Clean Hydrogen to Europe
Natural gas and hydrogen towards 2040

The future of gas, 13th February 2024

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H2 safety matters!
.. so does GWP of Hydrogen

Literature

Global Warming Potential (GWP) of Hydrogen

GWP20 or GWP100?

Both are important for assessing climate effects at different time scales.

UNFCC use GWP100.

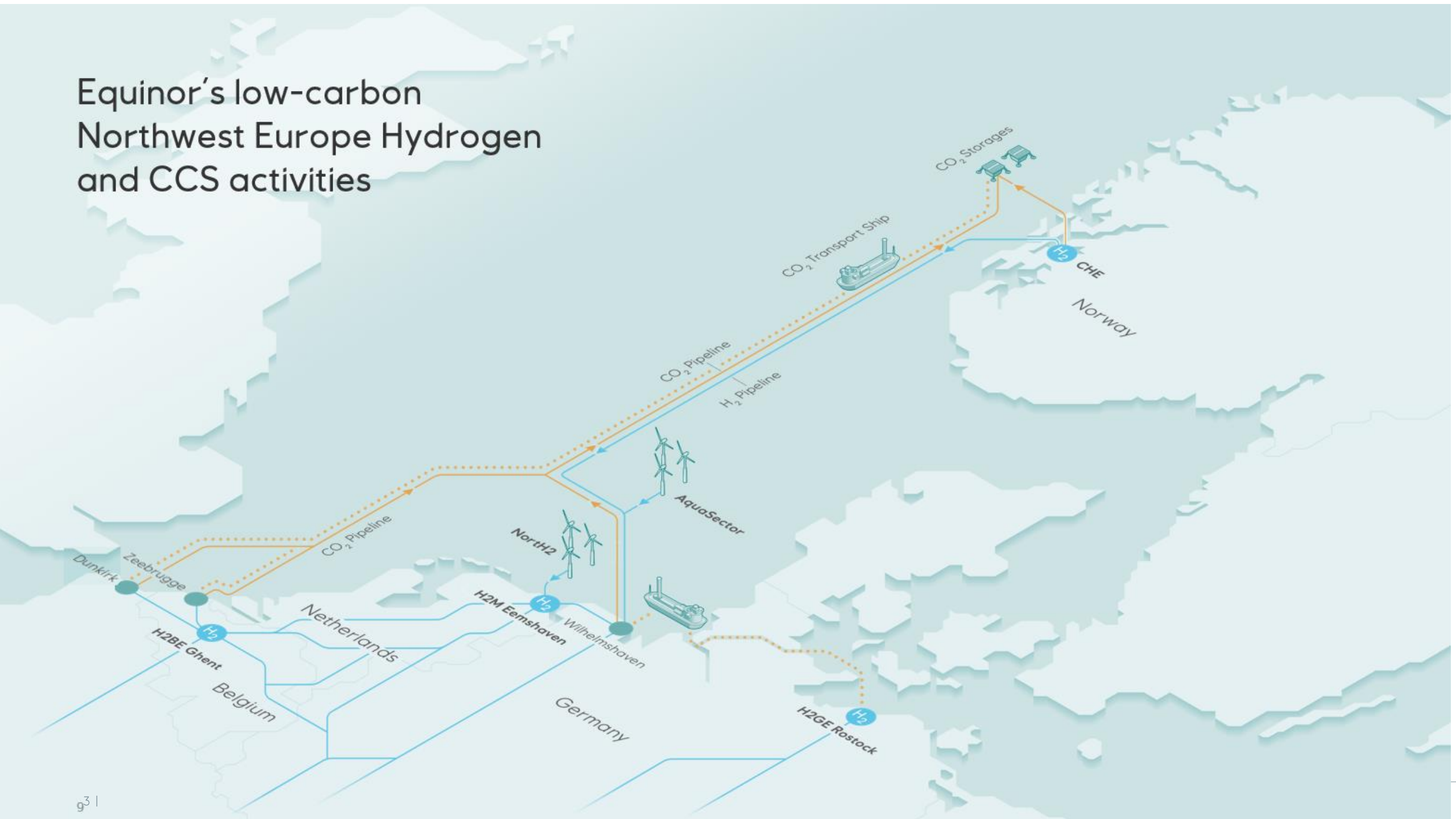
GWP100 = 11-12 $kgCO_2/kg\ H_2$

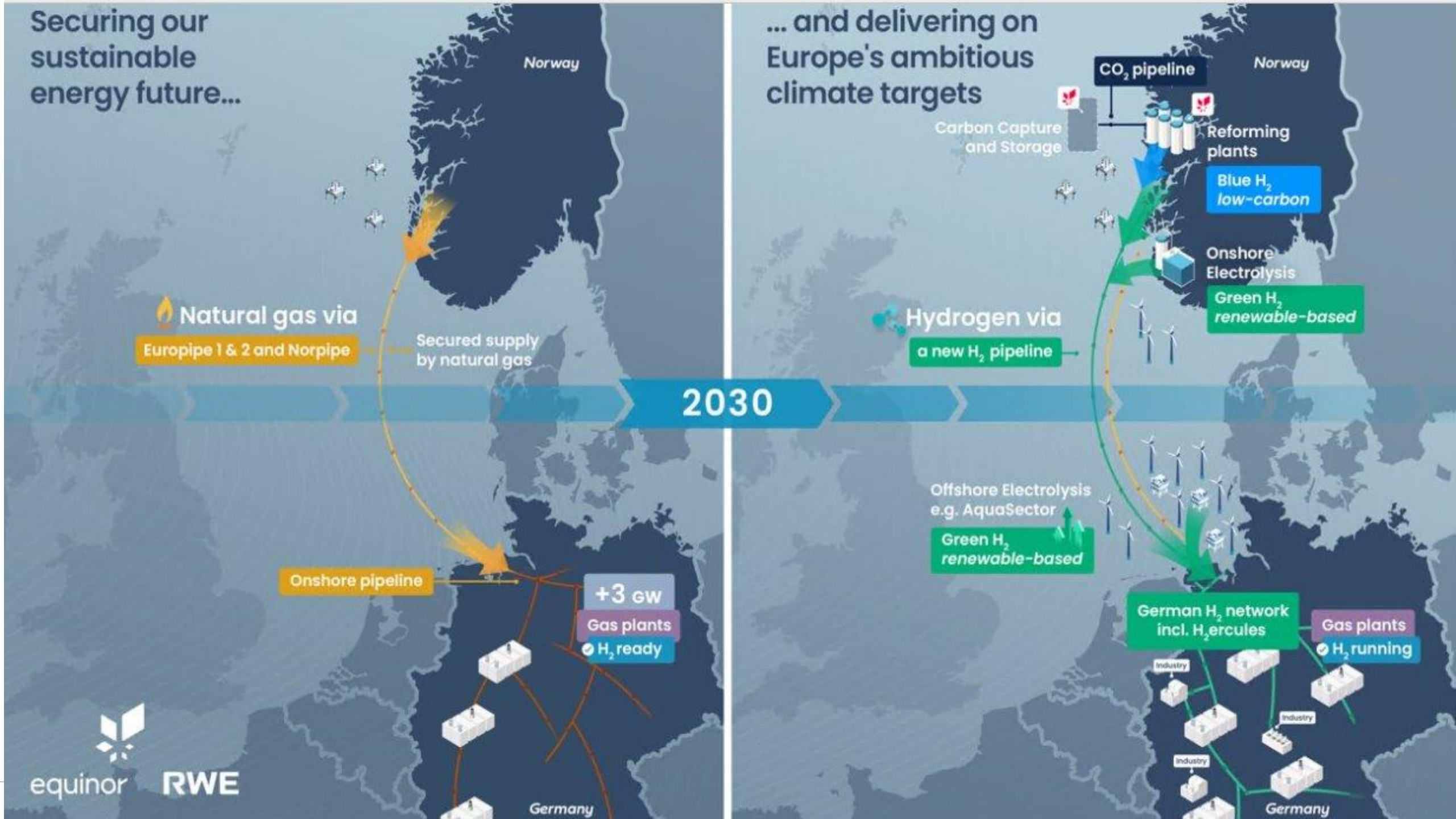
Over a 100-year time period, 1 kg emission of H_2 leads to as much global warming as 11-12 kg CO_2

	GWP20	GWP100
Derwent et al. (2020)		5 ± 1
Field and Derwent (2021)		3.3 ± 1.4
Derwent (2022)		8 ± 2
Warwick et al. (2022)		11 ± 5
Hauglustaine et al. (2022)	40.1 ± 24.1	12.8 ± 5.2

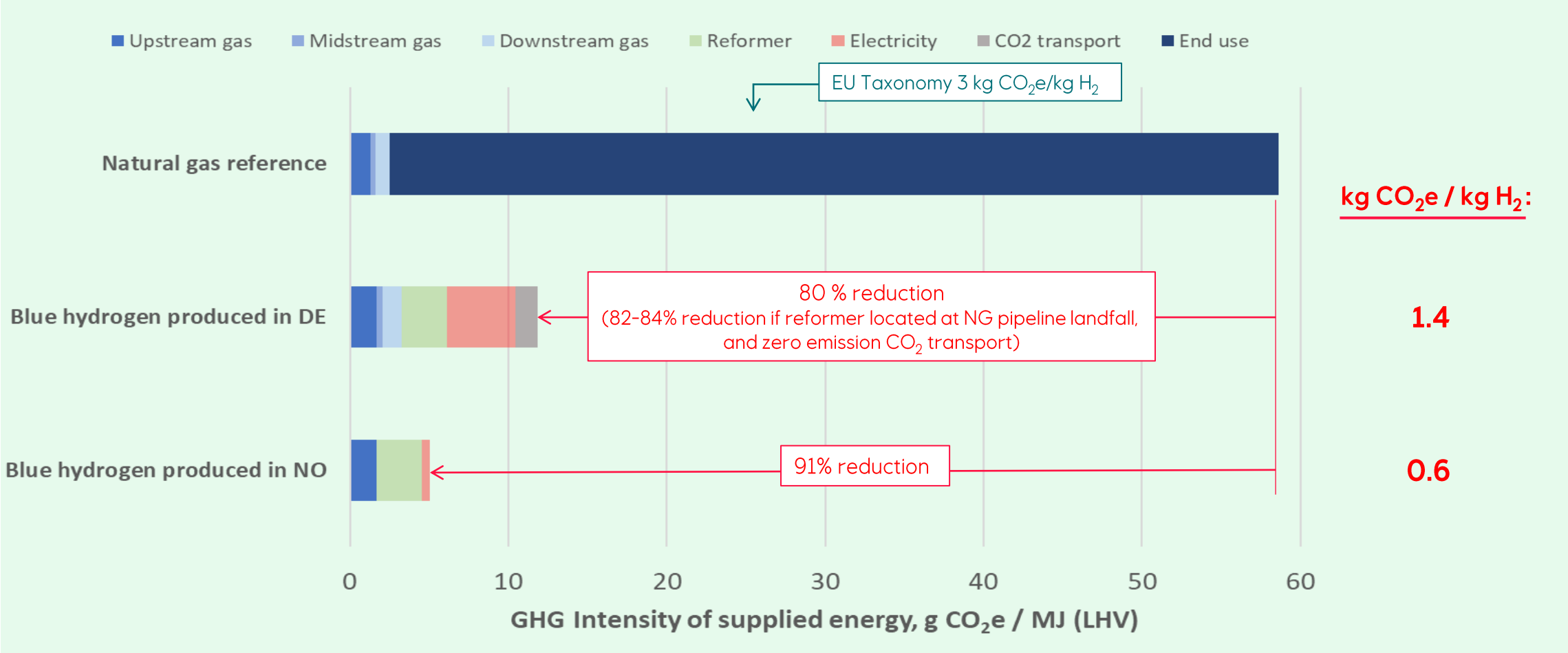
Methane:
GWP20 = 84, GWP100 = 28

Equinor's low-carbon Northwest Europe Hydrogen and CCS activities




Securing our sustainable energy future...
Norway
Natural gas via
Europipe 1 & 2 and Norpipe
Secured supply by natural gas
Onshore pipeline
+3 GW
Gas plants
H_2 ready
Germany
equinor
RWE
2030
... and delivering on Europe's ambitious climate targets
CO_2 pipeline
Norway
Carbon Capture and Storage
Reforming plants
Blue H_2
low-carbon
Onshore Electrolysis
Green H_2
renewable-based
Hydrogen via
a new H_2 pipeline
Offshore Electrolysis
e.g. AquaSector
Green H_2
renewable-based
German H_2 network incl. H_2ercules
Gas plants
H_2 running
Industry
Industry
Industry
Germany

Norway the best place in the world to produce blue H2?



GHG intensity of natural gas supply from Norway to Germany: Upstream / Midstream / Downstream 1.3 / 0.3 / 0.9 g CO_2e/MJ (LHV) (Equinor, 2021)., Gas reforming carbon capture ratio 96%, natural gas input to reformer 3.25 kg/kg H_2,, electricity need of reformer 3.5 kWh/kg H_2. Future (2030) grid electricity in DE assumed at 150 g/kWh, NO at 17 g/kWh. Including 2% loss in ship-based CO_2 transport from DE to NO.