Launch of EU-funded project SmartGasNet to improve the measurement of flow rates, quality and energy in gas grids to facilitate the uptake of renewable hydrogen and biomethane

- 10 partners from 8 countries participate in this project, which started in August this year and will last until July 2028
- Findings in the work in SmartGasNet will facilitate the introduction of renewable energy gases into current gas grids, partially replacing natural gas.

November 2025 - The European SmartGasNet project (Metrology for smart metering in gas networks) is now underway following its Kick-Off Meeting in Delft (The Netherlands) on October 13 and 14. The consortium partners have taken the first steps of a project that will improve the measurement of flow rates, quality and energy of renewable gases that are introduced into gas grids.

Security of the supply of gas of adequate quality in the quantity needed is paramount for society. SmartGasNet will advance the processes for data collection, modelling, processing and prediction to foster the safe, efficient and economic operation of gas grids, thereby supporting the introduction of low carbon and renewable energy gases. The project will provide the necessary methods, algorithms, datasets and good practice guides to enable gas grid operators to adapt their data processing for fiscal metering, custody transfer and billing. In this way, the project will enhance European expertise in modelling and forecasting of grid properties, including the role that artificial intelligence (AI) and machine learning (ML) can play in achieving this goal.

In order to accomplish this goal, SmartGasNet will tackle it from 5 different perspectives. First, SmartGasNet will create and share with open access datasets for time-resolved gas flow measurements, including temperature, pressure and gas composition, using state-of-the-art methods and techniques, mimicking changes seen in real-world scenarios. Second, the project will develop methods for evaluating temporal correlation in gas measurement data, methods that will then apply to hydrogen, natural gas, and hydrogen-enriched natural gas networks. In addition, it will also develop methods for uncertainty assessment of time averages of gas quantity and calorific value, linking them to the models used to operate gas networks. Third,

SmartGasNet aims to evaluate the potential integration of machine learning (ML) and artificial intelligence (AI) into intelligent measurement and monitoring systems used in gas networks, producing measurement results that comply with the requirements of ISO/IEC 17025, OIML R140, ISO 15112, and ISO/IEC Guide 98. Fourth, this initiative will develop a package of methods for the evaluation of measurement data to support gas allocation and the fiscal metering of the blends of natural gas with renewable gases (e.g., hydrogen and biomethane), as well as renewable hydrogen. Last, SmartGasNet wants to facilitate the take-up of the technology and measurement infrastructure developed in the project.

Outcomes for industry and users

The datasets and statistical methods, together with the accompanying documentation, will enable grid operators to assess and adapt their measurement systems, providing them also with knowledge on where and how to integrate AI/ML into their systems. Moreover, the data-driven models will support gas grid operators and other industries, such as carbon capture and storage, and water supply. Calibration and testing laboratories for flow measurement will benefit from these methods, too, as the assessment of the performance of flow meters under dynamic conditions will be more reliable. Finally, the guidance and practical examples provided will enable rapid adoption of these methods in the laboratory community and by small organisations. All these datasets and statistical methods will be published with open access.

Regarding the impact in the metrology community, the FAIR datasets will foster research and development, enabling metrology institutes to revisit their calibration and measurement capabilities and make necessary adaptations. The novel methods for dealing with serial correlations in measurement data will assist the metrology community in their understanding and use of these models in various areas (e.g., flow measurement, use of dynamic methods in gas mixture preparation and electrical measurements, etc.). In terms of standardisation, this project will contribute to the revision of ISO 15112, EN 1776 and OIML R140 that deal with fiscal metering and custody transfer.

Economic and environmental outcomes

All SmartGasNet activities will foster the decarbonisation of the gas grid by investigating and providing knowledge on the behaviour of renewable gases such as biomethane or hydrogen when injected into these grids. Using existing gas infrastructure for the distribution of renewable gases will contribute to savings in investment costs. SmartGasNet will also contribute to reducing carbon dioxide emissions and saving on energy transmission and distribution, aligning with European targets to achieve carbon neutrality by 2050. The proposed research will promote a smooth transition from fossil fuels to renewable energies by the industry and end users.

The project is funded by the European Union through the European Partnership on Metrology, co-financed by the European Union Horizon Europe Research and Innovation Programme and from the Participating States. In total, SmartGasNet has a budget of €2 million over its three-year duration.

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The consortium is made up by 10 entities from 8 countries

Partner Logo	Description
VSL National Metrology Institute	VSL National Metrology Institute (VSL, NL): VSL is the coordinator of the project. VSL will employ its facilities for flow rate measurement, pressure, mass, humidity, and composition measurement of energy gases to provide empirical data sets in WP1. Its expertise in the evaluation of measurement uncertainty, time series analysis, and using AI in metrology is used to contribute to the project. It coordinated 21GRD05, 16ENG05. VSL is closely connected to standardisation in ISO and has good relationships with OIML.
ČESKÝ METROLOGICKÝ INSTITUT	Czech Metrology Institute (CMI, CZ): CMI has experience in performing regular audits at transfer stations of Czech TSOs and DSOs. CMI will use its capabilities for providing input to the experimental work regarding the uncertainty evaluation in a legal metrology context.
LITHUANIAN ENERGY INSTITUTE	Lithuanian Energy Institute (LEI, LT): LEI has a proven track record of collaborative research and consultancy work with companies in the gas sector. It will use its capabilities for the measurement of air/gas flows and the calibration of a range of meters and quantities, including flow rate, volume, pressure, humidity, and temperature. Additionally, it will use its expertise in mathematical and numerical modelling of fluid dynamics.
PTB Physikalisch-Technische Bundesanstalt Nationales Metrologieinstitut	German National Metrological Institute (PTB, DE): PTB brings in its experience in numerical simulations of gaseous flows and machine learning in flow related applications. PTB's expertise will primarily be used to develop CFD models. PTB also operates a parallel computer cluster with 64 nodes (1792 processors) which is available for the project.
DTU Technical University of Denmark	Technical University of Denmark (DTU, DK): DTU has participated in research where state-of-the-art, fast spectroscopy-based methods and techniques have been developed and applied. DTU will contribute with focus on simultaneous dynamical pressure and gas composition

	measurements in high-pressure gas flows typical for gas nets. DTU will work closely with industrial partners in the project and contribute to generation of data sets.
	European Research Institute for Gas and Energy Innovation (ERIG, BE): ERIG is an international non-profit organisation which aims at strengthening the role that gas plays as an energy source for the transition of the European energy system in synergy with intermittent renewable energy production. ERIG will provide stakeholder feedback and help assure impact by communication and dissemination activities. ERIG will also support the coordinator (VSL) with the project management tasks.
	European Gas Research Group (GERG, BE): GERG is a non-profit international research association with a membership of European gas companies across the value chain, universities and research centres. GERG has expertise in coordination, knowledge management, and dissemination for R&D projects. It will leverage its stakeholder networks to ensure maximum awareness and potential take up of the project outcomes.
	Norwegian Research Centre (NORCE, NO): NORCE is one of Norway's largest research institutes, with expertise in e.g., the development of measurement technology, and evaluation and optimisation of measurement systems, particularly for flow measurements. NORCE will use its competence in the analysis of measurement uncertainty in its activities. NORCE leads tasks on time series modelling and building on software developed by NORCE for Met4H2 EU-Funded project.
	Netherlands Organisation for Applied Scientific Research (TNO, NL): TNO is a Dutch research organisation which has R&D department focus on flow assurance & fluid dynamics of gas transport. TNO led technology programs for cost-effective gas quality sensors and has developed detailed physical gas grid models, which were validated in real gas grids in the Netherlands. Next to physical modelling of gas networks, TNO has a background and extensive experience in data-driven machine learning metering, model updating techniques and uncertainties quantifications from oil & gas sectors.
	University of Ljubljana (UL, SI): UL includes a metrology research group at the Faculty of Mechanical Engineering at the University of Ljubljana, whose central fields of research are fluid flow metrology and measurement dynamics. UL, with support of national TSO, will provide the gas network data sets. UL will also contribute to the statistical and analytical analysis of time-series uncertainty correlations and will participate in software implementation and validation.