European Partnership on Metrology
Call 2025 – Health, Integrated European Metrology, Regulation and Research Potential

Selected Research Topic number: **SRT-n06**
Version: 1.0

Title: Metrology support for the development of standardised methods for methane emission detection and quantification

Abstract

The emission of methane, a potent greenhouse gas, needs to be reduced to tackle climate change. Therefore, Regulation (EU) 2024/1787 now sets clear requirements for accurate measurements, monitoring, reporting and verification of methane emissions in the energy sector at source and site scales, including the reduction of methane emissions through leak detection and repair (LDAR). However, to meet these targets, comparable, validated, harmonised and standardised methods need to be developed. Proposals are sought to address these metrology needs, providing regulators and the industry with the tools needed to comply with the new legislation in the energy, and other, sectors (e.g. waste management, agriculture). The potential to apply this legislation to different species (e.g. hydrogen) should also be investigated.

Keywords

Clean energy, climate change, emissions, greenhouse gas, methane, methane reduction, net-zero emissions, oil and gas, standardisation, validated measurement methods

Background to the Metrological Challenges

To achieve commitments made by parties to the United Nations Framework Convention on Climate Change (UNFCC) there is a need to reduce emissions of greenhouse gases. Standardisation provides a key element in delivering reliable measurements and to provide capabilities to support industry self-reporting and regulatory instruments. CEN/TC 264 [1] and EMN for Energy Gases [2,3] have identified standardisation priorities and metrology needs, which this SRT addresses as well as those arising from Regulation (EU) 2024/1787 [4] on methane emissions reduction and industry. This SRT is driven by the need for better data related to methane emissions, and specifically to the consequent need for the validated standardised measurement methods, which will provide this data.

Methane is the key component of natural gas and biomethane, and it is the second largest contributor to anthropogenic greenhouse gas emissions. Methane is present in several key industries, including the energy sector, waste management, mining, and intensive agriculture. Within these industries, there are multiple sources of methane emissions including fugitive emissions (leaks), venting (intentional release due to safety conditions, equipment design or operational procedures, or incomplete combustion). The EU has defined a methane strategy [5] with reduction targets that must be met by 2030 and has issued the methane Regulation (EU) 2024/1787 for the energy/mining sectors which supports the COP26 Methane Pledge. Industry has started to reduce methane emissions, however improved capabilities to detect and quantify methane emissions are needed for the efficient reduction of emissions. Gas operators started to use a source level measurement approach (also called a bottom-up approach) to go beyond generic emission factors, as required by the oil and gas methane partnership (OGMP) 2.0. Some companies implement leak quantification in a bottom-up approach using direct measurements such as the hi-flow sampler. One measure included in Regulation (EU) 2024/1787 is drawing a distinction between type 1 and type 2 leak detection and repair (LDAR) surveys, based on minimum detection limits and leak repair thresholds, which will require improved standardisation for its implementation.

Leak quantification requires the concentration and flow rate to be measured. For open air measurements the flow rate is generally based on the wind, but there are no standardised methods for determining the wind field for this measurement context. This includes complex wakes that occur downstream of equipment and buildings

EURAMET MSU,
Email: part.msu@euramet.org
Metpart.eu

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on site, along with potential interference from the measurement method itself (e.g. UAV mounted sampling equipment). EN 17628 covers general aspects, but the development of standardised methods for the meteorological parameters (or the tracer flow rate, in the case of tracer gas dispersion) is needed to minimise the uncertainties of these measurements.

In 2020, many operators joined the reporting framework of OGMP 2.0, the highest level of which requires site level quantification measurements (a top-down approach) for comparison with the bottom-up approach. Currently, these exists across a broad, non-standardised market with heterogeneous solutions. Stakeholders including gas operators have launched many initiatives for the performance assessment of these technologies, such as controlled release tests or test campaigns on industrial sites. These initiatives, which provide a lot of information from each test, are not harmonised and the methodologies and protocols are different in each project. Consequently, it is difficult to gather, compare and capitalise the results in a unified way. The proposed work should focus on developing a standardised performance assessment approach to resolve this issue and to ensure a harmonised implementation of Regulation (EU) 2024/1787.

Objectives

Proposers should address the objectives stated below, which are based on the PRT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the protocol.

The proposal shall focus on the development of standardised metrology capabilities for methane emission detection and quantification.

The specific objectives are

1. To develop methods for controlled methane release and validation studies. This should include the development of (i) performance standards for the measurement sensors and technologies that will be used in Objectives 2 and 3, (ii) the capability to produce methane reference leaks, in the low range of admissible leaks, including methods to ensure the traceability of calibrations, and (iii) procedures to evaluate the sensitivity of portable methane leak detectors along with guidance for quality control/quality assurance for field use.
2. To support the development of standardised methods for leak detection and repair at source scale. This should include (i) the development of measurement protocols and uncertainty estimation procedures for component level leak quantification methods, and (ii) the provision of updated correlation curves for use in the revision of EN 15446 for leak detection and quantification in industry.
3. To develop metrological methods for methane quantification at site level. This should include determining the performance of meteorological measurements (wind speed/direction) and atmospheric variability, including their impact on the calculation of mass emissions of methane and the uncertainty. In addition, different sampling approaches, complex wakes and the impact of mobile sampling systems on the local wind field should be determined to enable meteorological measurement protocols to be developed.
4. To develop an improved understanding of the uncertainties associated with the methane measurement methods developed in Objectives 2 and 3 and their implications for regulation, including support for the methane quantification standards that are being developed by TC 264 WG38. The quality infrastructure, i.e. calibration tools, best practice guides and proficiency testing schemes, should also be developed to support methane measurement providers.
5. To contribute to the standards development work of the technical committees CEN TC 264, CEN TC 234 and CEN TC 12 (via ISO/TC 67) related to Regulation (EU) 2024/1787 to ensure that the outputs of the project are aligned with their needs, communicated quickly to those developing the standards and to those who will use them, and in a form that can be incorporated into the standards at the earliest opportunity.

The proposed research shall respond to documented requirements related to specific regulations and legislation or explore the background and feasibility of expected possible future regulation. To enhance the impact of the research, the involvement of the appropriate user community such as regulatory authorities, conformity assessment bodies, standardisation bodies, and industry, is strongly recommended. Where relevant, proposals are encouraged to build on, or seek collaboration with, existing projects and develop synergies with other relevant European, national or regional initiatives and funding programmes. In particular, links are encouraged with (i) the projects funded under earlier relevant topics of the Horizon Europe programme; or (ii) other relevant European Partnerships.

Proposers should establish the current state of the art and explain how their proposed research goes beyond this. In particular, proposers should outline the achievements of the EMRP and EMPIR projects ENV52 HIGHGAS, 21NRM04 BiometCAP, 19ENV05 STELLAR, and 21GRD04 isoMET and how their proposal will build on those.

Proposers should note that the programme funds the activity of researchers to develop the capability, not the required infrastructure and capital equipment, which must be provided from other sources.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 1.0 M€ and has defined an upper limit of 1.3 M€ for this proposal.

EURAMET also expects the EU Contribution to the external funded beneficiaries to not exceed 30 % of the total EU Contribution across all selected projects in this TP.

Any industrial beneficiaries that will receive significant benefit from the results of the proposed project are expected to be beneficiaries without receiving funding or associated partners.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the 'end user' community, describing how the project partners will engage with relevant communities during the project to facilitate knowledge transfer and accelerate the uptake of project outputs. Evidence of support from the "end user" community (e.g. letters of support) is also encouraged.

You should detail how your proposal's results are going to:

- Address the SRT objectives and deliver solutions to the documented needs,
- Feed into the development of urgent documentary standards through appropriate standards bodies,
- Facilitate improved industrial capability, or improved quality of life for European citizens in terms of personal health, protection of the environment and the climate, or energy security,
- Transfer knowledge to the environmental monitoring sector and regulatory authorities.

You should detail other impacts of your proposed JRP as specified in the document "Guide 4: Writing Joint Research Projects (JRPs)"

You should also detail how your approach to realising the objectives will further the aim of the Metrology Partnership to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically, the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased
- organisations other than NMIs and DIs to be involved in the work.

Timescale

The project should be of up to 3 years duration.

Additional information

The links provided in this section are only correct at the time of publication up until the end of the Call year.

The references below were provided by PRT submitters; proposers should therefore establish the relevance of any references.

[1] *017 CEN TC 264 WG38 Validation for methane emission measurement methods*. https://www.metpart.eu/go/need17

[2] EMN Energy Gases Strategic Research Agenda https://www.euramet.org/research-innovation/metrology-partnership/strategic-research-and-innovation-agendas

[3] Orientation Paper by EMN for Energy Gases, https://www.metpart.eu/component/edocman/call-2025-orientation-emn-energy-gases-all/download.html?Itemid=0

[4] EU Regulation (EU) 2024/1787 https://eur-lex.europa.eu/eli/reg/2024/1787/oj/eng

[5] EU Methane strategy https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0663