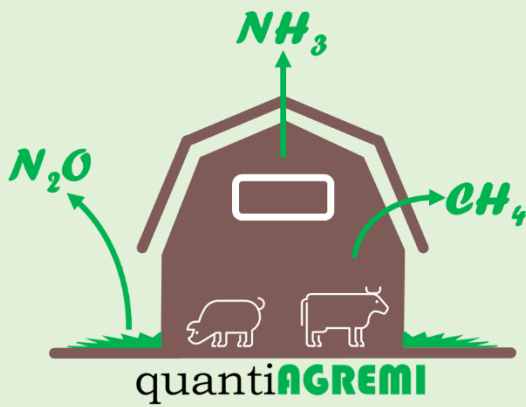


Project

Newsletter



September 2023

Project drivers
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 Meet the WP leaders



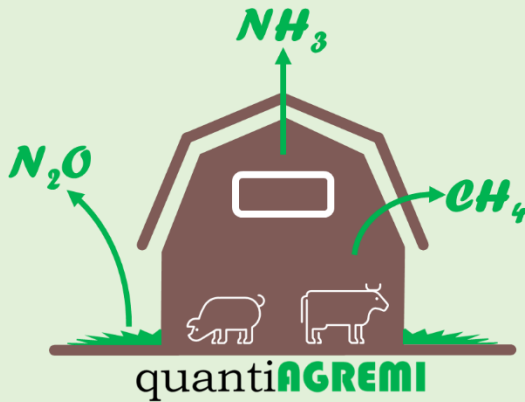
Welcome to the first newsletter!

In this first update from the project consortium, you will find a brief summary of the drivers behind the project together with the objectives. There is also a brief description of each of the four work packages and the work package leaders introduce their institutes.

Future editions of this newsletter will include introductions from the other project partners and provide progress updates for each work package.

Philip Dunn

WP4 leader
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Project drivers

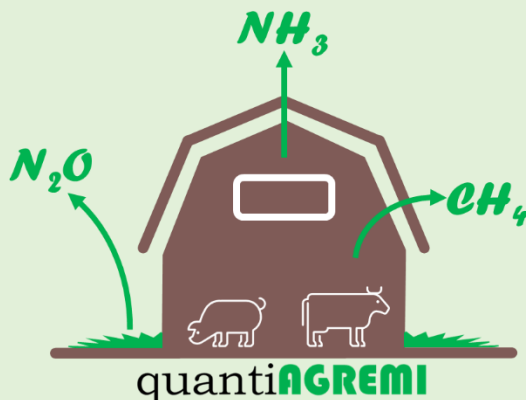
The agriculture sector, in particular livestock housing, contributes substantially to the emission of various greenhouse gases (GHG) within the EU including 93 % of EU ammonia (NH₃), 48 % of Methane (CH₄) and 72 % of nitrous oxide (N₂O) emissions. Further, emissions of NH₃ cause formation of fine aerosol particles, acidification and eutrophication of the environment and can be transformed to N₂O.

The EU Green Deal seeks to reduce GHG emissions for the agriculture by 55 % of the 1990 level by 2030 and to reduce N losses by at least 50 %. As a result, the uncertainties in emission inventories (up to 300 %), in deposition of NH₃ release from livestock housing and in N₂O production processes in biogeochemical models all need to be reduced. Low-cost emission monitoring solutions such as sensors that are traceable and validated are required.

It is thus essential to develop a coordinated European metrology infrastructure to improve the NH₃ and GHG measurements and to reduce the uncertainties of emission data for a better understanding the emissions of GHG and reactive N in agriculture.

Project objectives

1. To develop traceable techniques for quantifying NH₃ and CH₄ emissions from selected livestock housings with target uncertainties of 10 % (CH₄) to 20 % (NH₃) [mechanically ventilated] and 30 % (CH₄) to 40 % (NH₃) [naturally ventilated].
To **define target applications** (e.g. animal category, housing systems) according to stakeholder needs.
2. To develop and characterise CO₂, NH₃ and CH₄ emission monitoring techniques, considering atmospheric conditions, for enhanced spatial and temporal coverage.
3. To **identify key-indicators and improve emission models** for increasing the representativeness of the emission estimations and determine their uncertainty.
To **develop farm-monitoring systems** for evaluating the efficiency of reduction measures and provide management tools to farmers
4. To **reduce the uncertainty associated with up-scaling GHG emissions and nitrogen loss from soils** by improving model parameterisation to determine N₂O isotopic species for different production pathways.
To improve methods for quantifying NH₃ deposition from livestock housing and tracing nitrogen isotopes (e.g.¹⁵N) in managed soils.
5. To facilitate the dissemination and uptake of the technology and measurement infrastructure :
 - a. contributing to missions inventory reports under the UNFCCC,
 - b. providing guidelines to facilitate the establishment of decision matrices and the promotion of mitigation measures by policy makers,
 - c. providing farmers access to reliable methods for identifying efficient mitigation strategies and provide quantitative GHG emissions at farm level.



WP1 *Towards SI-traceable reference methods for livestock emissions factors*

- Improved **wet ammonia reference gas**,
- **New comparisons directly in stables** (reduction of the uncertainties),
- **SI characterization, validation and comparison** of the sophisticated emission calculation methods and other simplified models,
- **Uncertainty assessment** of the methods and the emissions factors.

WP leader:  **METAS**
Federal Office
of Metrology


WP2 *New sensors and measurement techniques: development, laboratory testing and demonstration in the field*

- Development and characterization of **new complementary sensors**,
- Two **field comparison** campaigns
- Precise **instruction for farmers** to use the new sensors

WP leader:  **KIT**
Karlsruher Institut für Technologie

WP3 *Beyond livestock buildings: Reducing the uncertainties of N2O inventories and improving the quantification of NH3 deposition*

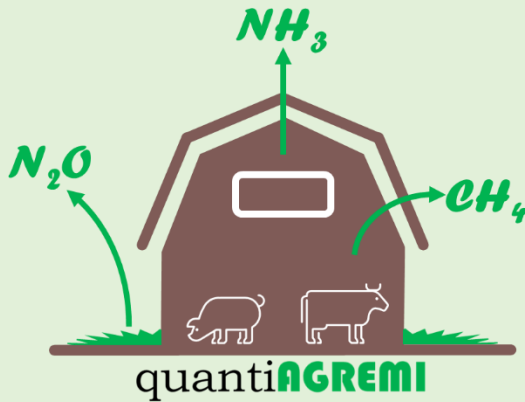
- Determination of **NH₃ deposition** close to livestock housings,
- **Intercomparison of measurement techniques for determination of field NH₃ fluxes**,
- Determination of **N₂O source** processes in the field based on **isotope ratios in N₂O**,
- **Improvement of biogeochemical models** based on isotope measurements.

WP leader:  **VTT**

WP4 *Dissemination and communication*

- **Contribution to missions inventory reports** under the UNFCCC,
- Provision of **guidelines** to facilitate the establishment of decision matrices mitigation measures by policy makers,
- Providing farmers access to **reliable methods** for identifying efficient mitigation strategies and provide quantitative GHG emissions at farm level.

WP leader:  **LGC**



Meet the Consortium

In this newsletter, the project partners leading the work packages introduce themselves. In future newsletters you will have a chance to meet the other project partners too.

LNE

LNE (Laboratoire national de métrologie et d'essais) coordinates the QuantiAGREMI project and is therefore the leader of Work Package 5 on management and coordination. LNE also contributes to WP1, WP2 and of course WP4 on creating impact.

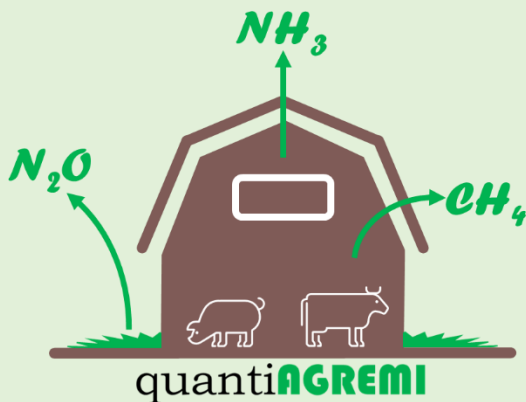
LNE operates as the national reference laboratory in metrology for French industry, to pursue its scientific and technological development in order to anticipate new measurements and testing requirements created by advances in technology and society's new expectations in the fields of safety, health, quality and environmental protection. It provides state authorities and key economic players with the technical assistance they require to draft new regulations and standards at national, European and international level and develops new test methods. Applying its multidisciplinary technical expertise, LNE provides companies with services in the fields of metrology, medical and health products, construction products, packaging, transport, environment and industrial products.

In the field of gas metrology, LNE develops and maintains reference materials, which are primary standard gas mixtures prepared by high accuracy gravimetric methods and is accredited to ISO 17034 standard. In this framework, LNE has developed capabilities in gas analysis and is fully accredited to ISO/IEC 17025 standard. LNE will make a major contribution from a wealth of experience in the preparation and analysis of gravimetric and dynamic reference gas mixtures.

LNE is also a member of the French Central Laboratory for monitoring air quality (LCSQA) which ensures the technical coordination of the monitoring networks in ambient air; the objectives of LCSQA is to improve the quality of data to fulfil the requirements of European Directives, and to bring metrology tools.

METAS

METAS, the Swiss Federal Institute of Metrology, is the Swiss NMI. It realises and disseminates internationally harmonised and recognised measurement standards at the required accuracy. The Chemical and Biological Metrology Section provides services related to the application of measuring instruments in the fields of environment and health, and it provides standards and calibration services to measure air pollutants. The Gas Analysis Laboratory at METAS has provided services in the area of gaseous airborne pollutants and carries out accurate measurements for gas mixtures for over 30 years. It started with the analysis and homologation of exhaust gas analysers according to Swiss national law.



A special emphasis of the laboratory lies on the dynamic generation and dilution of gas mixtures, for which METAS runs three magnetic suspension balances, four mobile reference gas generators and two mobile dilution systems. Additionally, an in house built cryo filling system is available.

The gas laboratory team already possesses a rich experience in gas mixture generation for the target species and at the required amount fractions of the quantiAGREMI project. They will dynamically generate reference gas mixtures for NH_3 and selected halogenated substances.

METAS leads WP1 of QuantiAGREMI and also contributes to the other work packages with the exception of WP2.

KIT

The Karlsruhe Institute of Technology (KIT) is a globally leading technological research institute and part of the Helmholtz Association, one of the most important German science organizations. The Institute of Meteorology and Climate Research, Atmospheric Environmental Research (IMK-IFU) has a focus on biosphere-atmosphere interactions, with an outstanding tradition in Nitrogen cycle as well as GHG research. Both the proposer and the division "Terrestrial Bio-Geo-Chemistry" (TBGC) of IMK-IFU have been intensively working on the quantification of N balances and N_2O emissions from agricultural and livestock systems with field and modelling studies being the instruments of choice.

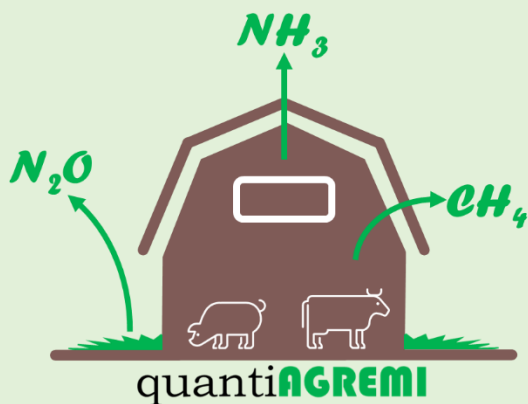
TBGC actively develops the biogeochemical model LandscapeDNDC, owns automatic GHG measuring infrastructure, and holds a state-of-the-art stable isotope laboratory that enable the foreseen modelling work, provisioning of a chamber system, and determination of water and plant isotopic composition.

In addition to leading WP3, KIT also contributes to all other work packages within this project.

VTT

VTT Technical Research Centre of Finland Ltd is the leading research and technology company in the Nordic countries. VTT carries out research and innovation activities for the needs of industry and knowledge-based society. VTT uses its research and experience to develop new smart technologies, profitable solutions and innovation services for domestic as well as for international customers and partners. As the National Metrology Institute of Finland, VTT MIKES provides the basis of reliability for measurements in Finland by realising the SI units and by implementing and developing the national measurement standards system. VTT MIKES has a long tradition of high-level metrological research and development of measuring applications in partnership with universities and industry.

VTT MIKES Process Metrology and Optical Spectroscopy teams have a wide field of activities covering research, training and calibrations. They are experts in optical spectroscopy research and applications, with special emphasis on reactive gases, including measurement, reference gas generation and gas handling of trace gases as well as determination of isotopic ratios in trace gases.



The groups currently develop optical gas sensing techniques in the near-IR and mid-IR spectral range and have developed and implemented various techniques for scientific, medical and industrial applications. Instrumentation developed within the groups extends from laboratory based devices to field capable instrumentation.

VTT performs varied research into the characterization and control of emissions originating from different sources, such as power plants, industrial processes and traffic. For this purpose, VTT has diverse measurement techniques (most of which are accredited according to EN ISO/IEC 17025) and they also develop new innovations with industry and analyser manufacturers for the determination of emissions together.

VTT leads WP2 and contributes to all other work packages as well

LGC

LGC hosts the UK's National Measurement Laboratory (NML) for chemical and bio-measurement, which is the UK's Designated Institute. LGC provides metrology research, calibration and testing and is responsible for underpinning the traceability of UK measurements in organic, speciation and inorganic analysis. LGC brings world-class expertise in reference materials production and chemical characterisation. Research within the Inorganic Analysis Team within the NML focusses on analyte (elements and element species) quantification at trace levels, isotope ratio analysis and production of certified reference materials.

Within WP3 of this project, LGC will contribute isotope ratio measurements of nitrogen in plant material and soil from transects around animal housings to assess if N isotopic composition can be used as a proxy for the spatial extent of near-field N deposition. They will also provide traceable determination of $\delta^{15}N$ for $[NH_4]^+$ and $[NO_3]^-$ in soil extracts. LGC also leads the impact and knowledge transfer work package (WP4).

First Stakeholder Workshop

To be held online on **8th November 2023**.

Dates for the diary