

Perspectives on hydrogen use in the steel industry

April 15th, 2021 | Gerrit Riemer| Head of Governmental Affairs Germany/Head of Hydrogen Economy| thyssenkrupp Steel Europe AG

tkH₂Steel

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We have defined clear climate goals

-30% Emissions from our own production operations and processes¹

2030 **-30%** Emissions from energy procurement²

¹ SCOPE 1-Emissions; ² SCOPE 2-Emissions (Base year 2018)



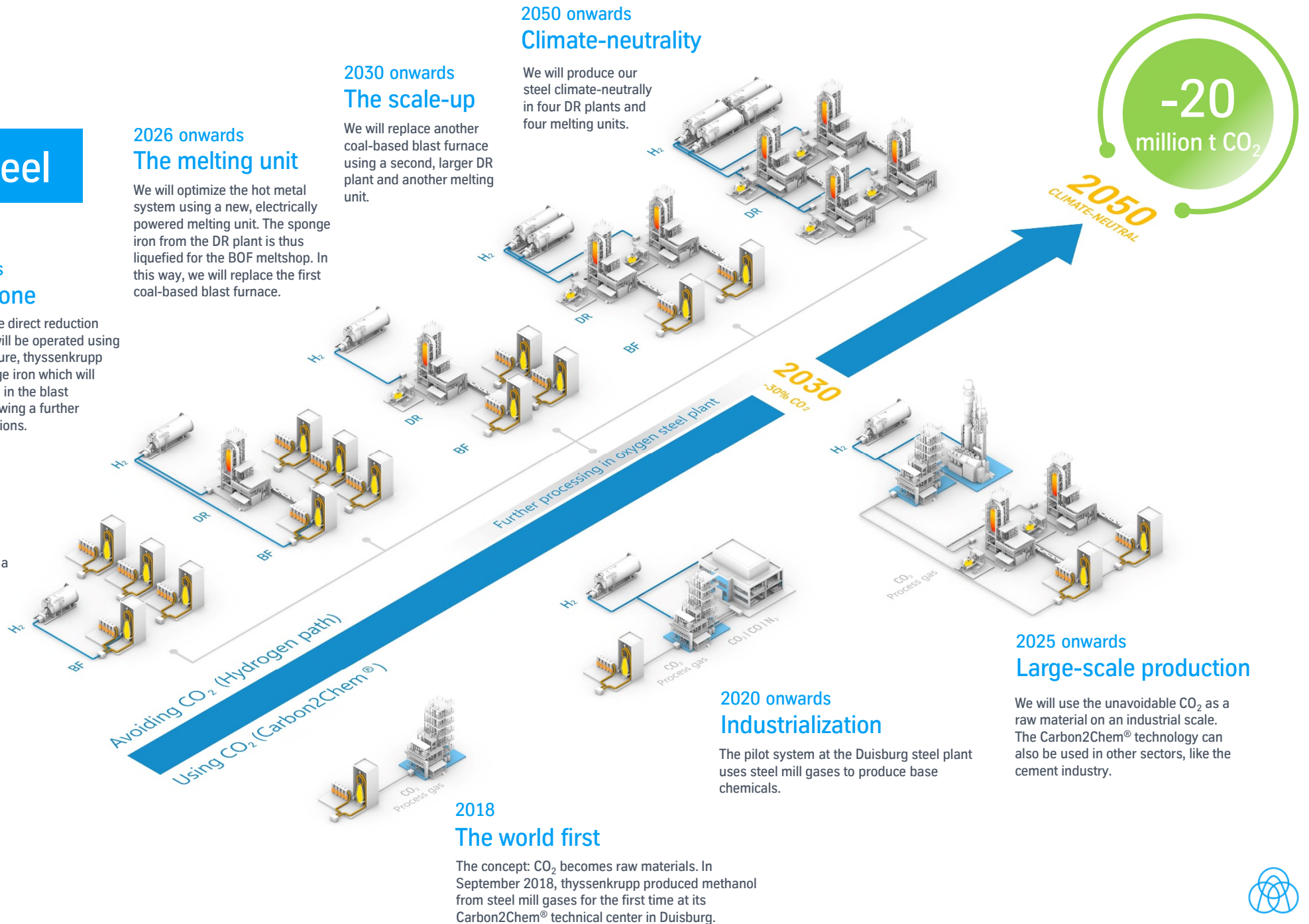
Hydrogen for climate-neutral steel

2024 onwards The milestone

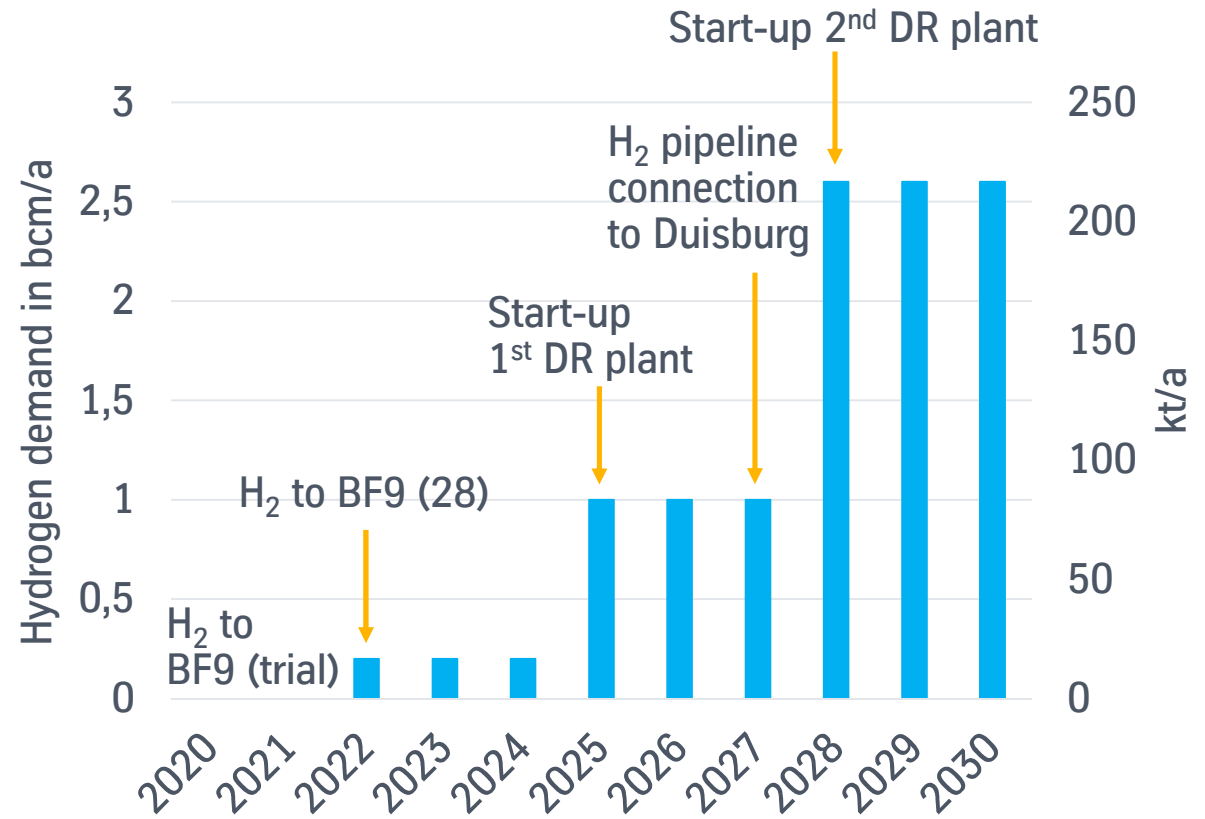
Using a large-scale direct reduction plant (DR) which will be operated using green H₂ in the future, thyssenkrupp will produce sponge iron which will then be processed in the blast furnaces (BF), allowing a further reduction in emissions.

2019 - 2022 H₂ in the blast furnace

We have been testing the use of hydrogen in a working blast furnace since 2019. The goal: The equipment of blast furnace 9.



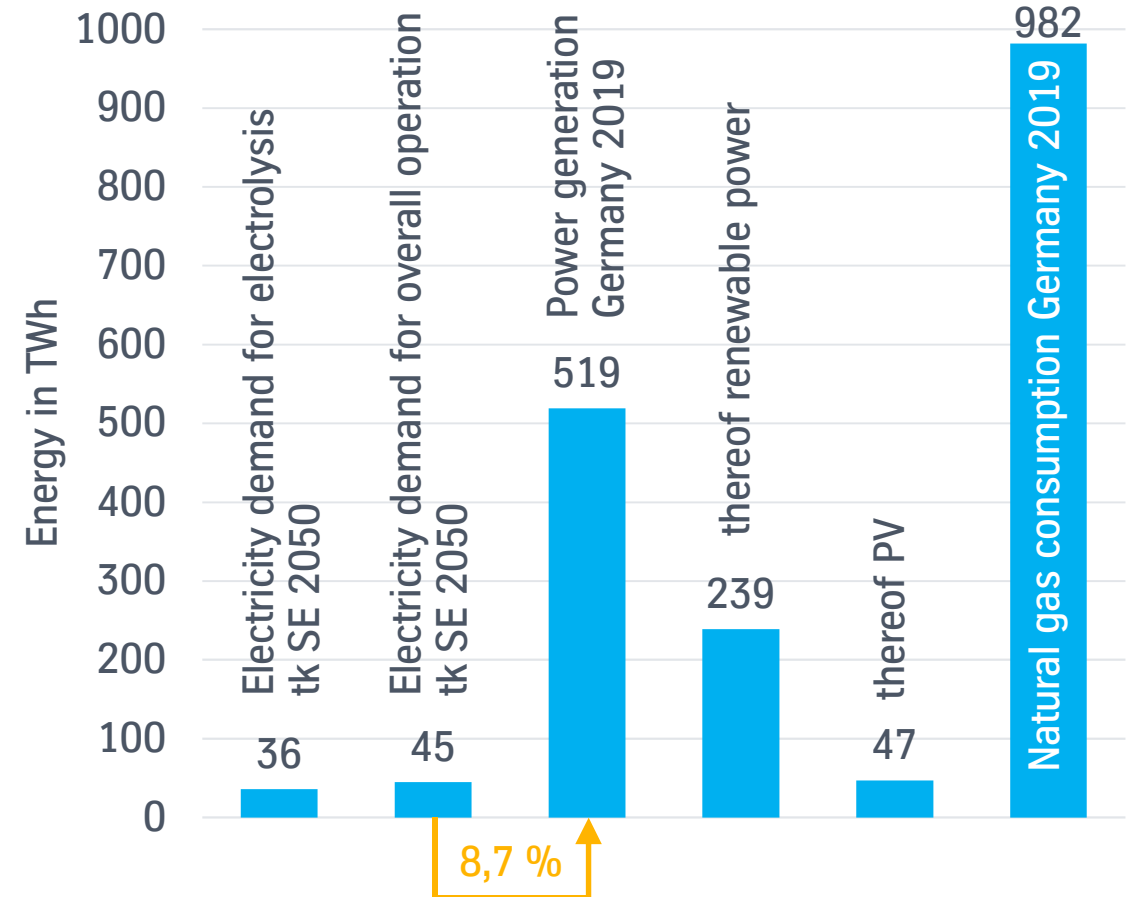
Our ramp-up will match availability of hydrogen and infrastructure



The energy demand is significant compared to the German electricity and gas market



Assumption: 10 mtpa steel from hydrogen direct reduction, Carbon2Chem not included



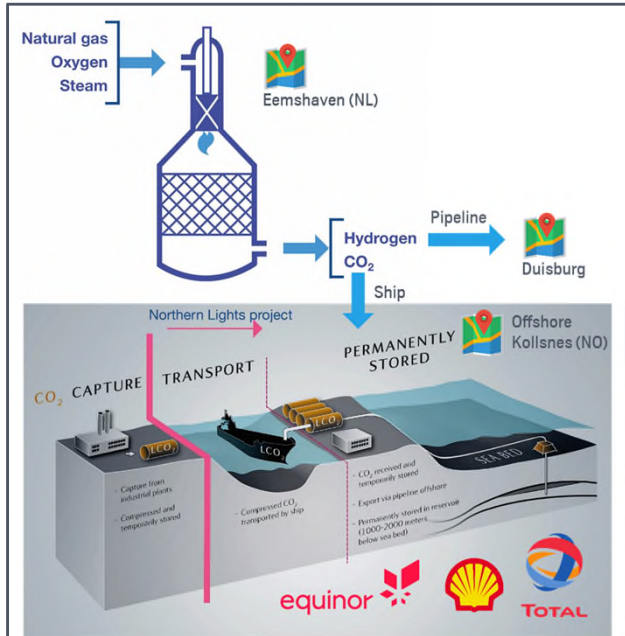
Sources:

https://www.energy-charts.de/energy_pie_de.htm?year=2019

https://www.bdew.de/media/documents/Erdgasverbrauch_Vgl_2018_2019_monatlich_online_o_monatlich_Ki_12032020.pdf



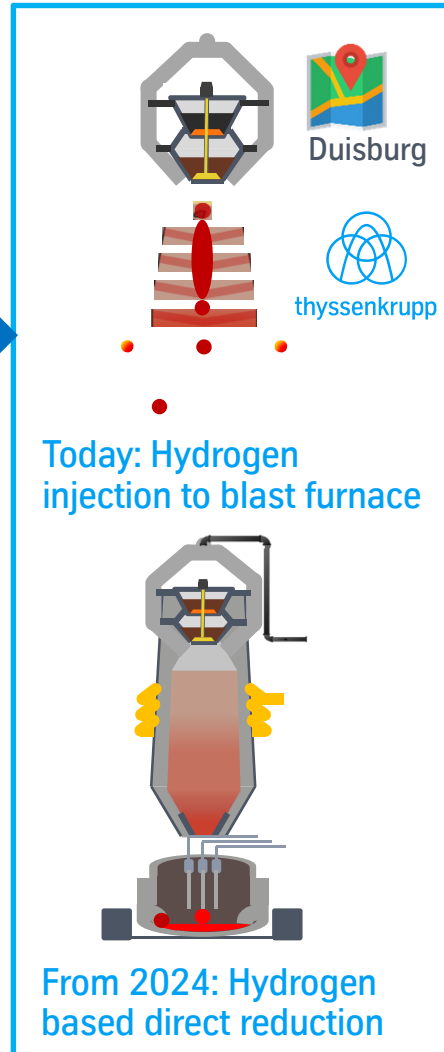
We follow an technology open approach in hydrogen supply projects



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Completed feasibility study for 2.7 GW ATR with CCOS

Blue hydrogen



Cooperation for 100 MW electrolysis in Lingen

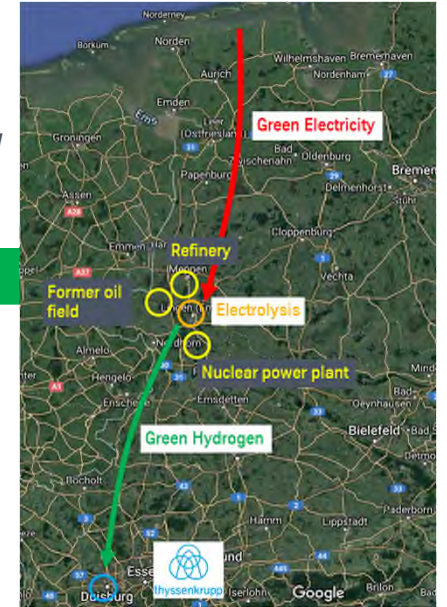
Green hydrogen

RWE

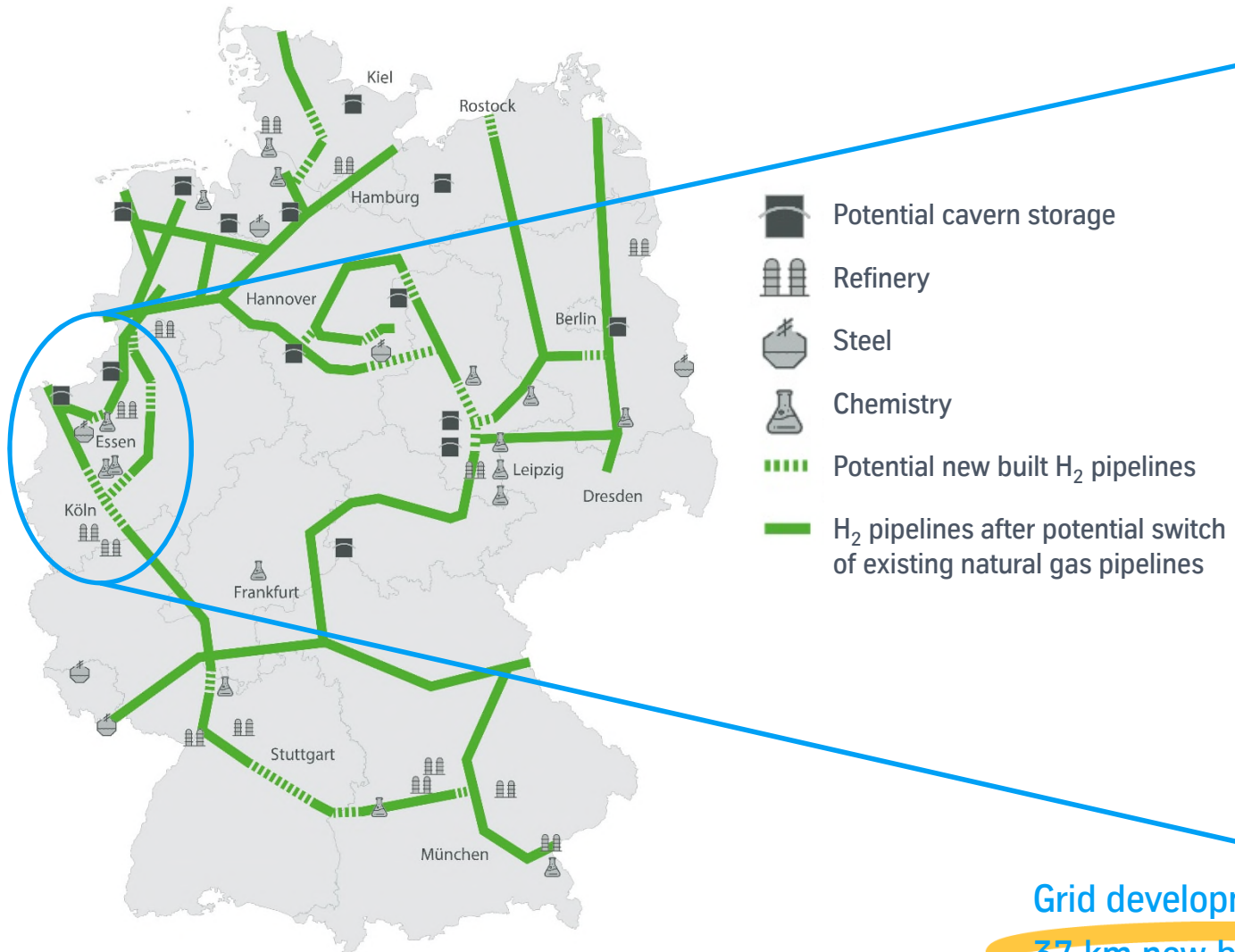
Feasibility study for 500 MW electrolysis in Duisburg-Walsum

Green hydrogen

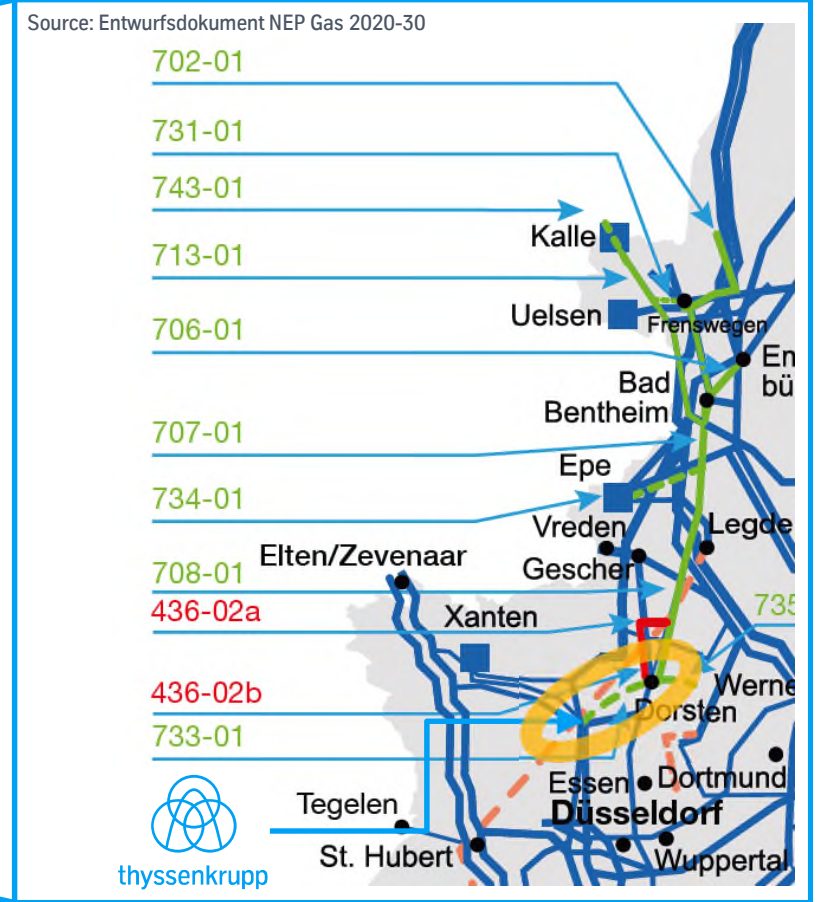
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Hydrogen pipeline connection is a prerequisite for a successful transformation ...



Source: FNB Gas



Grid development plan gas 2020-30 (green gas variant):

37 km new built H₂ pipeline and conversion of existing NG pipelines to H₂ for supply of tk SE Duisburg by end of 2026



Conditions for the transformation must be created now



- Hydrogen Strategies of EU and Germany must be harmonised and quickly be transposed into a reliable legal framework.
- Hydrogen should be available primarily to sectors in which it is de facto indispensable for CO₂ reduction and has the greatest leverage on CO₂ reduction .
- Acceptance of natural gas and other climate-neutral hydrogen types for a transitional period until green hydrogen is reliably available in sufficient quantities and at competitive prices. Substantial expansion of renewable energies; uniform European system of guarantees of origin for clean and low carbon hydrogen
- Short-term adoption of long-term effective instruments to reduce operating costs such as Contracts for Differences and short-budget-independent financing
- Existing gas grids must be made available for H₂ transportation and be regulated as first step.
- Production conditions for steel in the EU and Germany must not deteriorate
- Creation of green “lead” markets with sector-specific mix of instruments (quotas, standards)



Thank you

for your attention!



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