

## **Title: Flow metering of non-conventional gases (biogas, biomethane, hydrogen, syngas and mixtures with natural gas)**

### **Abstract**

Non-conventional gases (e.g. biogas, biomethane, hydrogen, syngas and mixtures with natural gas) are energy gases obtained by new and different sources of production rather than natural gas extraction. These new sources can be used in various local or national applications but require modifications to the metering systems in gas supply chains to allow for the differences in properties of the mixture compared to conventional gas. Work is required to demonstrate that the gas meters used with these mixtures conform to the requirements of the European Directive on Measuring Instruments (MID) 2014/32/EU. The impact of these new gases on the accuracy and the durability of meters on the market today should be determined and may lead to an update of the relevant standards.

### **Keywords**

Non-conventional gases, biogas, biomethane, hydrogen, syngas, natural gas, gas network, gas meter, flow metering.

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

Until recently, custody meters aimed at metering gas have only been required to work with town gas, manufactured gas, and natural gas. The increased production of non-conventional gases (i.e. biogas, biomethane, hydrogen, syngas and mixtures with natural gas) and the development of the injection process in the gas network now brings requirements to measure accurately the properties of these new gases and to demonstrate that the gas meters used conform to the requirements of the European Directive on Measuring Instruments (MID) 2014/32/EU.

Conformity to the directive can currently be demonstrated through the harmonised standards developed by CEN/TC 237 but these standards have been developed based on the gas defined in standard EN 437 which is similar to natural gas. Injection of hydrogen and/or biomethane into the supply changes the properties of the gas being measured and could impact the characteristics of the instruments particularly their accuracy and durability.

Measuring instruments used for the supply of gas have to be designed and certified according to the MID directive, but there are currently no validated methods that the measuring instrument devices manufacturers can use to demonstrate the accuracy of their devices for the metering of non-conventional gases, for on-line or off-line measurements, in order to ensure customers are billed correctly.

Adapting current European standards and regulatory documents for the widespread use of non-conventional gases not only allows the instrument manufacturers (gas meter manufacturers and general systems for metering the energy content of fuel gases) to demonstrate compliance with the directive, and consumers to have confidence that they are being charged correctly, it also enables Europe to increase the use of renewable energy gases thus contributing to the sustainability of the energy supply.

### **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 metrology research necessary to support the standardisation in flow metering of non-conventional gases.

The specific objectives are

1. To identify the typical uses for which the impact (non-impact) of non-conventional gases is not evaluated in terms of measurement accuracy, costs and life time, and defining an acceptable range of gas compositions, suitable to support the new “non-conventional” framework.
2. To develop traceable methods for the calibration of flow meters that are used to measure non-conventional gases quantity in compliance with the requirements of the Directive on the Measuring Instruments 2014/32/EU and to determine the uncertainty budget. In addition, to study and evaluate integrity of the internal components of the meters, durability of the materials, insulation of electronic components and other possible technical issues (attending on the composition of the evaluated gas).
3. To validate the calibration methods and uncertainty budgets developed via an appropriate inter-laboratory comparison.
4. To contribute to the standards development work of the technical committees CEN/TC 237 and OIML TC8/SC7 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 be justified by clear reference to the measurement needs within strategic documents published by the relevant Regulatory body or Standards Developing Organisation or by a letter signed by the convenor of the respective TC/WG. EURAMET encourages proposals that include representatives from industry, regulators and standardisation bodies actively participating in the projects. The proposal must name a “Chief Stakeholder”, not a member of the consortium, but a representative of the user community that will benefit from the proposed work. The “Chief Stakeholder” should write a letter of support explaining how their organisation will make use of the outcomes from the research, be consulted regularly by the consortium during the project to ensure that the planned outcomes are still relevant, and be prepared to report to EURAMET on the benefits they have gained from the project.

Proposers should establish the current state of the art, and explain how their proposed research goes beyond this.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 0.6 M€, and has defined an upper limit of 0.8 M€ for this project.

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

Any industrial partners that will receive significant benefit from the results of the proposed project are expected to be unfunded 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 JRP 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,
- Transfer knowledge to the biogas and energy sectors.

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.