

Methane emissions in the European natural gas transmission and distribution sectors

Natural gas and biomethane help global climate change mitigation

Global climate change led to an intensive discussion about greenhouse gases (GHG). Natural gas shall play a growing role in the energy mix, especially by replacing less environmental friendly fuels such as coal used today in Europe in significant quantities to produce electricity.

Natural gas is recognized as the fossil fuel with the lowest specific CO₂ emission per unit of energy provided. However, due to its main component methane (CH₄), it is itself a GHG which has a global warming potential of 25^{1,2} times more than CO₂ (based on 100 years). Losses and leakages of Natural gas from the European transmission and distribution systems have long been recognized by MARCOGAZ as a subject of interest.

It should be also noted that biomethane produced from the transformation of biomass and injected in the gas grids, is a renewable energy which will strongly contribute to reduce GHG emissions.

The natural gas grids need to deliver continuous and safe energy to the society. This leads to some operational constraints and technical requirements, which can create CH₄ emissions, e.g. during venting for maintenance, by start and stop of compressors, by gas driven pneumatic actuators and safety valves, etc.

Measuring and estimating methane emissions constitute a very complex process. On one hand the emissions are sometimes so low that they cannot be measured and on the other hand, it is sometimes difficult to identify and gather the sources.

¹ International Panel on Climate Change - Fourth Assessment Report: Climate Change 2007 (AR4)

² The AR4 is used to make a comparison to the UNFCCC Annual European Union greenhouse gas inventory, 1990–2012 and inventory report 2014

The MARCOGAZ study

In 2015, MARCOGAZ performed a technical study, using its own methodology (published in 2005 and widely circulated) to estimate the total CH₄ emissions from European natural gas transmission and distribution systems. The MARCOGAZ methodology is based on a bottom-up approach, using network operational data.

The MARCOGAZ network of technical experts is currently the most efficient way to have access to technical data coming from the field, and MARCOGAZ is currently the only technical organization doing this kind of study based on real data from the field at European level.

Data collected from MARCOGAZ members represent **70%** of the transmission pipelines and **60%** of the distribution grids in Europe, which is representative of natural gas systems in Europe.

Results

Compared to the total mass [tons] of natural gas sales in Europe³, the aggregated European methane emission is calculated to be **0,1%** for transmission and **0,4%** for distribution grids.

The total amount of GHG emissions caused by the methane emissions from Natural Gas transmission and distribution grids is estimated to be between **0,5% and 0,9%** of the total of anthropogenic⁴ GHG emission (CO₂ equivalents) in Europe (EU28)⁵.

The CH₄ emitted by the transport and distribution of natural gas in Europe has a very limited impact on the climate in comparison with all the anthropogenic and non-anthropogenic CH₄ emissions.

The Natural Gas Industry continuously develops a proactive and sustainable approach to manage adequately the gas infrastructure (old pipelines replacement, advanced operation techniques, prevention on third-party damages ...) and provides an important contribution to the climate change issue.

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³ This calculation included the countries : Austria, Belgium, Czech Republic, Denmark, France, Finland, Germany, Greece, Italy, Ireland, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Switzerland, United Kingdom

⁴ Anthropogenic emissions: emissions originating in human activity

⁵ Annual European Union greenhouse gas inventory, 1990–2012 and inventory report 2014, Submission to the UNFCCC Secretariat, page 10 - 11