Monthly Methane Mondays: MARCOGAZ methodology and data analysis

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Marcogaz developed and published (2005) a methodology using the existing knowledge available within the group of European gas infrastructure operators. Marcogaz already shared the template and the methodology.

Basis equation for the calculation of emissions:

\[
\text{Emissions} = \sum (\text{Activity Factor} \times \text{Emission Factor})
\]

e.g.:

\[
= (\text{number of valves} \times \text{average emission per valve}) \\
+ (\text{km length of pipe} \times \text{average emission per km}) \\
+ \ldots
\]

Development of an Excel sheet containing a number of emission sources to combine their activity factors with the respective emission factors.
Data required for the use of the Methodology:

- Activity Factors
- Emission Factors
- Emissions from vents (engineering calculations)
- Average methane content of natural gas
**Activity factors AF** are the population of emitting equipment. The methodology indicate the most relevant AF of the different parts of the natural gas system (e.g. Length of transmission pipes, Number of valves with pneumatic operations, Mechanical power of gas turbines, Number of blow down valves, Fuel gas consumption..)

**Emission factors EF** are the quantity of methane emitted from each emitting source / emitting event. Some EF can be evaluated on the basis of the characteristic of components or by using measurement techniques. The EF are dependent on pipeline material, type of components, pressure level, maintenance, pipeline ageing…

**Vented emissions** of natural gas are calculated case by case taking into account the geometrical volume of the section that is discharged and the pressure of the gas released (engineering calculations)
Important: distinguish between natural gas and Methane emissions, therefore consider the composition of natural gas and the conversion factor.

<table>
<thead>
<tr>
<th>Natural Gas Composition</th>
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<tbody>
<tr>
<td>Average Methane Content of Natural Gas:</td>
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<tr>
<td>Density of Methane:</td>
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<tr>
<td>Conversion Factor from m³ Nat. gas to g CH₄</td>
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It is recommended to indicate the source for the choice of the emission factor:
- Measurement
- Literature
- Estimation
Venting at the pipeline system cannot be calculated with activity and emission factor, but due to:

$$V_{total} = \sum (V_{single \ volume \ of \ sector} \times p)$$

i.e. multiplication of volume of the vented piping sector x pressure before venting
In 2017 Marcogaz, performed a technical study to estimate the methane emissions from the midstream and downstream activities for the year 2015.

- updated with new emission data resulting from measurements and evaluations
- with an enlarged scope to cover the methane emissions from LNG terminals, Underground Gas Storages facilities and Distribution grid.
For every step of the gas value chain MARCOGAZ analysed the methane emissions of the industry to define a “macro” Emission Factor based on a relevant Activity Factor. These EF can then be applied at the global EU28 level.
### LNG terminals
0.9% with 4,700 tons CH4

### Underground Storage
7.4% with 38,000 tons CH4

### Transport (>16 bar)
25.8% with 133,000 tons CH4

### Distribution (<5 bar)
65.9% with 339,000 tons CH4
Marcogaz data analysis

Remarks
✓ Results valid at global European level and not for an individual country.
✓ (*) 553,000 with 95% confidence level as mentioned in the report.
Marcogaz developed a methodology and technical studies starting from 2005 to estimate CH₄ emissions from EU gas infrastructure (Mid-Downstream). The data are similar to those provided by National Inventories -> some gaps need to be filled.

Starting from these activities, a more detailed data reporting was developed to comply with OGMP 2.0 and the different Levels.

The new templates and guide were published in November 2020.

https://www.marcogaz.org/app/download/8297774463/WG_ME-710.pdf?t=1614356848

https://www.marcogaz.org/app/download/8271109163/WG_ME-756+-+version+20201112.xlsx?t=1606983582