

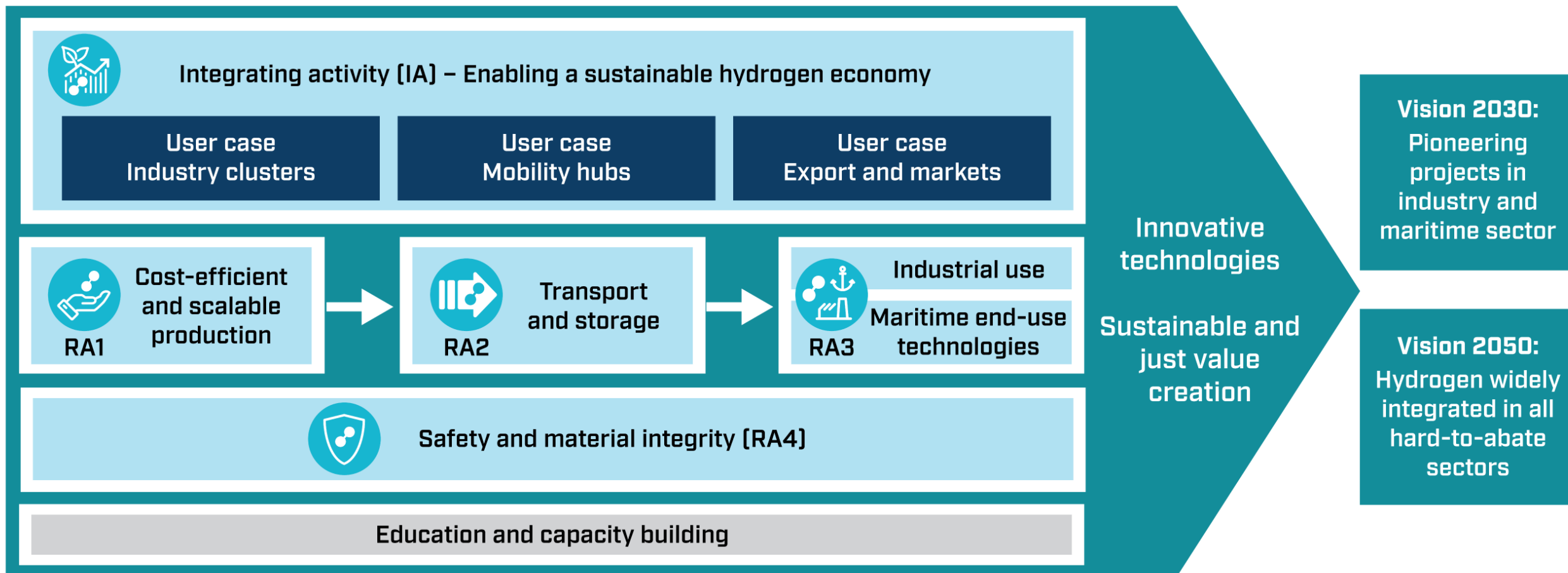


Hydrogen – footprint and prospects

Dr. Nils A. Røkke, EVP sustainability SINTEF, Director HYDROGENi

DNVA- 13 February 2024- "The future of gas"

FME HYDROGENi – Hydrogen for net zero by 2050



HYDROGENi partners

Energy companies:



Power companies:



Interest groups:



Process industries:



Clusters:



Maritime operators:



Vendors:



Safety specialists:



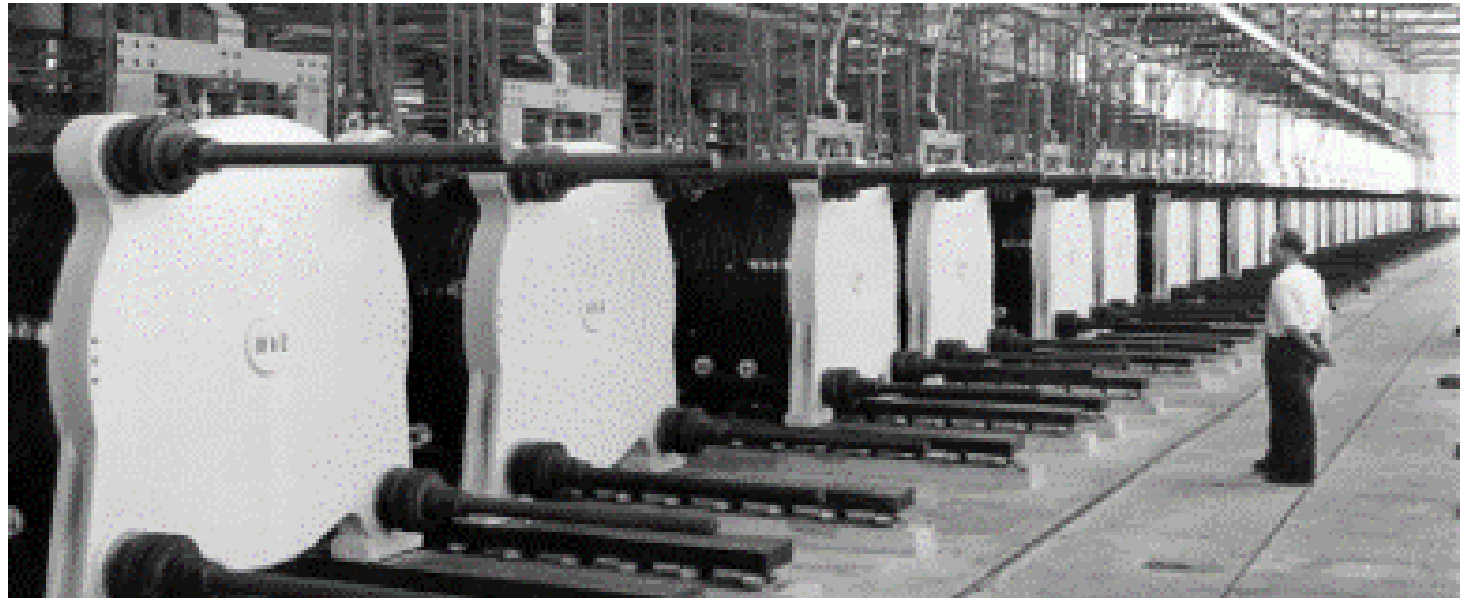
R&D partners:



Norwegian industry has a long proven track record in renewable hydrogen production



Rjukan, 1927 – 1970ies

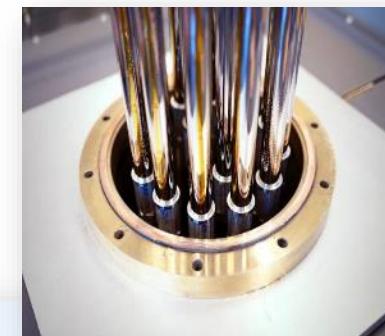


Glomfjord, 1953 – 1991

HYDROGENi wants to operate from R&I to industrial applications

- HYDROGEN Mem-Tech AS

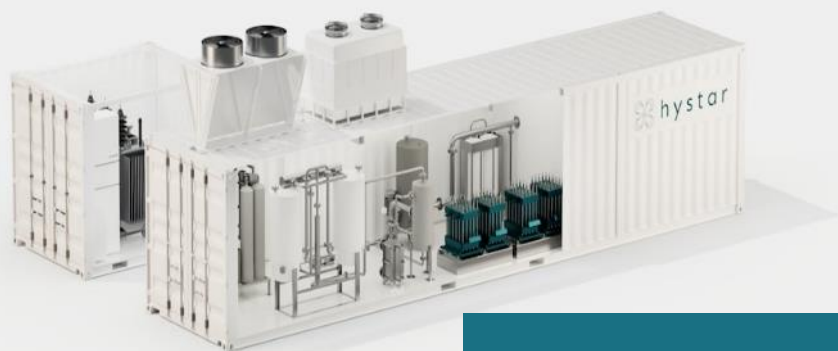
Demonstration at Tjeldbergodden
Membrane technology
developed at SINTEF



Skid designed by
Reinertsen New Energy



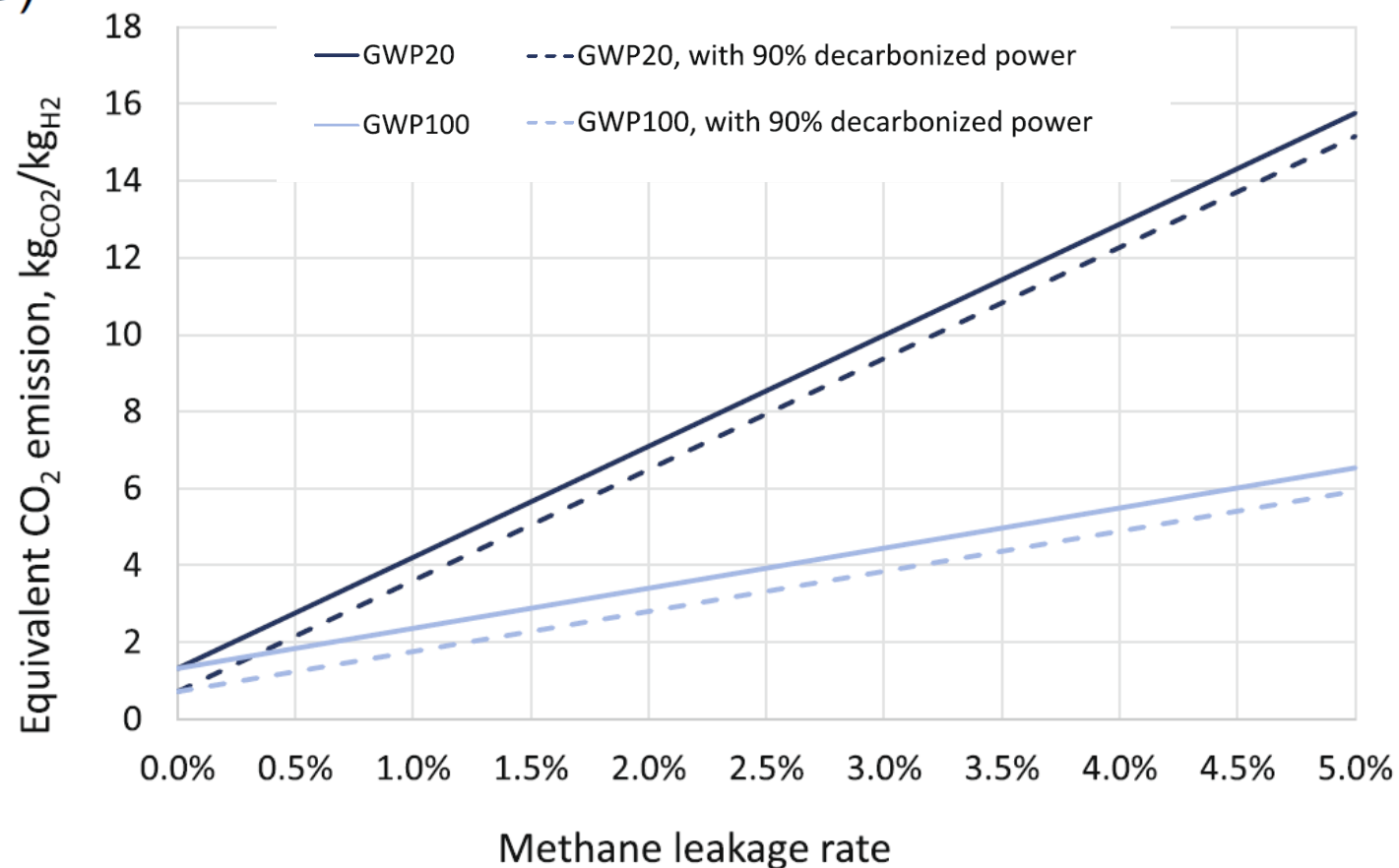
Module integration in
Equinor's methanol
synthesis plant in
Tjeldbergodden



 hystar

Footprint low carbon H₂ from NG w/CCS - ATR

(B)



Received: 20 December 2021 | Revised: 19 February 2022 | Accepted: 17 February 2022
DOI: 10.1002/anie.202111206

COMMENTARY

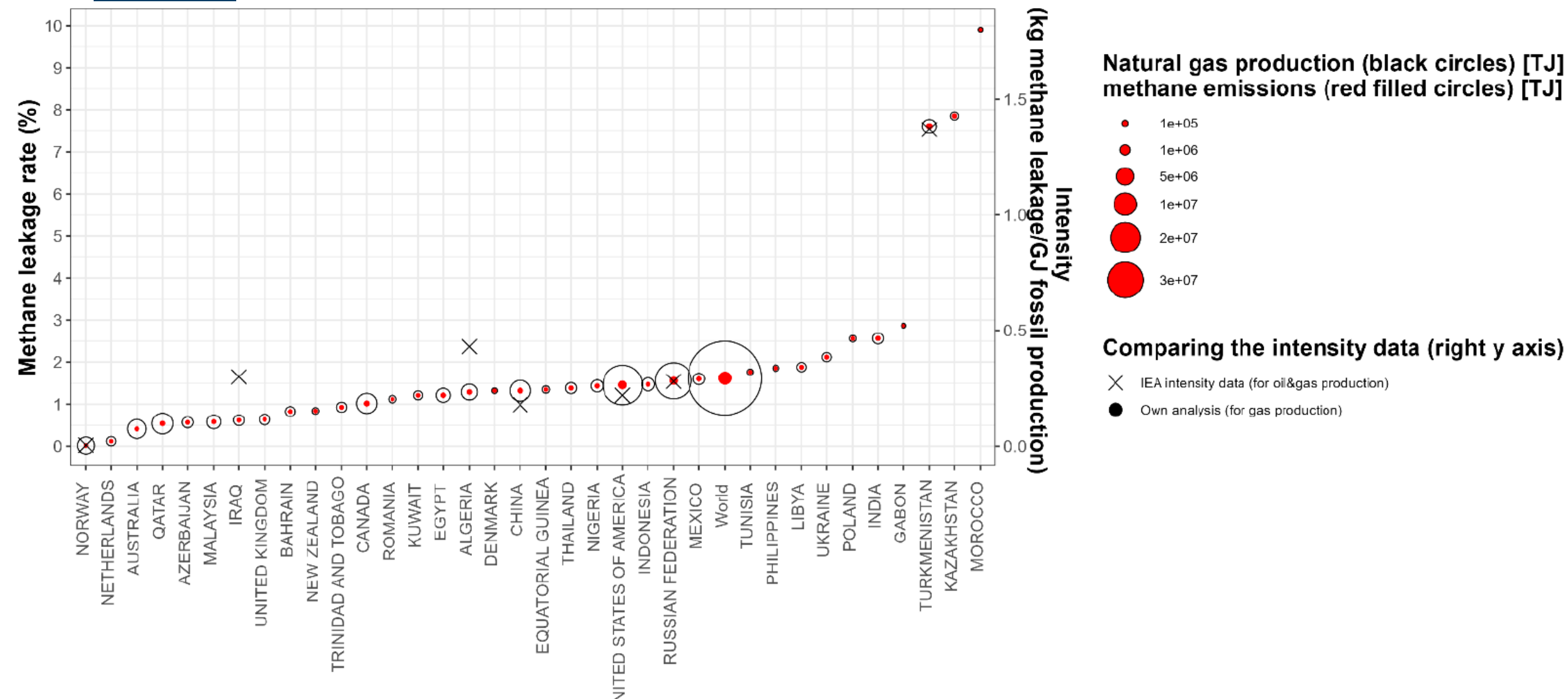
Comment on "How green is blue hydrogen?"

Matteo C. Romano¹ | Cristina Antonini² | André Bardov² | Valentin Bertsch¹ | Nigel P. Brandon³ | Jack Brouwer⁴ | Stefano Campanari¹ | Luigi Crema⁵ | Paul E. Dodds⁶ | Stefania Gardarsdottir⁸ | Matteo Gazzani⁹ | Gert Jan Kramer⁸ | Peter D. Lund¹⁰ | Niall Mac Dowell¹¹ | Emanuele Martelli¹² | Luca Mastropasqua¹³ | Russell C. McKenna^{12,13} | Juliana Garcia Moretz-Sohn Monteiro¹⁴ | Nicola Paltrinieri¹⁵ | Bruno G. Pollet¹⁶ | Jeffrey G. Reed⁴ | Thomas J. Schmidt¹⁷ | Jaap Vente¹⁸ | Dianne Wiley¹⁹



SINTEF

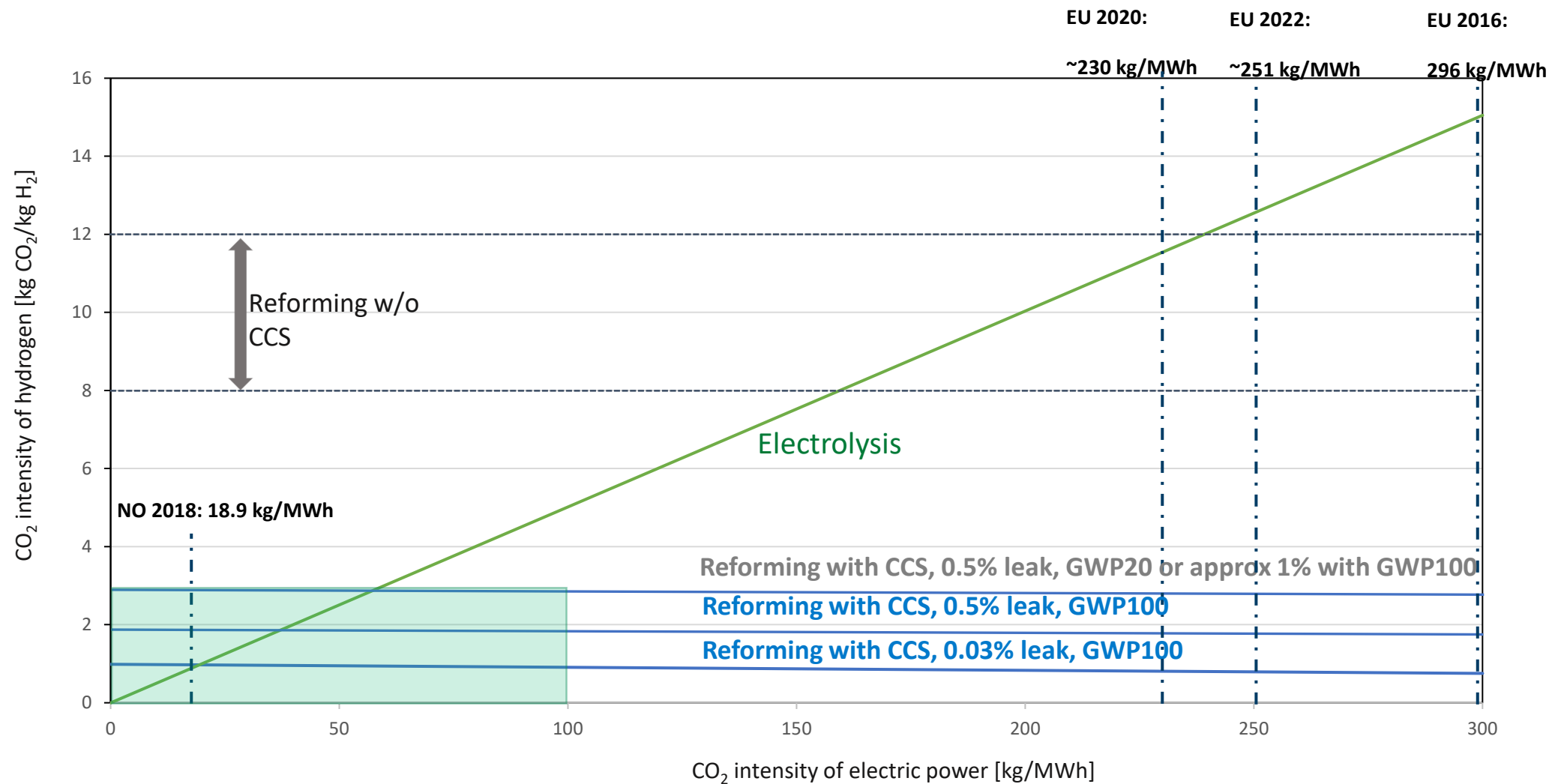
Regional heterogeneity of methane leakages





SINTEF

CO₂ footprint from hydrogen production

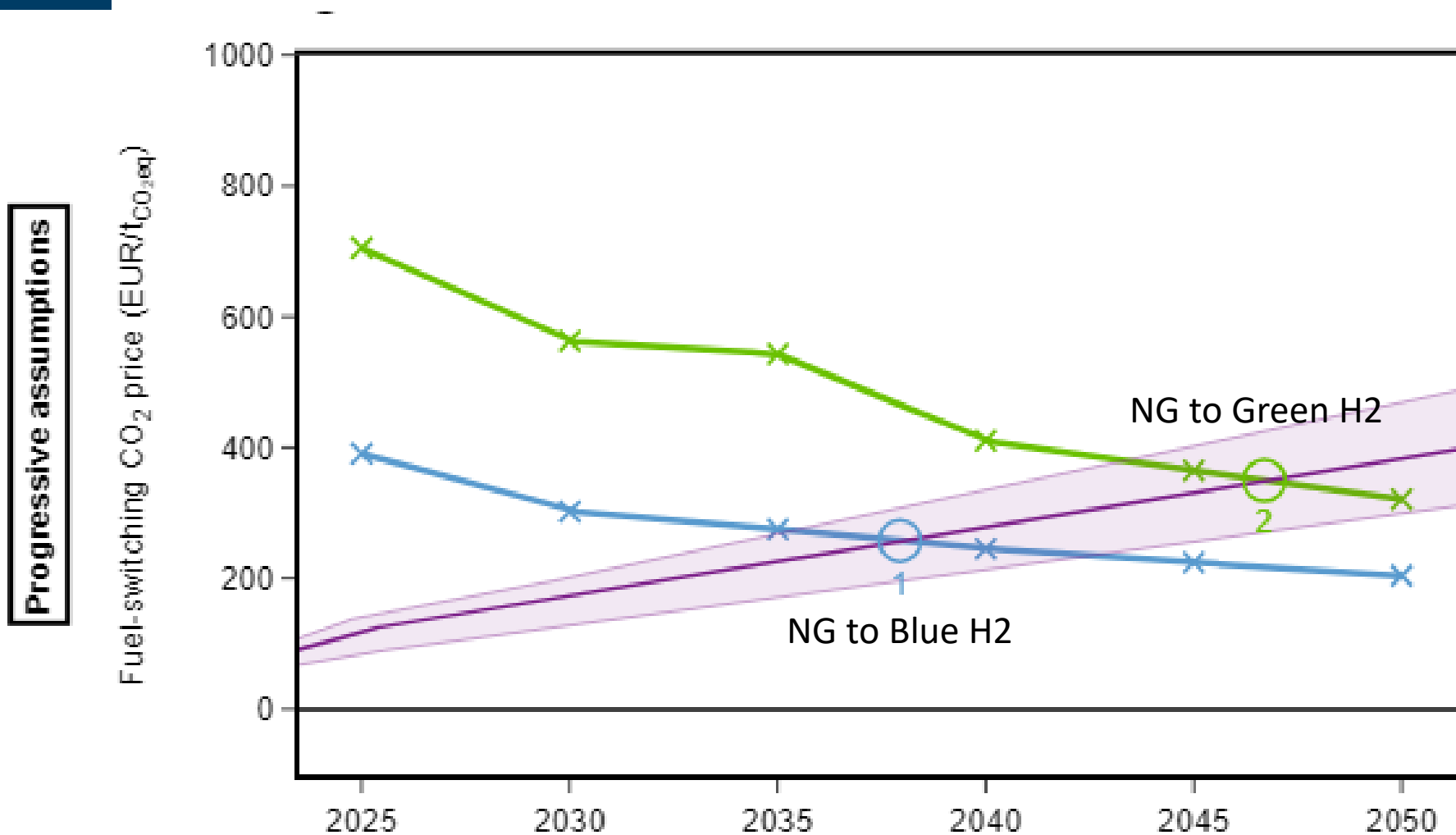


Green area: EU Sust. Fin. Taxonomy



SINTEF

Fuel-switching points in time based on fuel-switching CO₂ prices Scenario for Northern Europe



Summary

- Hydrogen and hydrogen carriers key for any credible decarbonisation path towards 2030, -40 and -50
- Urgent to replace "grey" hydrogen with low carbon hydrogen and to stop methane leakages
- Technology neutrality as long as emission targets are met, full LCA assessment needed
- ETS, regulations and support mechanisms will determine market attractiveness for various sources of hydrogen
- Pace slow in deploying hydrogen, both for offtake but also production, pace needed
- If someone wants to make a case for large scale hydrogen enabled by CCS and CCUS, time is now!

Acknowledgements*

FME HYDROGENi is financed by its industry partners and the Norwegian government through the Norwegian Research Council's Centres for Environment-friendly Energy Research programme (FMETEKN, project no. 333118)

* Pertains to the slides marked with the template and logo of HYDROGENi