

## **Title: Metrology for natural gas and biomethane-enriched natural gas**

### **Abstract**

The energy transition from fossil fuels to renewable energy requires metrological harmonisation to be implemented throughout Europe. However, metrological capacities in the quantitative and qualitative testing of natural gas and biomethane-enriched natural gas need to be strengthened at local and regional levels through the adoption of newly developed technologies. Therefore, comparisons need to be organised and conducted among established and developing NMIs/DIs to demonstrate their competence in measuring the temperature, dew-point, pressure, flow and chemical composition of natural gas and biomethane-enriched natural gas. In addition, novel TC193/SC1 and CEN/TC408 procedures for determining the composition and physical properties of these fuels need to be tested, and proficiency tests for measuring multi-parameters need to be organised and conducted.

### **Keywords**

Biogas/biomethane, enriched natural gas, inter-laboratory comparisons, multi-parameters, natural gas, physical properties, proficiency tests

### **Background to the Metrological Challenges**

Greenhouse gas emissions and Europe's dependence on imported natural gas need to be reduced. To address this, the second renewable energy directive 2018/2001 specifies that 32 % of energy consumption should come from renewable sources by 2030. In order to increase sustainability, through energy diversification, Europe's natural gas supply needs to be "greened" by injecting significantly more biomethane and upgraded biogas into the grid. To achieve this a pan-European measurement infrastructure is needed that supports the efficient and fair trade of biomethane and upgraded biogas, and which provides access for biogas producers to the natural gas grid and refuelling stations.

CCQM and CCM strategy documents confirm that this sector requires the development of traceable measurements and the demonstration of international equivalence. Previous EMRP and EMPIR projects have made significant progress in this field, but they are not sufficient to meet the requirements of the energy transition, which requires metrological needs and challenges to be met through harmonisation at a pan-European scale. These challenges are of similar importance for all European countries, therefore the European Metrology Network (EMN) for Energy Gases will provide a focal point for these activities. A strategic research agenda (roadmap) that identifies key measurement gaps and challenges will be developed to focus European research capacity. An online measurement service platform will also be created to disseminate European know-how. In addition, these activities will need to be supported by demonstrations, active knowledge transfer, inter-laboratory comparisons and trials with the aim of proving metrological competencies. This will prepare the metrological environment in those countries which lack unified metrological principles, and it will benefit all the actors in the metrology system, including those undertaking primary measurements and the realisation of reference values, as well as industrial and gas companies that need to provide traceable measurements.

### **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 JRP shall focus on the development of metrological capacity for characterisation of natural gas and biomethane-enriched natural gas.

The specific objectives are

1. To organise and conduct comparisons among the established and developing NMIs/DIs in order to (i) demonstrate the competence of the laboratories that are responsible for measuring the chemical composition of natural gas and biomethane-enriched natural gas and to (ii) test novel TC193/SC1 and CEN/TC408 procedures for determining the composition and physical properties of these fuels.
2. To organise and conduct comparisons among the established and developing NMIs/DIs in order to (i) demonstrate the competence of the laboratories that are responsible for measuring the temperature, dew-point, pressure and flow of natural gas, and biomethane-enriched natural gas, in gas grids and to (ii) test the applicability of the TC193 standards on these different gas mixtures.
3. To organise and conduct the proficiency tests developed within the scope of the EMN for Energy Gases for measuring multi-parameters (i.e. flow, gas composition, pressure and other relevant physical properties) in natural gas and biomethane-enriched natural gas.
4. To engage closely with regional and European stakeholders, including regulatory and governmental bodies, gas experts, professional societies, standards developing organisations, metrological committees and manufacturers to ensure that all legal and metrological requirements are met.
5. For each participant, to develop an individual strategy for the long-term operation of the capacity developed, including regulatory support, research collaborations, quality schemes and accreditation. They should also develop a strategy for offering calibration services from the established facilities to their own country and neighbouring countries. The individual strategies should be discussed within the consortium and with other EURAMET NMIs/DIs including members of the EMN for Energy Gases or relevant JRPs, to ensure that a coordinated and optimised approach to the development of traceability in this field is developed for Europe as a whole.

Joint Research Proposals submitted against this SRT should identify

- the JRP(s) or/and the joint European metrology structure initiative they refer to,
- the particular metrology needs of stakeholders in the region,
- the research capabilities that should be developed (as clear technical objectives),
- the impact this will have on the industrial competitiveness and societal needs of the region,
- how the research capability will be sustained and further developed after the project ends.

In particular, proposers should outline the achievements of the EMPIR project 16ENG05 Biomethane and how their proposal will build on those.

The development of the research potential should be to a level that would enable participation in other TPs or European Metrology Networks.

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 has defined an upper limit of 0.5 M€ for the EU Contribution to any project in this TP, and a minimum of 0.1 M€

EURAMET also expects the EU Contribution to the external funded partners to not exceed 10 % of the total EU Contribution across all selected projects in this TP.

## 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 JRP results are going to:

- Address the SRT objectives and deliver solutions to the documented needs,
- Provide a lasting improvement in the European metrological capability and infrastructure beyond the lifetime of the project, including the related JRP or EMN as applicable,
- Facilitate improved industrial capability or improved quality of life for European citizens in terms of personal health or protection of the environment,
- Transfer knowledge to the energy gases sector and the metrology community.

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 EMPIR 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.

### **Time-scale**

The project should be of up to 3 years duration.