DG ENER Study on Hydrogen Quality in Dedicated Infrastructure and Standardisation

MARCOGAZ Feedback

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ABOUT MARCOGAZ

Founded in 1968, MARCOGAZ represents 29 member organisations from 20 countries. Its mission encompasses monitoring and policy advisory activities related to the European technical regulation, standardisation and certification with respect to safety and integrity of gas systems and equipment, rational use of energy as well as environment, health and safety issues. It is registered in Brussels under number BE0877 785 464.

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1. Introduction

The development of a competitive and interconnected European hydrogen market depends on clear technical frameworks that enable cross-border compatibility and efficient infrastructure use. The study published by DG ENER on "Hydrogen Quality for Dedicated Infrastructure and Standardisation" contributes to this objective by examining key parameters that will influence how future hydrogen networks are designed and operated. Marcogaz considers this analysis a reference point in the broader process of establishing practical and harmonised rules for hydrogen deployment in Europe.

As hydrogen projects move from pilot initiatives toward large-scale implementation, infrastructure planning becomes increasingly central. Transport networks, underground storage facilities and terminals must function as an integrated system capable of linking diverse supply sources with evolving demand centres. In this context, hydrogen quality specifications are not purely theoretical considerations; they directly affect operational performance, system flexibility and investment decisions throughout the value chain.

Marcogaz submits this response to share the technical insights of its members and to support evidence-based policymaking. By drawing attention to operational experience and system-level implications, this contribution seeks to assist DG ENER in refining future standardisation work in a way that is workable in practice and responsive to the varied conditions present across Member States.

2. General Observations and System-Level Considerations

2.1. Time perspective of infrastructure scenarios

Certain modelling premises in the study — especially those concerning the proportion of new versus repurposed pipeline infrastructure — would benefit from clearer timeframe. For example, an infrastructure mix consisting of roughly 40% newly built pipelines and 60% converted assets may be difficult to achieve by 2030, more realistic around 2040, and broadly attainable closer to 2050.

Associating such assumptions with explicit milestone years would help stakeholders interpret the scenarios and judge their feasibility within the expected pace of hydrogen network expansion in Europe.

2.2. Even-handed comparison of purity options

While the study delivers useful technical input, parts of the analysis appear to give greater prominence to the 99.5% mol H_2 pathway. Considering the heterogeneous infrastructure starting points and strategic approaches among Member States, Marcogaz considers it important that alternative purity routes be assessed in a balanced and technology-neutral manner, particularly as the study may inform future CEN standardisation activities.

Ensuring that options such as 98% mol H_2 receive comparable analytical treatment would reinforce confidence that the conclusions support interoperable solutions suitable for the entire European market and infrastructure operators.

In addition, the analysis would benefit from explicitly considering the specific impurities associated with repurposed infrastructures, which are likely to reflect the historical use of the assets. For instance, residual methane may require dedicated treatment through PSA or membrane-based solutions, leading either to hydrogen losses or to additional energy consumption. Such impacts should be consistently reflected across all purity pathways in order to provide a realistic assessment.

3. Infrastructure and Storage Aspects

3.1. Range of storage options and utilisation rates

In the current analysis, storage is identified as a significant cost driver, yet the scope is largely limited to porous formations and newly constructed caverns. A more comprehensive representation of Europe's hydrogen trajectory would also consider:

- Converted salt caverns, which are expected to be instrumental during the early deployment phase.
- Utilisation assumptions aligned with ENTSOG TYNDP 2024 projections, where throughput typically falls between 17% and 24%, rather than the 10% value applied in the study.

Including these elements would provide a more realistic basis for estimating system costs.

4. Purification Technologies and Economic Assessment

4.1. Breadth of purification solutions

The report primarily evaluates Pressure Swing Adsorption (PSA) as the reference purification technology. Marcogaz members emphasise that other established techniques — such as Temperature Swing Adsorption (TSA) and membrane separation — are also relevant and should be incorporated to capture the full spectrum of technical and economic options.

Furthermore, the generalisation that PSA is consistently less expensive than TSA is not universally supported by operational experience. The suggestion that PSA tailgas could be reinjected into storage sites is very questionable as it introduces operational and safety considerations that warrant additional clarification. In practice, reinjection of PSA tailgas into infrastructure would typically necessitate an additional purification step, most often membrane-based, due to the low pressure of the tailgas stream after adsorption. This would in turn require recompression, leading to additional energy consumption and associated costs. These elements are not reflected in a simplified comparison with a single-step TSA-based approach. Alternatively, direct valorisation of PSA tailgas as fuel would require the presence of a continuous on-site consumer capable of accepting a degraded hydrogen stream, which may not be systematically available.

4.2. Clarity of cost calculation methodology

Key charts and tables in Chapter 5 form the foundation for the study's cost comparisons, yet the intermediate calculation steps are not always explicit. Marcogaz members report that this limits traceability and makes it challenging to understand how final figures are derived. This issue is significant because relatively small parameter changes, including those listed in Table 5-1, can materially affect the results. The indicated cost gap between purification to 99.5% and 98% hydrogen, for instance, corresponds to a relative difference of roughly one third, underscoring the sensitivity of the model.

This cost difference between the two purity levels is not the same for new facilities and converted facilities, which will undoubtedly require specific purification steps depending on the trace pollutants resulting from the previous activities of these assets.

More detailed documentation of the modelling approach would enhance transparency and support constructive stakeholder engagement. The accuracy of the models must be addressed to ensure that the differences are significant.

The computational core and the tool underlying this study are confidential at this stage.

As the study was financed by public funds (DG ENER), MARCOGAZ believes that the core calculations and the tool underlying this study should be made public in their entirety.

This calculation method and the tool underlying this study should be made available to stakeholders or/and to representative associations (such as MARCOGAZ, GIE, ENNOH, CEFIC, etc.) who request it. These stakeholders or representative associations could, as necessary, examine the details of these calculations in greater depth and conduct any sensitivity studies they deem useful. This solution would promote approval of this study and consensus around it.

MARCOGAZ requests the core calculations and the tool underlying this study and is available to examine the details of these calculations in greater depth and conduct any sensitivity studies it deems useful.

5. Conclusions and Proposals

Marcogaz endorses the Commission's ambition to establish a coherent framework for hydrogen quality and agrees that rigorous technical analysis is essential for effective standard setting. Based on the expert review carried out by its membership, Marcogaz proposes:

- Linking infrastructure and cost assumptions to clearly defined timeframe.
- Maintaining an impartial and technology-neutral evaluation of purity pathways.
- Reassessing underground storages options and utilization rates; including extending storage scenarios to cover repurposed caverns.
- Assessing a wider portfolio of purification technologies and associated costs.
- Improving transparency in cost-modelling procedures.

6. Closing Statement

Marcogaz remains committed to ongoing collaboration with DG ENER and other relevant stakeholders. Continued dialogue, grounded in transparent analysis and shared technical expertise, will be vital for developing an efficient and interoperable European hydrogen market. Marcogaz is prepared to support the forthcoming stages of the standardisation process with further specialist input.