Title: Standardisation of methods for impurity contents in biomethane and upgraded biogas

Abstract

To meet the diversification targets of the European natural gas supply, CEN, the European Committee for Standardisation, is drafting the specifications of biomethane and upgraded biogas for the injection into natural gas grids and the use as vehicle fuel. For implementing these specifications, standardised and validated sampling and measurement methods are urgently required for the contents of targeted impurities, such as siloxanes, chlorine, fluorine, compressor oil, dust, carbon monoxide and ammonia. To do this, methods and determining the performance characteristics of such methods, and offering these to CEN/TC 408 for consideration as European Norms, is needed.

Keywords

Biomethane, biogas, conformity assessment, siloxanes, ammonia, carbon monoxide, chlorine, fluorine, compressor oil

Background to the Metrological Challenges

Natural gas resources are declining and EU Directives specify that 20 % of EC energy consumption should come from renewable sources and that biofuels should provide at least 10 % of transport petrol and diesel consumption both by 2020. This has increased European dependence on imported natural gas and diversification of the natural gas supply. There is now an urgent need to significantly increase the amount of biomethane and upgraded biogas which is injected into natural gas networks and for use as a transport fuel and the EC has issued a mandate M/475 to CEN. As a result CEN/TC408 is developing;

- A European Standard for a quality specification for biomethane to be used as a fuel for vehicle engines

- Technical Specifications or EN standards for quality specification for biomethane to be injected into natural gas pipelines transporting either High calorific-gas or Low calorific-gas.

The development of the draft specification (prEN 16723-1 for injection into natural gas grids and prEN 16723-2 for transport fuel) is well underway. However during this development of these specifications an urgent need was highlighted for standardised test methods for biomethane and upgraded biogas. Test methods, written into the prEN 16723-1 and prEN 16723-2 for, e.g., the contents siloxanes, chlorine, fluorine, compressor oil, dust, carbon monoxide and ammonia were criticised because their suitability for biomethane and upgraded biogas was not established. To make progress with the implementation of the specifications, it is urgently needed to draft standardised test methods that are dedicated for biomethane and upgraded biogas. A further issue concerns the sampling of biogas for assessing impurity levels, as the sampling guidelines currently are dedicated to sampling natural gas, and not necessarily suited for sampling biogas for the range of parameters mentioned above. Whereas the composition of biomethane and upgraded biogas falls within the scope of ISO 6974 (the commonly used standard test method for determining the composition of natural gas), this standard was also proposed for the carbon monoxide content. This component is not part of the scope of ISO 6974 and most natural gas analysers are not designed for separating carbon monoxide from the other components. Similarly, for, e.g., chlorine and fluorine content, standard test methods for sampling and determining the contents of these components in air have been proposed. Although these methods constitute a good starting point for specifying dedicated methods for biomethane and upgraded biogas, their suitability has not been assessed yet. For most of the listed impurities, key performance indicators (KPIs) of the methods, such as repeatability, reproducibility, and the limit of detection

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have not been established. These KPIs are essential in relation to the use of such methods for conformity assessment of biogas and biomethane.

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 standardisation for CEN/TC 408 "Project Committee - Natural gas and biomethane for use in transport and biomethane for injection in the natural gas grid".

The specific objectives are

1. To develop and standardise methods for the measurement of the contents of targeted impurities, such as siloxanes, chlorine, fluorine, compressor oil, dust, carbon monoxide and ammonia, to support the establishment of specifications in prEN 16723-1 and prEN 16723-2 being developed by CEN/TC 408;

2. To determine the limits of detection and quantification, as well as the limits of repeatability and reproducibility of these standardised methods;

3. To address issues concerning the sampling, sample collection and storage;

4. To provide a definition of each standardised test method to CEN/TC 408 for consideration with the aim that the methods will be incorporated into a revision of EN 16723-1 and EN 16723-2.

The proposed research shall be justified by clear reference to the measurement needs within strategic documents published by the relevant 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.

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

In particular, proposers should outline the achievements of the EMRP projects ENG09 Biofuels, and ENG54 Biogas and how their proposal will build on those.

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

EURAMET also expects the EU Contribution to the external funded partners to not exceed 30 % of the total EU Contribution to the project. Any deviation from this must be justified.

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 energy 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 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.

Additional information

This topic is in response to needs identified by CEN/CENELEC published at http://msu.euramet.org/pre_norm_2015/index.html#stage1-orientation (priority 10 Improving the precision of determination and sampling methods for biomethane).