

Distribution Sector

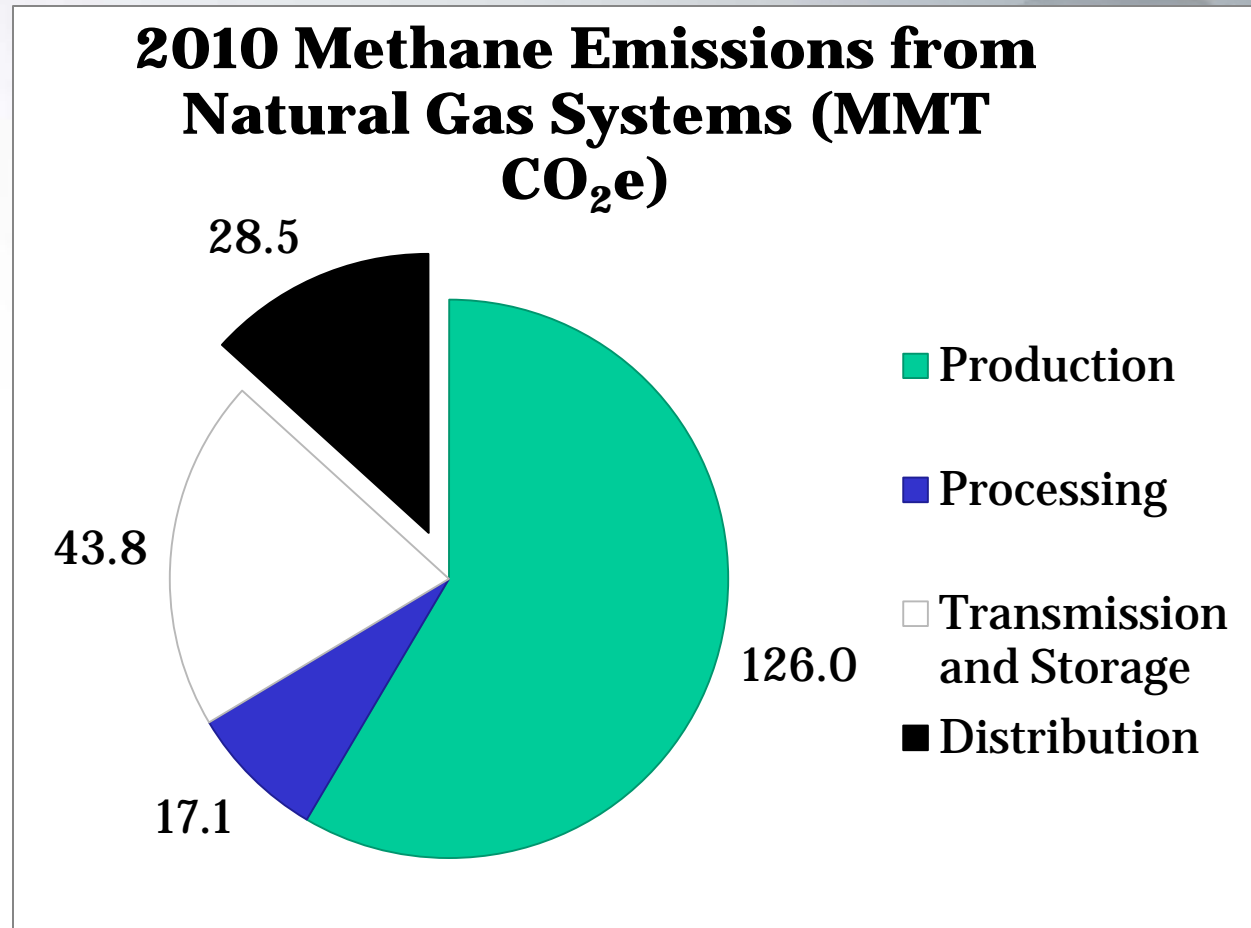
September 14, 2012



Distribution Sector



- 28.5 MMT CO₂e
- 13.2% of total natural gas systems emissions



Background



Distribution Sector – Sources in the distribution system, including fugitives (e.g., pipelines, meter/regulator [city gates], customer meters, etc.) and vented emissions (i.e., routine maintenance and upsets).

2012 Inventory Distribution Sector Emissions (MMT CO_2e)

	1990	1995	2000	2005	2010
Calculated Potential	33.4	32.8	32.0	30.0	29.6
Voluntary Reductions	+	-(0.4)	-(0.6)	-(0.7)	-(1.1)
Regulatory Reductions	N/A	N/A	N/A	NA	N/A
Net Emissions	33.4	32.4	31.4	29.3	28.5

+ = Does not exceed 0.05 MMT CO_2e

Distribution Emission Sources

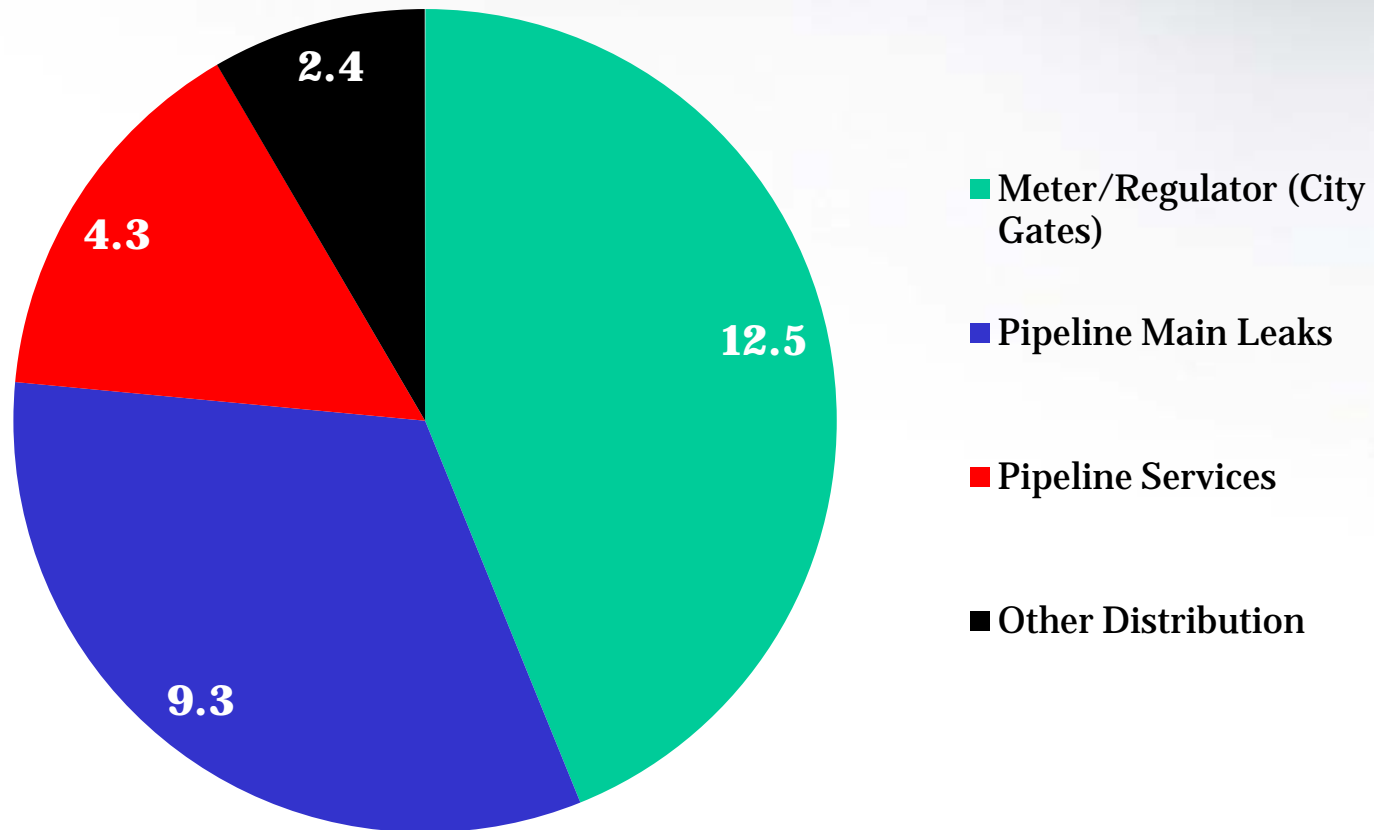


- 3 sources represent over 90% of distribution emissions
 - **Meter/regulator-city gates**
 - **Pipeline leaks**
 - **Pipeline services**
- Other sources
 - Customer meters (residential)
 - Customer meters (commercial/industrial)
 - Routine maintenance (pressure relief valve releases, pipe blowdown)
 - Mishaps (digging)

Distribution Emission Sources



2010 Methane Emissions (2012 Inventory), MMT CO₂e



Methodology overview



Step 1. Calculate Potential Methane

- 1a – Activity Data
- 1b – Emission Factor

Step 2. Compile Reductions Data

- 2a – Voluntary Reductions Reported to GasStar
- 2b – Regulatory Reductions

Step 3. Calculate Net Emissions

Meter/Regulation-City Gates



Step 1. Calculate Potential Methane

- Activity Data is number of stations of each type for given year (EPA/GRI (1996)) – scaled linearly from 1992 to 2010 with residential gas consumption

$$AD_{2010} = \text{Stations}_{1992} \times (\text{ResGasCons}_{2010} / \text{ResGasCons}_{1992})$$

- Emission factors from the EPA/GRI study (1996) {previous slide}

Step 2. Compile Reductions Data

– N/A

Step 3. Calculate Net Emissions

2010 Emissions (2012 Inventory), MMT CO₂e

Activity data (stations)	Emissions Factor (scfh/station)	Emissions (MMT CO ₂ e)
148,026	× (Ranges from 0.09 to 179.8)	= 12.5

Meter/Regulation-City Gates



- Source comprises several components

Component	Emission Factors (scfh/station)
M&R >300	179.8
M&R 100-300	95.6
M&R <100	4.31
Reg >300	161.9
R-Vault >300	1.3
Reg 100-300	40.5
R-Vault 100-300	0.18
Reg 40-100	1.04
R-Vault 40-100	0.0865
Reg <40	0.133

- Emissions estimated for each type and then summed

Pipeline Leaks (Mains)



Step 1. Calculate Potential Methane

- Activity data is number of pipeline miles of each type of material (cast iron, unprotected steel, protected steel, plastic) for given year (PHMSA)
- Emission factor is Mscf/mile for each main type, EPA/GRI (1996)

Step 2. Compile Reductions Data

– N/A

Step 3. Calculate Net Emissions

2010 Emissions (2012 Inventory), MMTCO₂e

Activity data (mains pipeline miles)	Emissions Factor (Mscf/mile)	Emissions (MMT CO ₂ e)
1,202,191	× (Ranges from 3.1 to 238.7)	= 9.3

Emission Factors Pipeline Mains



Mains - Cast Iron	Mscf/mile-yr	238.70
Mains - Unprotected steel	Mscf/mile-yr	110.19
Mains - Protected steel	Mscf/mile-yr	3.07
Mains - Plastic	Mscf/mile-yr	9.91

Pipeline Services



Step 1. Calculate Potential Methane

- Activity Data is number of pipeline services for each type of material (unprotected steel, protected steel, plastic, copper) for given year (PHMSA)
- Emission factors is Mscf/service for each pipeline type, EPA/GRI (1996)

Step 2. Compile Reductions Data

– N/A

Step 3. Calculate Net Emissions

2010 Emissions (2012 Inventory), MMT CO₂e

Activity data (pipeline services)	Emissions Factor (Mscf/service)	Emissions (MMT CO ₂ e)
63,113,859	× (Ranges from 0.01 to 1.7)	= 4.3

Emission Factors Pipeline Services



Services - Unprotected steel	Mscf/service	1.70
Services Protected steel	Mscf/service	0.18
Services - Plastic	Mscf/service	0.01
Services - Copper	Mscf/service	0.25

Calculating Net Emissions Distribution



- Voluntary reduction activities include:
 - Directed inspection and maintenance (DI&M) at surface facilities
 - Identify and rehabilitate leaky distribution pipe
 - DI&M survey and repair leaks
 - Identify and replace high-bleed pneumatic devices
 - Reduced emissions through third-party damage prevention
 - Convert to instrument air systems
 - Install excess flow valves
 - DI&M at compressor stations (non-mainline transmission)
 - Inject blowdown gas into low pressure system
- No current regulatory activities identified

2010 Emissions from Distribution (2012 Inventory), MMT CO₂e

Potential Methane	Voluntary Reductions	Regulatory Reductions	Emissions
29.6	- 1.1	N/A	= 28.5

Questions for Stakeholders



- Are more recent data sources available?
 - Activity data
 - Emission factors
 - Drivers
- Suggestions for updates to presentation of distribution sector information in the GHG Inventory?