

# Research Roadmap **BIOMETHANE**



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# INTRODUCTION

Biomethane can contribute to decarbonising the European energy system.

It can be regarded as carbon neutral or even carbon negative depending on biomass source, production process, and factors such as carbon capture or CO<sub>2</sub> utilisation being applied in its lifecycle.

Extensive research and development are required to guarantee a seamless, safe and cost-efficient integration of biomethane in the grid, while contributing to Europe's decarbonisation objectives.





# GERG'S RESEARCH ROADMAP PROCESS

The process is a **collaborative effort** by industry experts that **defines research and development gaps** and integrates the results of other ongoing initiatives in Europe and internationally. It will be used as a tool to inform the larger R&D community, as well as policy makers, facilitating the creation of targeted research projects.

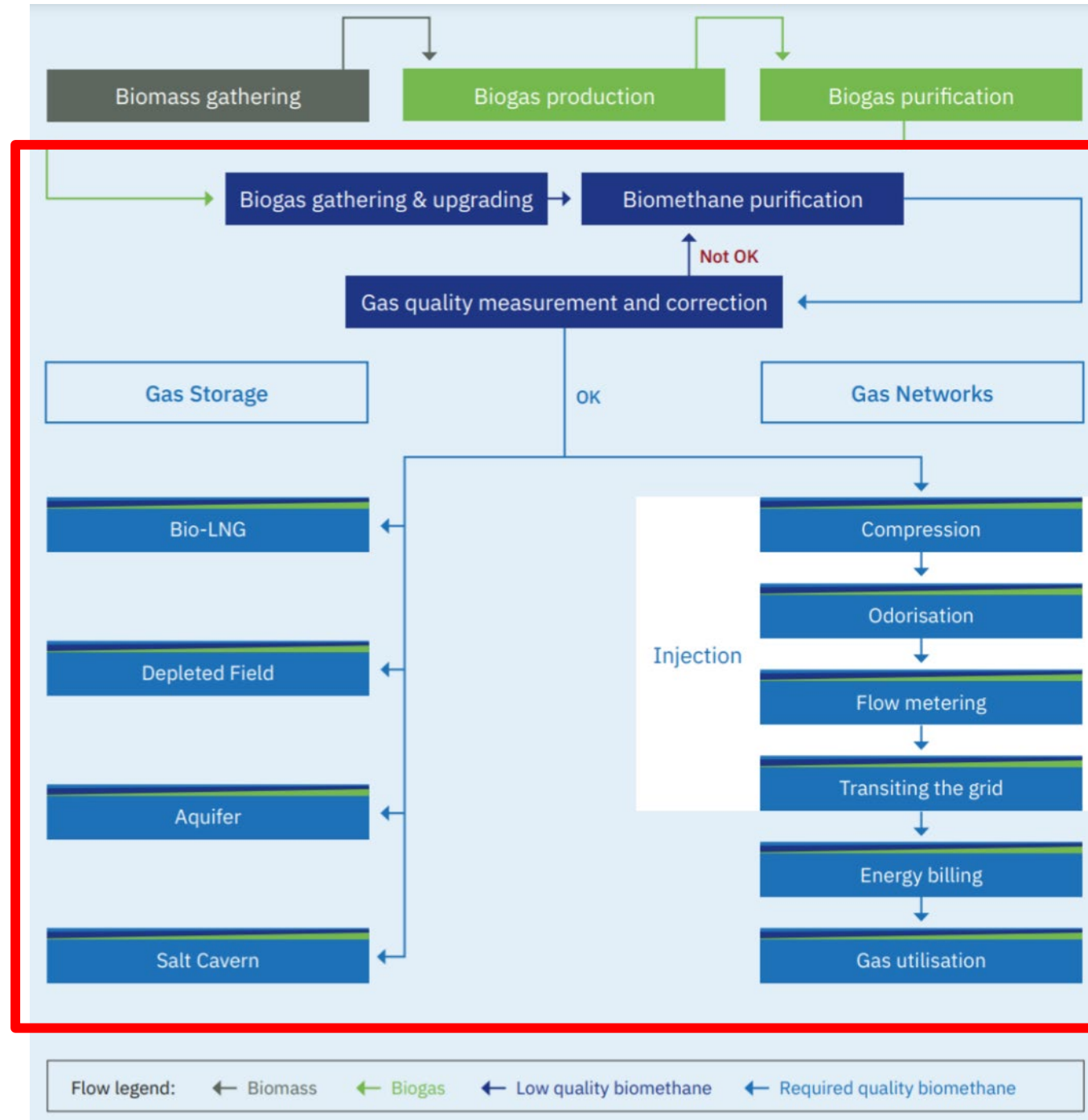




# BIOMETHANE VALUE CHAIN

Schematic view of the biomethane value chain, with a specific focus on the **flows**: biomass, biogas and biomethane.

Scope of the GERG Roadmap





# GERG'S BIOMETHANE RESEARCH ROADMAP

Based on a series of workshops to collect the insights of experts, the GERG Secretariat and WG leader developed a list of research topics to be addressed by the sector.

These topics were classified into 11 categories, and sorted by priority within each category. Timelines were proposed for each category, and research actions classified by priority.

## Value Chain

- Upgrading and gathering
- Injection
- Storage
- Methane emissions

## Gas Quality

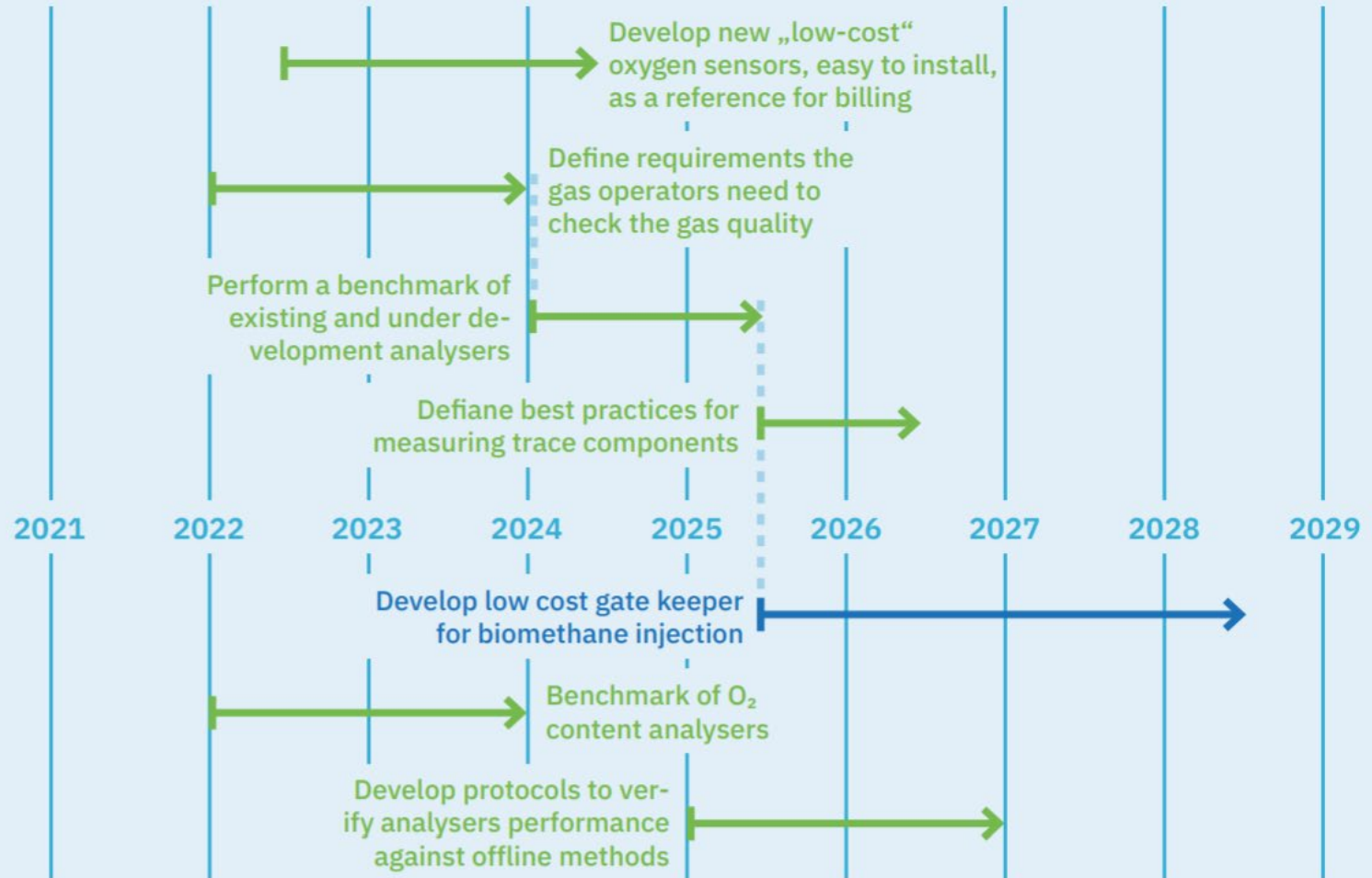
- Overall gas composition
- Impact of siloxanes
- Sulphur and terpenes
- Safety
- Odourisation
- Analysers and meters
- Energy billing





## Timeline example: R&D Topics Analysers and meters category (gas quality section)

Figure 2: R&D Topics Analysers and Meters Category



Priority: High Medium

# KEY FINDINGS: RESEARCH ACTIONS

## Value Chain

- ↪ Review of **purification/upgrading processes** based on the production/use needs.
- ↪ Guidelines on **biogas gathering** system.
- ↪ Benchmark about the technical aspects of **injection** adaptation to biomethane.
- ↪ Recommendations for managing **summer-time production** (decision tree).
- ↪ Evaluation of formation (rock and water) damage due to **trace components**.
- ↪ **Oxygen removal** units for UGS and sensitive end-users.
- ↪ Sources of **methane emissions** from the biomethane **value chain** and their relative importance.
- ↪ **Emission factors** definition for biomethane assets through measurement campaigns.
- ↪ **Best practices** on measurement methods for biomethane plants.
- ↪ **GHG saving potential** of the biogas/biomethane industry.
- ↪ Best practices for all process blocks in order to **limit GHG emissions**.

## Gas Quality

- ↪ **Data collection** on the distribution of biogas/biomethane production processes/ feedstock used, and on the resulting composition of the gas.
- ↪ Possible **interaction** between several components (O<sub>2</sub>, CO<sub>2</sub>, sulphur, etc.).
- ↪ **Siloxanes** impact on sensors.
- ↪ Siloxanes impact on HDV engines.
- ↪ Evaluation of sources of **terpenes**.
- ↪ Limit value and impact of **terpenes** on elastomers.
- ↪ **Sulphur content** limit definition.
- ↪ Impact of **trace components** on corrosion and odourisation.
- ↪ Practical operating guidelines to prevent or mitigate **odour masking**.
- ↪ „low-cost“ **oxygen sensors**, easy to install, as a reference for billing.
- ↪ Gas operators **requirements** to check **gas quality**.
- ↪ Benchmark of existing and under development **analysers**; protocols to verify their performance against offline methods.
- ↪ **Best practices** for measuring trace components.
- ↪ Benchmark of **O<sub>2</sub> content analysers**.
- ↪ State of the art for energy **billing** practices in Europe.
- ↪ Regulatory requirements of **tracking** specifically for distribution and city grids.
- ↪ Trade-off between number of sensors and model **performance**.





# CONCLUSION

- The biogas and biomethane sector is a valuable asset in the energy transition.
- Collaborative R&D and knowledge sharing is key to ensure the its efficient development.
- The GERG Research Roadmap is an example of such a collective initiative, and follow-up actions are already ongoing (Biomethane injection best practices project).
- A Summary Brochure of the Roadmap will be publicly available after the conference.

