Technology Transfer Workshop  
May 11, 2010  
Farmington, NM

### **Background: Emissions from Petroleum and Natural Gas Operations**



- Majority of oil and gas fugitive and vented emissions are methane ( $\text{CH}_4$ ) emissions that come from:
  - Natural gas production, processing, transmission, and distribution
  - Oil production
- $\text{CH}_4$  emissions can be intentional (process venting) or unintentional (fugitive leaks, system malfunctions)
- Carbon dioxide ( $\text{CO}_2$ ) emissions by the oil and gas industry are primarily combustion related for compressor and equipment operation; fugitive and vented  $\text{CO}_2$  is a relatively small source (e.g., acid gas removal during processing)
- EPA knowledge of industry through Natural Gas STAR Program experience (since 1993)



## Background: Petroleum and Natural Gas Industry Emissions



### Oil and Gas Systems are 5<sup>th</sup> largest source in MRR

Rank	Subpart Code	Name of Sector	Covered Emissions (mil. tonnes of CO <sub>2</sub> e/yr)
1	MM	Suppliers of Petroleum Products	2,841
2	D	Electricity Generation	2,262
3	NN	Suppliers of Natural Gas and Natural Gas Liquids	783
4	OO	Suppliers of Industrial GHGs	643
5	W	Petroleum and Natural Gas Systems	272
6	C	General Stationary Fuel Combustion	220

\*Oil and Natural Gas Systems emissions total includes fugitive and vented emissions from new sectors, onshore production and distribution, which were not in the initial proposal.

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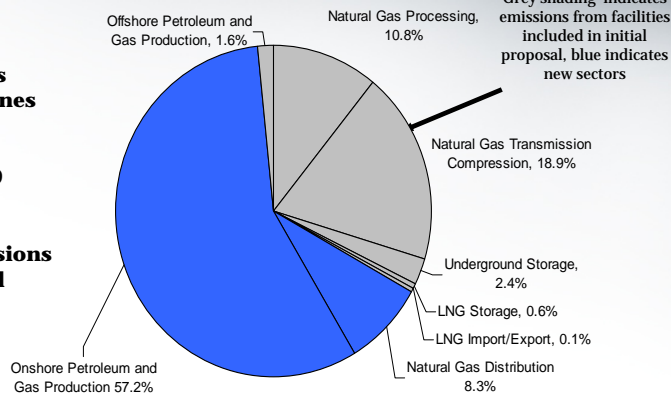
## Emissions Covered by Petroleum and Natural Gas Reporting Rule



### Breakdown of Oil and Gas Process (Fugitive and Vented) GHG Emissions by Sector

• **Total oil and gas process emissions ~ 272 million tonnes CO<sub>2</sub>e/year**

• **An estimated ~ 79 million tonnes additional CO<sub>2</sub> combustion emissions covered (reported under Subpart C)**



• **Proposal covers 88.6% of total oil and gas industry emissions (process plus incremental combustion emissions)**

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## Background: Initial Oil and Gas Systems Proposal



- **Proposed oil and gas reporting included in proposed Mandatory Reporting Rule (MRR), published in the FR 4/10/09**
- **Required reporting fugitive and vented CO<sub>2</sub> and CH<sub>4</sub> emissions for 24 individual sources (e.g. compressor seals, pneumatic devices, storage tanks) from the following facilities:**
  - Offshore petroleum and natural gas production facilities
  - Onshore natural gas processing facilities, including gathering/boosting stations
  - Onshore natural gas transmission compression facilities
  - Underground natural gas storage facilities
  - Liquefied natural gas (LNG) storage facilities
  - LNG import and export facilities.
- **Did not include onshore oil and gas production (the largest methane emissions source) and natural gas distribution (fourth largest):**
  - More time was needed to address complexity in defining a facility and diffuse, complex sources
  - Specifically sought comments on options for including these sectors
- **Data collection methodologies required comprehensive use of direct measurement including:**
  - Equipment-based leak detection and measurement of all fugitive emissions at all facilities
  - Engineering estimates in combination with direct measurement for vented emissions.

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## Objectives of Re-Proposal



- Respond and address comments on sources covered under the initial proposal
- Revise data collection methodologies to increase data quality and reduce burden
- Include the production and distribution sectors as they contribute a significant portion of emissions
- Focus efforts on most significant sources within each category

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## Key Provisions of New Proposed Petroleum and Natural Gas Reporting Rule



- Reporters and facility definition:
  - Onshore petroleum and gas production (including EOR CO2 surface emissions), basin level reporting
  - Offshore petroleum and gas production platforms
  - Natural gas processing plants
  - Natural gas transmission compression facilities
  - Underground natural gas storage facilities
  - Liquefied natural gas (LNG) storage facilities
  - LNG import and export facilities
  - Natural gas distribution facilities, owned or operated by Local Distribution companies (LDCs)

\*Blue notes new facilities, not included in initial oil and gas systems proposal

- Proposing a 25,000 metric ton threshold for all facilities
- Data collection methods revised from initial proposal to collect robust data while better managing burden
- Data collection to begin in 2011; reports due to EPA March 2012

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## Summary of Revised Data Collection Approach— Emissions Coverage



New Calculation Methodology	Sources Covered	Emissions Coverage
<b>Engineering Estimate</b> Monitored process operating parameters and either simulation models or emission factors	<b>Major Vented Sources</b> Pneumatic device and pump vents, well venting for liquids unloading and completions and workovers, storage tanks, dehydrators	64%
<b>Direct Measurement</b> Meters depending on source e.g., flowmeter for once per year measurement	<b>Major Vented Sources</b> Compressor wet seal and rod packing vents, transmission condensate tanks, install meter for well venting optional	6%
<b>Leak Detection and “Leaking” Factor</b> Leak detection and apply a leaking factor to estimate actual emissions	<b>Compressor and Significant Non-Compressor Fugitives</b> Compressor fugitives and non-compressor plant/station fugitives	23%
<b>Equipment Count and Population Factor</b> GRI emission factors to estimate potential emissions; GOADS for Offshore	<b>Minor Fugitive Sources &amp; Offshore</b> Production surface equipment fugitives, LDC mains, service lines, vaults, and other inaccessible sources	7%

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## Petroleum and Natural Gas Systems Reporting Rule: Summary of Coverage and Reporters



- Total process (vented and fugitive) GHG emissions coverage is 272 million tonnes CO<sub>2</sub>e/year (88.6% of total oil and gas process emissions)
- Leads to an additional 79 million tonnes combustion emissions (will be reported under General Stationary Fuel Combustion, subpart C)
  - Once petroleum and natural gas subpart is final, the MRR will cover over 85% of total oil and gas industry emissions (CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O fugitive/vented and combustion emissions)
- Total number of facilities reporting is approximately 3,037 facilities
  - 1,832 of those facilities are estimated to be new reporters, 1,205 are already reporting under another subpart of the Final MRR

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## Oil and Gas Systems Reporting Rule: Summary of Costs



- Total cost burden for reporting process emissions is **\$56 million in the first year, \$21.4 in subsequent years**
  - \$3.9 million first and subsequent year costs for reporting additional combustion emissions
- Despite inclusion of two new sectors (187 million metric tonsCO<sub>2</sub>e of emissions), revised proposal reporting burden (cost per metric ton) **decreased by 45% (\$0.38 to \$0.21) for first year costs and by 75% (\$0.33 to \$0.08) for subsequent years**

Source Covered	Process Emissions (million metric tons CO <sub>2</sub> e/year)	Total Cost (millions)	Average Cost Effectiveness (\$ Per metric ton CO <sub>2</sub> e)
<b>Initial Proposal</b>	85	\$32.5 (Year 1) \$28.1 (Subsequent)	\$0.38 (Year 1) \$0.33 (Subsequent)
<b>*Revised Proposal</b>	272	\$56 (Year 1) \$21.4 (Subsequent)	\$0.21 (Year 1) \$0.08 (Subsequent)

\*Revised proposal includes initial proposed facilities and new sectors, onshore oil and gas production and gas distribution. Year one costs are higher due to the initial cost to install monitoring equipment for compressors and other sources. Subsequent costs are year 2, 3, 4 average.

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## Questions / Comments



- Welcome to meet with EPA
- Must submit comments to docket in order for them to be considered
- For more information, please go to:  
**[epa.gov/climatechange](http://epa.gov/climatechange)**

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