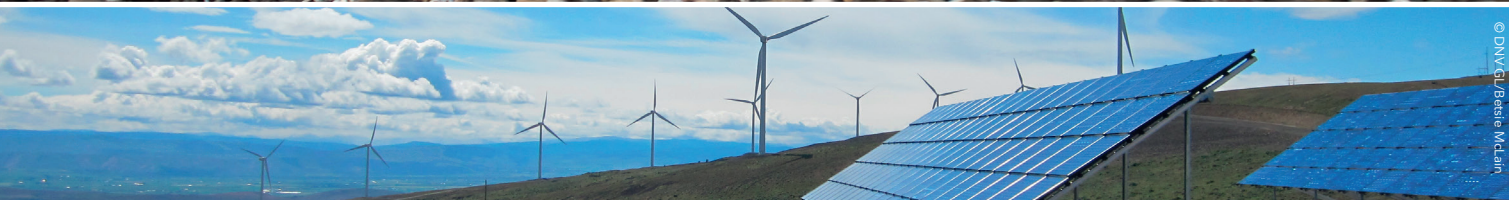




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OIL & GAS

HYREADY

In order to support the decarbonization of the energy system, stakeholders are considering the accommodation of hydrogen (e.g. from Power-to-Gas) in the natural gas grid. With HYREADY Guidelines, transmission and distribution system operators (TSOs and DSOs) can prepare their natural gas networks and operations for the injection of hydrogen, both pure and as a gas component, with acceptable consequences. The guidelines will be based on existing knowledge and particularly address practical questions, including a sound balance between mitigation measures and remaining consequences.

Objective

To prepare guidelines for TSOs and DSOs to support the preparation of natural gas networks and operations for the injection of H₂ (pure and as a gas component) with acceptable conse-

quences. They should lay down sound engineering practice and guidance on mitigation measures to ensure that the considered hydrogen injection in the natural gas system can be done with acceptable consequences.



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Challenge

The chemical and physical properties of hydrogen differ importantly from those of natural gas. As natural gas does not usually contain any hydrogen, the design of the natural gas chain reflects this. Examples of the impact of hydrogen added to natural gas in the natural gas system are:

- Material degradation (e.g. metal loss and polymer swelling)
- Safety (e.g. zoning, suitability of safety devices, maintenance and repair procedures)
- Performance and integrity of end user equipment, such as burners, engines and turbines
- Performance of measurement equipment, including gas chromatographs
- Gas losses due to permeation through pipe walls
- Efficiency reduction of compressors
- Reduction of transmission capacity in MJ/h

There are no guidelines for TSOs and DSOs concerning the preparation of their natural gas networks and operations for the injection of hydrogen with acceptable consequences.

Scope

The programme concerns all components in the natural gas system:

- The high pressure transmission network
- The medium pressure (regional) transmission grid
- Distribution grid (incl. PE, PVC and steel pipelines)
- End user in-house infrastructure and appliances (domestic and industrial).

Approach

HYREADY will distinguish the impact of hydrogen on the natural gas system and feasible countermeasures on:

- *Component level:* to which extent are the component's performance and characteristics - including lifetime, leakage, permeability, efficiency, accuracy- affected by hydrogen?
- *System level:* to which extent is the functionality of the system affected by hydrogen addition? Think of e.g. network capacity (MJ/hr) and calorific determination system for billing purposes
- *Location level:* to which extent are the installation requirements, including safety zoning, affected by hydrogen addition?
- *Operational level:* to which extent are repair procedures, maintenance tools, personal safety equipment, etc. affected by hydrogen addition?

Deliverables

- Practical guidelines to support gas TSOs and DSOs in preparing their networks and end users for hydrogen addition to natural gas with acceptable consequences. They will describe an unbiased methodology where practical "how-to" questions will be addressed.

The HYREADY Guidelines will be based on existing knowledge and will be treated as confidential among project partners;

- The HYREADY Guidelines are to be converted into DNV GL Recommended Practices. These documents will be public documents, but will contain less detail than the HYREADY Guidelines.

Contact person

Onno Florisson, onno.florisson@dnvgl.com, +31 50 7009723