

## Important information about these documents

This call is being held ahead of any agreement from the Commission that the relevant funding will be available. At present the relevant legislation is still under discussion in both Council and Parliament, and there is no certainty on the detailed arrangements for funding selected projects. The funding of any selected project, and the terms and conditions of participation in the projects, are dependent on completion of the legislative process and the subsequent contractual processes between the European Commission and EURAMET. Proposers submit to this call at their own risk.

### Background

Last year, EURAMET submitted a draft proposal to the EC for a further research programme to be established under article 185 of the Treaty on the Functioning of the European Union (TFEU) to follow on from EMRP and EMPIR. This was published by the EC at [https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-digital-industry-and-space\\_en](https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-digital-industry-and-space_en)

The initiative would be called the European Partnership on Metrology and would aim to create, by 2030, a sustainable and effective system for metrology at European level that ensures Europe has a world-class metrology system that:

- Provides metrology solutions, fundamental metrological reference data and methods, offering fit-for-purpose solutions supporting and stimulating European innovation and responding to societal challenges.
- Supports and enables effective design and implementation of regulation and standards that underpin public policies that address societal challenges.

The Commission commissioned an impact assessment into this proposal and 11 others in similar priority areas, and, based on those findings, published their own proposal for the Partnership, their response to the impact assessment and a draft of the Decision on 23<sup>rd</sup> February 2021. See:

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:89:FIN>

[https://ec.europa.eu/commission/presscorner/detail/en/ip\\_21\\_702](https://ec.europa.eu/commission/presscorner/detail/en/ip_21_702)

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021SC0035&qid=1614677899327>

That draft Decision is currently under discussion in the European Council and the European Parliament.

Under the assumption that the Council and Parliament pass the basic act which would form the legal basis for this research programme, and that the participating countries named in the Draft Decision submit the required commitment letters, EURAMET is publishing these potential Selected Research Topics and draft guidance notes. These documents are not approved by the Commission nor will they lead to a binding decision by EURAMET e.V. for any further negotiation or funding. All published guides and templates are subject to amendment by the EC and EURAMET e.V. as further information becomes known.

# Title: Protocol for SI-traceable validation of methods for biomethane conformity assessment

## Abstract

Biomethane is a renewable energy gas that can be injected into natural gas networks, and used as a vehicle fuel, if it conforms with the specifications of EN 16723. To ensure conformity, the industry requires measurement standards that contain both SI-traceable levels of targeted impurities and other possible interferents. Therefore, methods should be developed for the dynamic preparation of these gas standards, which should be validated for use in biomethane conformity assessment. In addition, a comprehensive protocol should be developed for the validation, and performance evaluation, of the analytical instruments and measurement methods that are used. It should be suitable for both onsite and offsite analysis using commercially available industrial gas analysers. The protocol, gas standard preparation methods and use cases should be provided as a contribution to the standards development work of technical committees, including ISO/TC193/SC1/WG25 “Biomethane”.

## Keywords

Biomethane, conformity assessment, EN 16723, gas analysers, impurities, multi-component gas standards, performance evaluation, validation protocol

## Background to the Metrological Challenges

The European Green Deal prioritises decarbonisation of the gas grid to meet the goals of the 2016 Paris agreement on climate change. To foster sustainable growth, the second renewable energy directive 2018/2001 specifies that by 2030, greenhouse gas emissions should be at least 55 % lower than 1990 levels. In order to meet European targets, biomethane will need to play a key role in gas decarbonisation pathways. For example, 50 % of the total energy gas consumption (1170 TWh) is planned to come from biomethane by 2050. To achieve this, biomethane needs to meet the specifications set out in EN 16723 for injection into natural gas networks and for use as a vehicle fuel. To implement EN 16723, laboratories need to deploy dedicated measurement standards and test methods for the conformity assessment of biomethane. In addition, ISO/IEC 17025 requires laboratories to validate these methods before their services can be accredited.

Parts of the infrastructure needed to establish metrological traceability for the content of trace-level impurities in biogas and biomethane have already been developed. For example, recent progress has included the development of primary gas standards in high pressure cylinders (e.g. for siloxanes, halogenated VOCs) and in sorbent tubes (e.g. for amines), as well as the development of in-situ dynamically generated gas standards (e.g. for hydrogen chloride) and various test methods for measuring trace levels of the individual groups of impurities specified in EN 16723. The use of dynamic methods has been demonstrated for several primary measurement standards, but gas standards need to be prepared that contain “nuisance” components, which could interfere with the components of interest in biomethane analysis. The number of combinations of compounds is huge, therefore a flexible approach to gas mixture preparation will be required. Nonetheless, these standards need to be developed to enable the comprehensive validation of the methods and the performance evaluation of gas analysers.

Thus far, the gas analysers that are used to measure biogas and biomethane have only been developed to perform trace measurements for subsets of potential impurities. Different impurities in biomethane, as specified in EN 16723, can interfere with each other and with the matrix gas, resulting in cross-interference. This is a concern as it could lead to unrepresentative measurement results if not duly mitigated in the validation process. Methods have been developed for the SI-traceable calibration of gas analysers, but tools need to be developed to assess the effects of the gas matrix, and non-target impurities, on the measurement results.

A harmonised approach is needed for assessing the cross-interference caused by the gas matrix and other impurities in order to support the performance evaluation of industrial gas analysers and the validation of measurement methods. ISO10723 describes the evaluation of the performance of the analytical systems that are used for natural gas. A similar approach needs to be developed which describes the methods and validated protocols that are needed for the metrological characterisation, and performance evaluation, of the gas analysers that are used for measuring impurities. The protocol will need to be metrologically validated in order to meet customer requirements, and it is expected to become an essential part of the measurement chain for biomethane conformity assessment. Implementation of the protocol will be key to demonstrating the robustness of the methods and to show that the measurement results correctly identify and quantify the impurities found in biomethane.

Standards need to be developed for the testing and validation of the analytical instruments (gas analysers e.g. spectroscopic, gas chromatographic) and methods that are used in the conformity assessment of

biomethane. Therefore, a harmonised versatile protocol is needed that explains how SI-traceable validation and performance evaluation can be performed by end users, in the field and in the laboratory, including details of how the instruments' precision, trueness, sensitivity and selectivity will be assessed. This protocol, the gas standard preparation methods and use cases should be suitable as input for ISO/TC193/SC1/WG25 "Biomethane" and for use in the development of new or revised ISO standards.

## 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 metrology research necessary to support standardisation in the SI-traceable validation of methods for the conformity assessment of biomethane.

The specific objectives are

1. To develop and validate methods for the dynamic preparation of gas transfer standards containing different groups of impurities. These should be suitable for use in the SI-traceable validation and performance evaluation of the analytical instruments and methods that are used in the conformity assessment of biomethane in accordance with EN 16723. In addition, this should include determining the key metrological parameters of each method.
2. To develop a comprehensive protocol for the validation and performance evaluation of the analytical instruments and methods that are used in the conformity assessment of biomethane. The validated and implemented methods should be able to generate reproducible and SI-traceable measurement results.
3. To use the protocol, developed in objective 2, to evaluate the performance of commercially available industrial gas analysers, based on e.g. spectroscopy or gas chromatography, which are used for laboratory and field-based biomethane (test) measurements. The protocol should also be used to evaluate all relevant measurement methods.
4. To maintain constant contact with the EMN for Energy Gases and collaborate with the technical committee ISO/TC193/SC1/WG25 "Biomethane" and the users of the standards they develop to ensure that the outputs of the project are aligned with their needs and are incorporated into future standards at the earliest opportunity. This will include, in particular, the protocol developed in objective 2.

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. In particular, proposers should outline the achievements of the EMRP projects ENG01 GAS and ENG54 Biogas and the EMPIR projects 16ENG05 Biomethane and 18NRM06 NEWGASMET and how their proposal will build on those.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 0.8 M€, and has defined an upper limit of 1.0 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 biomethane sector.

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 potential European Partnership on Metrology 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.