

EuroTeQ Collider 2023

Theme:

Methane emissions – monitoring, quantification, and evaluation of the emission footprint of fugitive emissions of natural gas in the distribution network

Introduction

Based on the call of the EU Green Deal to develop the European Union into a climate-neutral Union by 2050, households, transport systems and industries strive for zero greenhouse gas emissions. Key to this goal is the application of new technologies, the development of new operational processes for existing technologies and operation and maintenance procedures for gas distribution companies.

Who is behind this initiative?

GasNet is the operator of the largest gas distribution network in the Czech Republic, providing reliable and secure energy from natural gas supplies for more than 2.3 million customers. With its 65.000 kilometers of gas distribution pipelines, does GasNet cover around 80% of the natural gas distribution in the Czech Republic.

The company's focus is to deliver energy reliably and safely to 2.3 million customers and to support the Czech Republic's decarbonization goals. GasNet targets at carbon neutrality by 2040, this mainly by replacing natural gas by hydrogen and biomethane. To successfully manage this unprecedented transformation process, GasNet will intensely invest not only into the renewal and retrofit of its network, but also into new advanced technologies and apply new work approaches.

What is the challenge?

One of the important contributors to the above-mentioned strategy is to actively monitor and evaluate natural gas leaks from operating facilities, and subsequently take effective measures to minimize them. To be successful and efficient, the latest technologies and approaches to measure, monitor and quantify each emission source shall be applied.

During the operation of gas facilities, so-called **fugitive emissions** arise from natural gas leaks (e.g. corrosion attack, pipe joints, etc.), both from underground facilities, such as gas pipelines and gas pipeline fittings located below the surface, or from above-ground components such as measuring lines, fittings and gas control stations (mainly the connection-points of such components). Fugitive emissions form a significant part of the emission load in the overall portfolio and shall therefore be reduced predominantly and actively. The EU, through the newly prepared directive of the European Commission from 2021, is preparing new conditions and rules for a more active approach of all operators in the gas chain, towards a more effective and proven approach to monitor and manage methane emissions.

That is why we are looking for an optimal approach to monitor and search for sources of natural gas leaks in operational practice.

Interested student teams are asked to engage in

- Proposing a design for the **management of fugitive emissions**
(strategy → technology → data collection & processing → evaluation of findings-
algorithms)
 - propose technologies for monitoring devices, both in urban areas (cities, suburban areas, villages, etc.) and in non-urban areas (open terrain, forest intersections, fields, meadows, etc.)
 - propose the approach to collect information on found natural gas leaks, data processing and evaluation
 - design of technology for data collection → carriers, sensors, localization in the field (image, georeferencing - coordinate transformation, etc.)
 - proposal for an algorithm for the evaluation of findings and the creation of a scenario for the restoration of the gas infrastructure

Relevant considerations for the challenge / theme:

- Provide a clear and profound storyline and assessment to the technological and economic feasibility of the proposed solution design and concept.
- Challenge the status quo and be open minded.