ENNOH'S PUBLIC CONSULTATION ON HYDROGEN QUALITY

MARCOGAZ Response

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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.

DISCLAIMER

Identification :

1. Please provide your name, your position, and the organization you represent, or indicate if you wish to remain anonymous.
Organisation: MARCOGAZ

General Considerations :

2. What do you consider to be the main purpose of hydrogen quality monitoring?
The primary purpose of hydrogen quality monitoring is to ensure: • **Infrastructure integrity and safety**, including compatibility with pipelines, underground storage, and utilisation in end-use appliances. • **Interoperability across interconnected networks**, enabling cross-border hydrogen flows. • **Reliable metering and billing**, as contaminants may affect measurement technologies and calorific value determination. • **Market confidence**, ensuring hydrogen delivered meets agreed specifications.

3. Several studies have been carried out, and position papers have been issued on this topic. In your view, what is the main decision that needs to be made at this stage?
The key decision is to determine **the regulatory philosophy for hydrogen quality**: • Whether Europe should adopt a **single network specification with limited flexibility**, or • A **harmonised framework based on contaminant thresholds with application-specific requirements**. MARCOGAZ considers that **agreement on contaminants thresholds and measurement methodologies** is more urgent than defining a single purity number.

Infrastructure :

4. Do you agree that one of the most important principles is to build a single, interconnected hydrogen network without distinctions between hydrogen grades or types?
In principle, yes. A single interconnected hydrogen network supports market liquidity and efficient infrastructure use. However, this should be based on **a common baseline quality envelope**, taking into account that limitations for end-use applications and underground storages may occur. Also, we should consider that the construction of H_2 transport networks begins today with regional projects for which local agreements defining a specific quality of H_2 may be found. These may differ from the values proposed in European studies.

5. Do you agree that storage facilities represent the most critical link in the hydrogen value chain?

Storage facilities are indeed critical due to:

- Potential **presence of impurities (from the underground) in the withdrawn gas (e.g. moisture, sulfur species, hydrocarbons)** possibly due to mixing effects and cushion gas interactions, but also underground water and bacteria.
- Implementation of costly gas treatment units considering underground storages pressures and flow rates; keeping in mind that processes generating too much tailgas will not be applicable.
- Lack of space to implement such treatment units on some existing storages.

A special attention should be devoted to H2 underground storage as many of them will be retrofitted from NG gas, implying the presence of impurities that may require expensive and huge treatment units, if feasible. On a long term basis there will be the same challenge with porous storages (aquifers and/or depleted fields). However, hydrogen storage is critical for the development of an interconnected market, the initial market movers are equally invaluable in establishing and sustaining the hydrogen economy.
Specific monitoring and operation procedures will be necessary at Storages interfaces, similar to those at producers exit points.

6. How do you assess the role of hydrogen transmission network operators (HTNOs)?

Hydrogen transmission network operators should:

- Guarantee **quality preservation during transport**
- Provide **transparent quality data**
- Implement **network balancing and mixing management**
- Ensure the reliability and availability gas transport infrastructure and guarantee transit under optimal conditions in terms of safety and cost, while respecting the environment.

HTNOs are central in ensuring cross-border interoperability and system integrity.

7. Do you agree that specifying hydrogen quality at entry points is a necessary and sufficient condition for HTNOs, provided that hydrogen is delivered at exit points in accordance with the entry specifications?

We strive to have one hydrogen quality specification applicable for the value chain as a whole and compatible with all operators of infrastructures.
Every stakeholder along the value chain is equally responsible for maintaining the quality parameters given by a common and agreed standard.
HTNOs should therefore ensure **both entry compliance and network quality management**, supported by monitoring and modelling.

8. How do you assess the role of hydrogen distribution network operators (HDNOs)?

HDNOs play a crucial role as the interface with end users:

- Managing **local quality variations and pressure regimes**
- Ensuring **metering accuracy**
- Facilitating connections for diverse consumers with different quality sensitivities
- Supporting deployment of **local purification where required**

9. Do you identify any specific considerations or challenges related to terminals?
Terminals may introduce variability due to: • Conversion processes (e.g. cracking of carriers, liquefaction/regasification) • Transient operations and start-up phases • Potential introduction of specific contaminants (e.g. nitrogen, ammonia traces) The same quality requirements apply to terminal interfaces as to the rest of the value chain.

Purity levels and contaminants thresholds:

10. What do you consider more important: reaching a consensus on a unified hydrogen purity level in Europe, or primarily reaching a consensus on contaminants thresholds?
Reaching consensus on **contaminants thresholds** is more important than defining a single purity level. From a network perspective, **specific contaminants drive safety, material compatibility, and metering performance**, while overall purity is a derived indicator. Also, including a Wobbe-Index range would support this approach. It should be noted that adopting higher purity standards would entail additional treatment costs for the hydrogen infrastructure, including both pipelines and storage facilities, which operate as interconnected assets to ensure the safe and efficient functioning of molecule-based energy systems.

11. With regard to contaminants, do you believe that a consensus has already been reached on threshold values? What are the remaining areas of concern?
A broad consensus has already been reached on threshold values for most contaminants relevant to hydrogen transport and distribution. The main remaining area of discussion concerns **methane content, in which some progress is already made.**

12. Do you think that standardisation bodies such as CEN/CENELEC should receive a clear mandate from the European Commission to issue specifications recognised by all Member States?
Yes. A clear mandate from the European Commission to **CEN / CENELEC** would accelerate harmonisation and avoid fragmentation between Member States.

Production:

13. Do you identify any areas of concern related to hydrogen production?
Concerns include: • Variability of production routes and associated contaminant profiles • Drying and purification performance • Trace contaminants affecting infrastructure and metering • Lack of harmonised measurement at production sites
14. With regard to natural hydrogen (white hydrogen), do you foresee potential challenges in the event of an expansion of this type of production?
Potential challenges include: • Uncertain contaminant composition • Variability over time • Presence of inert gases or sulfur species • Need for dedicated treatment and monitoring

Consumption:

15. Different levels of purity are required depending on end uses. Do you believe that, if a globally high level of purity were specified across all interconnected European networks (e.g. >99.97%), local purification units (e.g. for fuel cells) could be avoided?
Even if a globally high hydrogen purity level were specified across interconnected European networks (e.g. >99.97%), local purification units would likely still be required for limited sensitive applications (e.g. electronics). In that case, a European hydrogen network would be highly unlikely, with only local clusters emerging, as ensuring consistent adherence to such a specification across Europe would be nearly impossible. The most efficient solution is: • Establishing a **harmonised baseline network specification** that ensures infrastructure integrity, interoperability and safe storage operation, all at reasonable economic costs. • Allowing **application-specific polishing at the point of use** where ultra-high purity is required (e.g. fuel cells, electronics, mobility hubs) • Avoiding overly stringent network-wide purity requirements that could significantly increase costs and operational complexity for transmission, distribution and storage assets • Bear in mind that eventually, all end-users will have to support the costs of both production and infrastructures (distribution, transmission and underground storages). This layered approach minimises system costs, preserves operational flexibility (including storage cycling and network mixing), and avoids transferring end-use driven purification burdens onto network operators.

16. What do you consider to be the main priorities regarding data provided by HTNOs through a transparency platform?

Key priorities:

- Real-time or near-real-time quality data
- Standardised parameters and units
- Traceability and historical data
- Information on deviations and corrective actions
- Interoperable data exchange formats

Research and development:

17. Do you foresee significant innovation opportunities that could reduce hydrogen purification costs?

Promising areas include:

- Advanced membranes and sorbents
- Modular purification technologies
- Improved sensors and real-time analysers
- Digital quality tracking and predictive models

18. Do you identify a need for investment in developments related to hydrogen quality?

Yes. Investment is needed in:

- Measurement technologies
- Online monitoring systems
- Storage conditions gas treatment processes
- Digitalisation and data platforms

Regulation and cost allocation:

19. In a regulated framework, what would you consider to be the optimal approach to cost allocation for hydrogen purification processes?

In a regulated framework, an optimal cost allocation should reflect responsibilities across producers, network operators (TSOs/DSOs), and storage operators (SSOs), while preserving market development.

A balanced approach would include:

- **Polluter-pays principle at entry points**, whereby producers ensure compliance with baseline network quality specifications
- **Regulated cost recovery** for TSOs/DSOs/SSOs for monitoring, quality tracking and operational measures necessary to preserve quality within networks and storage
- Recognition that **storage facilities may require specific quality management measures**, with associated costs treated as regulated infrastructure costs where they benefit the overall system
- **End-user driven purification costs** allocated locally when purity exceeds network specifications

This approach ensures cost reflectivity, avoids cross-subsidisation, and supports efficient network and storage utilisation while maintaining interoperability.

20. Do you think that incentive mechanisms could be useful in relation to hydrogen quality?
Yes. Incentives could: • Encourage producers to meet higher quality standards • Promote innovation in purification and monitoring in general and more specifically for underground storages (e.g.: high pressure, high flow rate, little space) • Reward transparency and quality reliability • Support early deployment of harmonised solutions