Methane Emissions from Gas Residential Meter Set

François Rongere
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• Meter set leaks emissions account for 20% of PG&E’s overall emissions.
• Population-based emission factors does not show leak abatement efforts.
• The recent CARB-GTI residential meter set study provides data to revisit the population based emission factors.

<table>
<thead>
<tr>
<th>Meter Type</th>
<th>Number</th>
<th>Emission factor¹ (scfh)</th>
<th>Annual Emissions (Mscf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>4,261,168</td>
<td>0.0169</td>
<td>630,653</td>
</tr>
<tr>
<td>Commercial/Industrial</td>
<td>232,216</td>
<td>0.0058</td>
<td>11,843</td>
</tr>
</tbody>
</table>

CARB-sponsored study at PG&E

- In Feb. 2018, GTI surveyed 200 residential meter sets in 4 Bay Area coastal and non-coastal cities (Fairfield, Fremont, San Ramon, Pacifica).
- Hi-Flow Sampler and LGR MicroPortable sensor were used to quantify leak rate.
- A total of 58 leaks were detected. The emissions rate of 33 leaks were measured.

**Leak sizes (scfh) distribution**

<table>
<thead>
<tr>
<th>Size Range</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-0.005</td>
<td>30</td>
</tr>
<tr>
<td>0.005-0.01</td>
<td>1</td>
</tr>
<tr>
<td>0.025-0.03</td>
<td>1</td>
</tr>
<tr>
<td>0.045-0.05</td>
<td>1</td>
</tr>
</tbody>
</table>

**Cumulative Distribution of Leak size (scfh)**

<table>
<thead>
<tr>
<th>Size (scfh)</th>
<th>Cumulative Distribution (%)</th>
</tr>
</thead>
</table>

**Average leak size / Leak-based EF**

0.003 scfh

**Population-based EF**

0.001 scfh

**Population-based EF (GRI 2016)**

0.017 scfh

EF from new study is 17x less than current EF.
Meter set survey

• Compliance requirement is to survey meter sets every 5 years.
• Meter sets are visually inspected at a minimum once every three years for atmospheric corrosion.
• A vast majority of MSAs are surveyed with a methane detector every three years during compliance leak surveys.
• Grading criteria for aboveground leaks: Soap test

<table>
<thead>
<tr>
<th>Grade</th>
<th>Soap test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soap solution is blown off, providing no opportunity for bubble to form and “hold”</td>
</tr>
<tr>
<td>2</td>
<td>Soap solution holds a cluster of bubbles</td>
</tr>
<tr>
<td>3</td>
<td>Soap solution forms small bubbles</td>
</tr>
</tbody>
</table>

Source: PG&E Utility Procedure TD-6100P-11 and TD-4820P-05
Moving forward: Using soap test for quantification

- Preliminary results show that the size of the bubbles can help differentiate small leaks:
  - Foam and small bubbles are representatives of leaks smaller than 0.01 scfh
  - Large static bubbles are representative of leaks up to 0.1 scfh
  - Fast growing bubbles expanding beyond the leak area are representative of leaks in the 1 scfh range

- Additional test by GTI will characterize flows between 0.1 scfh and 5 scfh to complete the correlation.
Calculating Emissions based on detected and quantified leaks

• Create a guide for field crews to quantify MSA leaks in bins (To be adjusted based on final results from GTI’s study).

• Field crew will report MSA leaks with quantification (bins)
  - Verification may be performed using pictures or videos

• Emission for each leak will be calculated in function of mode and discovery dates and repair date (as pipeline leaks) and a flow rate corresponding to its quantification bin

• MSA emissions will represent actual leak population in each utility territory
Proposed timeline

- GTI study: Q2 2019
- Pilot: Q4 2019, Q2 2020, Pilot evaluation
- Deployment: Q4 2020
- Annual Reporting: Q2 2021
Thank you!

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Meter set repair

- Most common type of repair is TLA (tightening, lubricating/re-dope, and adjustment).

- Depending on conditions, repair, component replacement, or full may be necessary.

- Leak test with soap solution after job is completed.

Source: PG&E Utility Procedure TD-4110P-03 and TD-4110P-09
Meter set replacement

• Under its **Statistical Meter Performance Control Program**, PG&E reviews accuracy of meters using statistical sampling techniques and replaces any group of meters that does not meet prescribed standards. Almost 30,000 meters were replaced in 2017.

• The **Periodic Meter Change Program** addresses meters that cannot be managed using statistical techniques. These meters are replaced before they are in service for 10 years. 1,514 PMC meters were replaced in 2017.

• In addition, PG&E gas service representatives regularly replace meter sets with anomaly operating conditions (**Corrective Maintenance**) either due to customer call-ins or scheduled leak surveys.

*Source: Gas Meter Performance Control Program 2017 Report. Pursuant to GO 58A.*