

H₂ GWP - THE NEED FOR QUANTITATIVE EMISSION MEASUREMENTS TO MAXIMIZE VALUE OF H₂ VALUE CHAIN

Name (s) of author (s): Rognø, Hege¹, Krohl, Victoria¹, Roudot, Malgven¹
¹Equinor, Norway

Corresponding author's e-mail address: hros@equinor.com, vikh@equinor.com,
marou@equinor.com

Keywords: Societal and environmental aspects, Hydrogen emissions

ABSTRACT

As the world transitions towards a cleaner and more sustainable energy system, hydrogen has emerged as a promising alternative to fossil fuels. At the same time, it has been shown¹ by several scientific communities that hydrogen is an indirect climate gas; hence an increase of hydrogen in the atmosphere indirectly leads to a warming of the planet (1 kg of H₂ is equivalent to the warming of 11-12 kg of CO₂). It is therefore important to measure and quantify hydrogen emissions along the value chain to control and minimize leakages and emissions for the positive climate effects of transitioning to hydrogen to be maximized.

The climate benefit of switching to hydrogen from fossil fuels is to a degree dependent on hydrogen emission levels, and the use of appropriate sensor technology and development of fit-for-purpose methodology to quantify hydrogen emissions is needed. It is well known that hydrogen molecules are small and diffusive measurement/quantification technologies have not been developed for the energy sector application. Today there is little data on hydrogen leakage along existing value chains – only theoretical assessments, simulations or extrapolation exist rather than direct measurements.

Monitoring and minimizing hydrogen leakages must be a priority both for climate², safety as well as from an economic perspective and we need reliable methods for diffuse measurement. To raise the standard of trust for hydrogen in the energy transition, Equinor has started (2023) a hydrogen emissions quantification (HEQ) campaign where the objectives are

- Detect and quantify emissions from hydrogen facilities.
- When successful, bring forward improved hydrogen release scenarios.
- Communicate the results and conclusions with relevant policymakers and stakeholders via publications, Joint Industry Projects, and EU projects such as NHyRA³.

Hydrogen will have a key role to play in decarbonizing the energy system, and to support this, we would like to see a well-regulated hydrogen infrastructure/system informed by empirical data and research. In summary, this presentation will underscore the importance of considering the indirect climate effects when using hydrogen as an energy source, while also highlighting the

need for robust measures to quantify emissions and prevent leakages. It will further describe Equinor's ongoing hydrogen emissions quantification (HEQ) campaign.

References

1. Sand, M., Skeie, R.B., Sandstad, M. *et al.* A multi-model assessment of the Global Warming Potential of hydrogen. *Commun Earth Environ* 4, 203 (2023).
<https://doi.org/10.1038/s43247-023-00857-8>
2. Fan, Zhiyuan *et al.* Hydrogen Leakage: A potential risk for the hydrogen economy. *Center of Global Energy Policy, Colombia/SIPA*
[HydrogenLeakageRegulations_CGEP_Commentary_063022.pdf \(columbia.edu\)](#)
3. [NHyrA - European Commission \(europa.eu\)](#)