

Title: Support for a European Metrology Network on energy gases

Abstract

Human life depends on energy. To prosper, while tackling climate change, society needs to provide ever more energy for a growing global population while finding ways to reduce CO₂ emissions. Therefore, the energy sector is facing a transition. Driven by EU legislation on renewable energy and by the ratification of the Paris agreement aimed at a zero-carbon economy, renewable energy gas sources are being explored and entering the market.

EURAMET intends to establish a collaborative network aimed at identifying and jointly addressing the diversity of metrological needs with respect to quality, efficiency, safety and trade aspects of this energy transition and thereby setting the basis for a harmonised and sustainable European measurement infrastructure to catalyse the process.

This SNT is intended to support that network in their initial tasks.

Keywords

Renewable energy gases, Energy transition, Liquefied Natural Gas, Biogas, Biomethane, Hydrogen, Mobility, Energy production, Energy distribution, Energy conversion

Background

The EMN aims at providing support to the societal needs related to the energy transition towards renewable gaseous fuels. It will facilitate addressing metrological issues related to a sustainable and transparent energy supply of energy from conventional (natural gas, liquefied NG) and renewable energy sources such as biogas/biomethane and hydrogen and any emerging new topic.

The main drivers at European level that push towards energy diversification and towards use of more sustainable energy gas sources are the European Directives on renewable energy (2009/28/EC) [1], the limitation of gas supplies and the ratification of the Paris agreement (COP21) [2]. Regarding the high importance of the transport and distribution of energy gases on a pan-European scale, the European Commission issued EU Regulation 703/2015 [3], setting requirements on harmonised approaches for the measurement of energy traded across Europe.

National and European platforms of energy gases stakeholders have been established and they work on fundamental challenges, such as setting the physical and chemical specifications needed for renewable gases to enter the existing natural gas grid, assessing the quality and safety requirements for using hydrogen as fuel for long distance transportation or identifying the most efficient methods to allow power-to-gas conversion. The robustness of measurements made in these areas is often compromised at the top level by a lack of traceable measurement standards and at the end-user level by absence of appropriate quality control and standardisation of sampling and routine measurement procedures. The activities required to address these problems and to also bridge the gap between the metrology and end user community require efforts that go beyond the current activities carried out at the technical committees under EURAMET and CIPM. These activities would require a more flexible approach and, especially, the ability to work much more closely with end users to ensure the proper dissemination of metrological traceability and best practice at the routine measurement level in the field or in the factory. A European Metrology Network for Energy Gases with a broader remit than traditional metrology fields would have more capability to answer these requirements and become the central nucleus to cover all measurement needs regarding metrology, standardisation and accreditation issues. The EMN will also cover similar standardisation challenges appearing in e.g. flow characteristics of hydrogen or hydrogen enriched natural gas, purity analysis in hydrogen or

biogas/biomethane, and so on (e.g. ISO/TC 158 Gas Analysis, ISO/TC 193 Natural Gas (including biomethane) and ISO/TC 197 Hydrogen) that are not currently part of a coherent approach.

The CCQM and CCM have developed strategy documents [4,5] that confirm new energy gases as one of the key sectors that will require the development of traceable measurement results and demonstration of international equivalence. EMRP and EMPiR programmes have supported and still support joint research projects (e.g. ENG01 GAS, ENG54 Biogas, 16ENG05 Biomethane, ENG03 LNG, ENG60 LNG II, 16ENG09 LNG III, 15NRM03 Hydrogen, 16ENG01 MetroHyVe, 14SIP06 Siloxanes (for biomethane)) to develop new measurement methods and measurement standards for specific needs of the energy transition. Facilitated by these research programmes, NMIs/DIs have engaged closely with target stakeholders and identified their specific needs. For example, answering the need for estimating the quality of biogas entering the natural gas network, measurement standards to determine the content of specific impurities in biogas have been developed in EMRP JRP ENG54 BIOGAS. However, these projects are not sufficient to meet the future energy gases needs of industry and society alone. Furthermore, the metrological needs and challenges are of pan-European importance as the energy transition requires European harmonisation and implementation, implying that not one single NMI/DI will be able to address them even in the long-term. Therefore, as the energy gases challenges are of similar and prime importance for all European countries, a strong metrological coordination point like the EMN for Energy Gases is vital.

Currently, NMIs and DIs have measurement capabilities in place to support the measurement infrastructure for conventional energy gases. For the natural gas flow measurements, for example, four European NMIs and DIs have joined their expertise in EuReGa. EuReGa is based on a MoU and it ensures the dissemination of a Harmonised Reference Value (HRV) for High Pressure Gas Flow measurements since almost 20 years ago. However, only few NMIs and DIs are involved in research programmes or have strategies aiming at establishing new measurement standards for renewable energy gases.

How and where NMIs should focus limited resources to obtain maximum impact for society urgently requires a strategic plan and significant coordination both at European and global levels. No single NMI has the expertise or resource to tackle all or even a significant fraction of the most critical priorities without collaboration. Without coordination, there is a strong likelihood of unnecessary duplication, with NMIs (nationally and/or regionally) potentially independently choosing to focus efforts on the same challenge with consequential neglect of others. EURAMET intends to establish a European Metrology Network to coordinate the European NMI response, to establish close links to the stakeholder community, to develop and implement a strategic agenda and establish a knowledge, technology transfer and promotion plan, to ensure an effective response is put in place. This SNT is intended to support that network in their initial tasks.

Objectives

Proposers should address the objectives stated below, which are based on the PNT 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 / legal / regulatory / market constraints, but the reasons for this should be clearly stated in the protocol.

The JNP shall focus on developing a long term ongoing dialogue between the metrology community and relevant stakeholders. This dialogue should support the take-up of research outputs from the metrology community and the collection of needs from industry to inform future research.

The specific objectives are

1. To publish a roadmap covering energy gases measurement requirements with an emphasis on the European energy transition process. The roadmap should identify the key measurement gaps and challenges as experienced by regulators and stakeholders working in the energy gas industry.
2. To disseminate research results from European metrology research activities (e.g. EMRP, EMPiR) for the benefit of relevant policy makers and regulatory bodies to support their ongoing standardisation activities. This should be achieved through presentations at relevant committee meetings and distribution of reports.
3. To develop a freely accessible online measurement service platform that will boost the dissemination and knowledge transfer of metrological services in the energy gases field to European industry. This should allow customers to access all available energy gases measurement services in Europe through one easy-to-use “contact” platform. This platform should advertise all measurement and calibration services, including those developed in the EMRP and EMPiR Programmes. Creating a brand for the ‘Energy Gas Metrology Network’ Measurement Service Hub should allow this site to become a recognisable platform used by

the whole energy gas industry to find the right measurement service or proficiency testing scheme.

4. To develop processes to create synergies between members of the EMN, stakeholders and other parties to address emerging issues related to energy gas production, trade, transmission and use. These collaborations should facilitate the provision of services that cannot be provided by one single party and deliver solutions at a scale relevant to the needs of the sector. Examples may include the provision of joint measurement and calibration services, proficiency testing schemes, workshops, seminars and training programmes by bringing together the organisations with the necessary expertise and parties requesting the services dealing with energy gases aspects e.g. legal metrology, inspection, manufacturing and production.

The proposed activities shall be justified by clear reference to the measurement needs within strategic documents published by the relevant stakeholders. Proposers should establish the current state of the coordination in this area, and explain how their proposed project goes beyond this.

The proposed activities should not include those essential for the establishment and operation of the EMN. EMNs will be established and operated by the EURAMET members using their own national resources regardless of whether specific EMPIR proposals are funded. EMPIR funding is for specific tasks aimed at ensuring a planned EMN will progress quickly towards contributing to the objectives of the programme.

EURAMET expects the average EU Contribution for the selected JNPs in this TP to be 0.4 M€, and has defined an upper limit of 0.5 M€ for this project.

Potential Impact

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

You should detail how your JNP results are going to:

- Address the SNT objectives and deliver solutions to the documented needs,
- Provide a lasting improvement to coordination in the European metrological community and communication with their stakeholders beyond the lifetime of the project,

You should detail other impacts of your proposed JNP.

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

Time-scale

The project should be of up to 5 years duration.

Additional information

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

- [1] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources
- [2] Paris Agreement, Reference: C.N.735.2016.TREATIES-XXVII.7.d, Paris, 12 December 2015
- [3] COMMISSION REGULATION (EU) 2015/703 of 30 April 2015 establishing a network code on interoperability and data exchange rules
- [4] CCQM Strategy document, 5.3.2 Support for NMIs to meet new measurement requirements in sectors, 5.3.2d “Energy”, <https://www.bipm.org/utis/en/pdf/CCQM-strategy-document.pdf>
- [5] CCM Strategy document, 5.2.3, 6.1.2 and 7.1, <https://www.bipm.org/utis/en/pdf/CCM-strategy-document.pdf>