

# Field Measurement Program to Improve Uncertainties for Key Greenhouse Gas Emission Factors for Distribution Sources



In a effort to control and manage greenhouse gases in the natural gas industry, researchers are developing enhanced methods and revised factors involved in emissions calculations. Research is focused on improving greenhouse gas inventory methods to reduce the potential for emissions from distribution sources to be miscalculated due to emission factors based on limited data.

## *Project Description*

In the energy sector, industry leaders have expressed significant interest in developing improved scientific methods for determining greenhouse gas (GHG) emission inventories. Contributing to the interest are: state and regional environmental programs; concerns regarding corporate environmental liability; the public perception of corporate accountability; and, legislation being considered that could trigger federal mandates for GHG reporting in the U.S.

For the natural gas industry, methane is a GHG concern which must be included in GHG emission estimates. Currently, methane estimates are based on emission factors (EFs), most of which are from a decade-old study and/or based on limited data. Researchers contend that EFs for some sources need improvement if a robust emission inventory is desired.

Natural gas companies, trade associations, the Environmental Protection Agency, and state/regional GHG registries have expressed an interest in improving GHG EFs and standardizing GHG estimates for key natural gas sector sources. Emission estimate approaches have been reviewed and a preliminary list of priority EFs has been identified in a collaborative study completed by the primary natural gas industry trade associations. The collaborative study indicated that additional data is needed for certain source types (e.g., fugitive methane emissions). Improvements associated with meter and regulating (M&R) stations have also been identified as primary interests.

In addition to published emission factors, another likely candidate for improvement is emissions from liquefied natural gas terminals – a priority data gap that has been identified.

In this project, a field-test program was initiated employing state-of-the-art technologies and measurement practices for measurement of methane.

This project is being conducted by Innovative Environmental Solutions, Inc., specifically to improve high-

priority GHG EFs for estimation of GHGs from distribution-sector sources. The emission factors investigated will be determined based on input from project investors and the results of an American Gas Association collaborative project with the Interstate Natural Gas Association of America and the American Petroleum Institute that prioritized GHG emission factors for natural gas systems.

## *Deliverable*

Following testing, a Final Report detailing research results and refined GHG emission factors will be released.

## *Benefits*

Improved GHG emission factors are needed to decrease the uncertainty associated with the estimation of methane emissions for key distribution sources. This study will result in improved inventory methods and reduce the potential for GHG emissions from distribution sources to be miscalculated due to emission factors based on limited data. The project results will be coordinated with other industry efforts to ensure consistency and standardization of GHG estimates.



## *Technical Concept & Approach*

Field studies were designed with the objective of reducing the large uncertainties and improving segment-specific emissions estimates. Field measurement programs were conducted to improve the understanding of the GHG reduction potential at M&R stations and customer meters. Source types of interest were prioritized based on OTD recommendations.

Ranking	Distribution Sector Greenhouse Gas Source
1	Fugitive emissions from meter and regulating stations with inlet pressure of 100-300 psi.
2	Fugitive emissions from cast-iron main pipelines.
3	Fugitive emissions from unprotected steel service pipelines.
4	Fugitive emissions from unprotected steel main pipelines.
5 / 6 (tie)	Fugitive emissions from regulating stations with inlet pressure above 300 psi.
5 / 6 (tie)	Vented emissions from pipeline blowdowns.
7 / 8 (tie)	Vented emissions from pipeline mishaps (dig-ins).
7 / 8 (tie)	Fugitive emissions from plastic main pipelines.
9 / 10 (tie)	Fugitive emissions from regulating stations with inlet pressure between 100-300 psi.
9 / 10 (tie)	Fugitive emissions from commercial/industrial customer meters.
10	Fugitive emissions from residential customer meters.

*Surveys of natural gas industry experts and field tests have determined the areas of greenhouse gas sources of greatest concern.*

Field testing included:

- A survey of accessible components in gas/vapor service
- Component counts for fugitive emissions segregated (based on line size, pressure, composition, age, etc.) from meters and regulators
- Detection and tagging of leaking equipment components and subsequent measurement of the leak rate
- Customer meter leak screening (followed by measurement as needed)
- An assessment of the effectiveness of alternative leak-screening tools (e.g., infrared camera).



Field efforts also investigated repair effectiveness for key “problem” fugitive sources. Emission factors will include calculation of the uncertainty in both the activity data (e.g., process parameter) and emission factors. Revised emission factors will consider utilizing prior data if available and practical.

Field-testing campaigns were conducted at distribution company host sites to identify sources of lost and unaccounted-for methane emissions and quantify natural gas leaks from M&R stations, vehicle compressor stations, and customer meters.

## Results

Initial field observations and emissions data analysis found that:

- Equipment categorization and nomenclature varies from company to company and within companies.
- Residential and customer meter set fugitive losses appear to be minimal and actual emissions are likely to be significantly lower than previously estimated.
- Maintenance blowdown vented events and loss may be a larger source than previously estimated for some companies or operations.
- Catalytic line heaters are a GHG source that was not adequately addressed in earlier studies for distribution systems. Initial measurements indicate that this source category may contribute approximately 600-650 pounds of methane per component per year.
- Field data suggest that significant differences occur in fugitive and vented emissions between commercial and industrial meter sets.
- Continuous vented pneumatic devices are likely the largest source of vented emissions in customer meters and M&R stations.
- There is considerable variation in the equipment, operation, and size of M&R stations, as well as their emissions.

## Status

Five field tests at participating utilities have been completed. Details of the tests and data from a sixth test (provided in-kind by one of the project sponsors) have been integrated into a Final Report released in 2009. The report summarizes the results of six, one-week-long field surveys conducted at six natural gas utilities from 2007 to 2009 and an additional supplemental commercial meter-testing program to augment the population of this GHG source category.

The field tests provided useful data that allows for the development of alternative emission factors that more accurately represent equipment types and operations.

*For more information:*

### **Maureen Droessler**

Program Administrator

Operations Technology Development, NFP

Phone: 847/768-0608

maureen.droessler@otd-co.org