RICE
Research & Innovation Center for Energy

GERG
THE EUROPEAN GAS RESEARCH GROUP

Authors: Cristina Lopez, Elodie Rousset, Jean-Luc Fabre

GRTgaz, RICE (Research and Innovation Center for Energy),
1-3 rue du Commandant Estienne d'Orves, 92390 Villeneuve-a-Garenne, France

GERG - Technology Benchmark for site level methane emissions quantification

Phase 1 – State of the Art

A common bottom-up/source level "bagging" measurement

Ensuring the reliability of methane emissions quantification is very important for gas operators Currently, bottom-up/source level methodologies are used to that aim. However, there is an increasing interest for so-called "Top-Down"/ site level methodologies shared by multiple stakeholders (nongovernmental organization, technologies providers, academic researchers) to reach OGMP 2.0 level 5. In this context, a project on methodologies for methane emissions quantification was launched in the GERG association (18 members). Phase 1, divided in 4 WP, aimed to provide different states of the art through bibliography review.

Components of a top-down/site level methodology

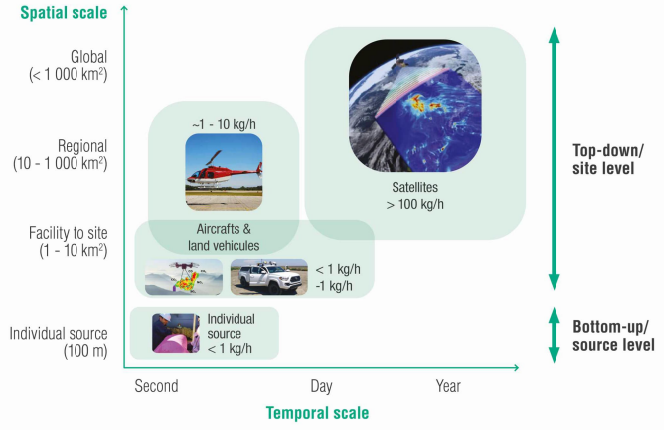
Infrared spectroscopy sensor

Complementary measurements

A mobile platform

Quantification algorithm

Comparison of top-down/site level and bottom-up/ source level methodologies



WP1: satellites

Objective: evaluate satellite ability to monitor emissions from industrial sites.

Main results:

- They are mainly use to spot emissions at the global level/used to spot "super-emitters" (~t/h). Current detection limit: 100 kg/h.
- Some satellites have enough spatial resolution (30m) to assign the source of plumes to an industrial site.

WP2: top-down

Objective: evaluate the mobile "top-down" technologies existing in the market and under development at the laboratory scale.

Main results:

- Very broad panorama in terms of techniques, degree of Technology Readiness Level (TRL), and typology of actors.
- The few existing measurement campaigns have showed limitation for accurate quantification (algorithm limits).

WP3: distribution network

Objective: brought together existing measurement campaigns in the distribution sector.

Main results:

- Direct survey by direct flow measurements: The existing measurement campaigns have shown the suitability of suction method (although time consuming).
- Mobile surveys, carried out with a vehicle coupled to an algorithm. Results showed that there are good to spot the largest leaks rapidly, which is an opportunity for a cost-effective way to reduce methane emissions.

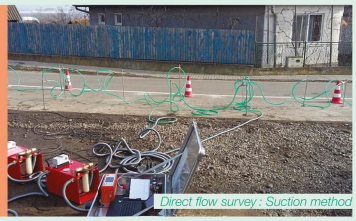
WP4: next steps

Objective: selection of methodologies of interests based on the state of the art from WP2 and WP3.

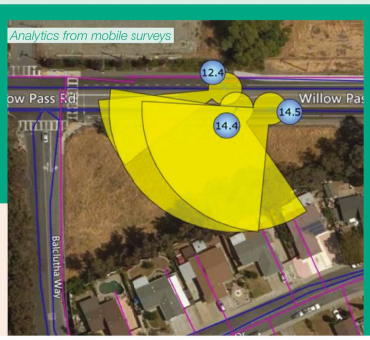
- Partners worked together to establish use cases definition and description of experiments.

Methodology

- Public communications
- Scientific articles, thesis, conferences
- Discussions with the stakeholders
- Workshop with the project's participants to define needs and scope of work for future projects



Direct flow survey : Suction method



Conclusions

- There is a high level of uncertainties in terms of quantification for top-down/site level methodologies.
- There are not enough studies to evaluate their performance : tests must be carried out in an european context to better quantify the concentration accuracy and uncertainties of such methodologies.
- The project produced a proposal to progress on Top-Down methodologies, based on controlled release tests.

References: T.A. Fox et al., A review of close-range and screening technologies for mitigating fugitive methane emissions in upstream oil and gas, Environ. Res. Lett. 14 (2019) | Ravikumar, AP, et al. 2019. Single-blind inter-comparison of methane detection technologies – results from the Stanford/EDF Mobile Monitoring Challenge. Elem Sci Anth, 7: 37 | Methane Guiding Principles, Reducing Methane Emissions: Best Practice Guide, Identification, Detection, Measurement and Quantification, September 2020 | Assessment of methane emissions for gas Transmission and Distribution system operators, MARCOGAZ 2019

EGATEC2022 The 5th European Gas Technology Conference

Pilot: RICE Research & Innovation Center for Energy, GRTgaz

Members: Synergrid, kiwa, snam, Italgas, elengy, uniper, Thyssengas, ENGIE Lab CRIGEN, enagas, DBI, sedigas, GRDF, GAZ system, ENERGINET, wintershall dea, gasunie, storengy

Peer review: TNO, LSCE