Perspectiva Internacional de la Inyección de Hidrógeno en Redes de Gas Natural

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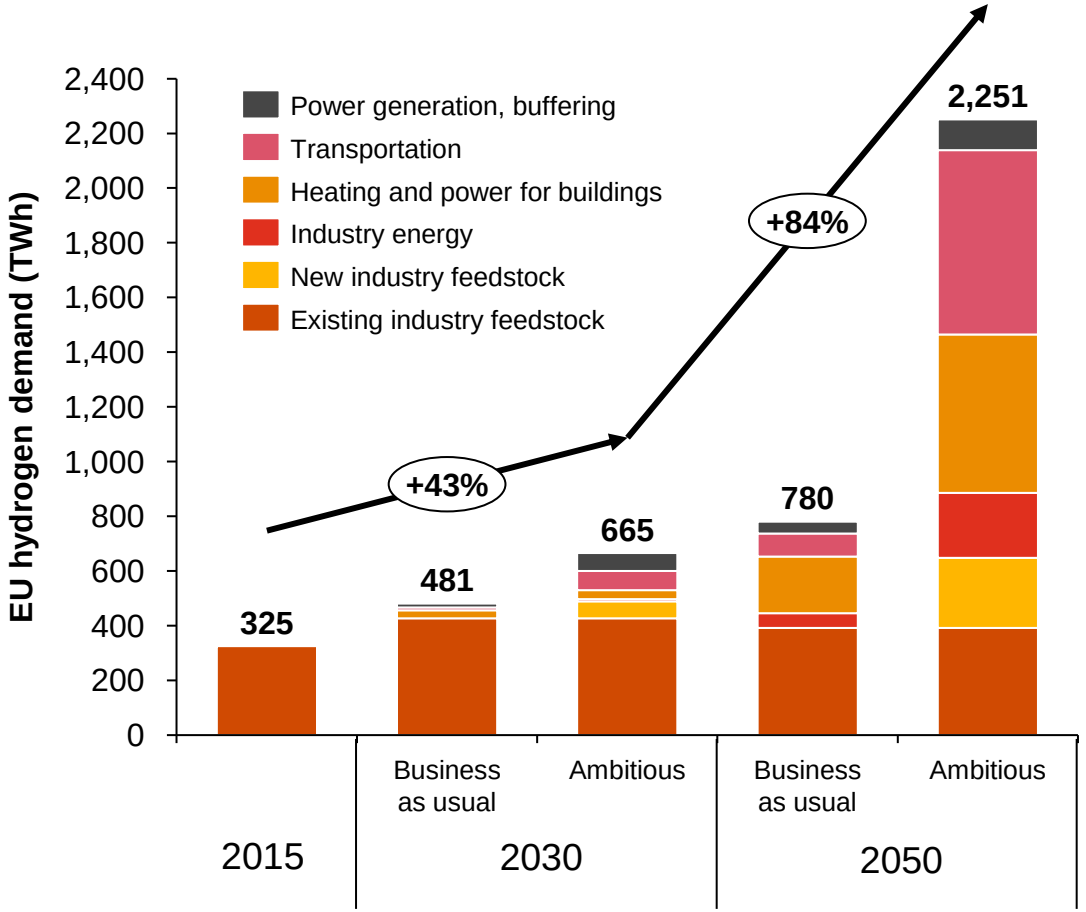
pwc

Hydrogen demand is rising

EU H_2 demand development



Key insights

- First-mover advantages can be drawn from pilot projects in the 2020s
- Niche applications will grow first
- High demand growth requires investments in infrastructure
- It is necessary to gradually increase hydrogen in the gas grid
- Smooth transition towards net zero stems from blending in the initial phase

Source: Hydrogen roadmap Europe, https://www.fch.europa.eu/sites/default/files/Hydrogen%20Roadmap%20Europe_Report.pdf

Hydrogen blending – What does it imply?

- Hydrogen is integrated into existing natural gas pipelines → NG/H_2 blending
- Reduces carbon intensity
- Simple option to bring H_2 into the gas market and a solution on path to hydrogen competitiveness
- Functional benefits: Energy storage, resiliency, emission reductions
- Long-term effect of hydrogen blends on materials and equipment is not well understood
- Today up to 9.9% blending in natural gas grid is allowed
- Blending rates can reach up to **20%** without infrastructure changes

Source:
Energy post, https://energypost.eu/what-effect-will-blending-hydrogen-into-the-natural-gas-network-have/
FCHEA, https://www.fchea.org/in-transition/2021/3/8/hydrogen-blending

Blending – Avacon, DVGW & E.ON

- In a gas network section in Saxony-Anhalt, up to 20 % hydrogen is to be mixed with natural gas within this heating period
- Until now, the blending limit was <10%
- Hydrogen is compatible with the existing infrastructure and can be stored and used in a variety of ways in the natural gas network that covers more than 500,000 kilometers throughout Germany

"The pilot project marks an important milestone on the way to a climate-friendly energy system. It shows that the blending of ever higher proportions of CO_2-free gases is within reach and that in the future it will be technically possible to feed up to 100 % hydrogen into the natural gas grid"

- Prod. Dr. Gerald Linke, DVGW

avacon DVGW e·on

Source: Energie Blog, https://energie.blog/avacon-und-dvgw-mischen-erdgas-erstmals-20-wasserstoff-bei/

Blending – HyBlend

- 2-year project led by National Renewable Energy Laboratory (NREL), 20+ other partners
- $14-15 million funding for R&D
- Answer high-priority research questions:
  - Are pipelines compatible with hydrogen?
  - What are the costs and environmental impacts?
  - How will hydrogen blends affect appliances and other equipment?

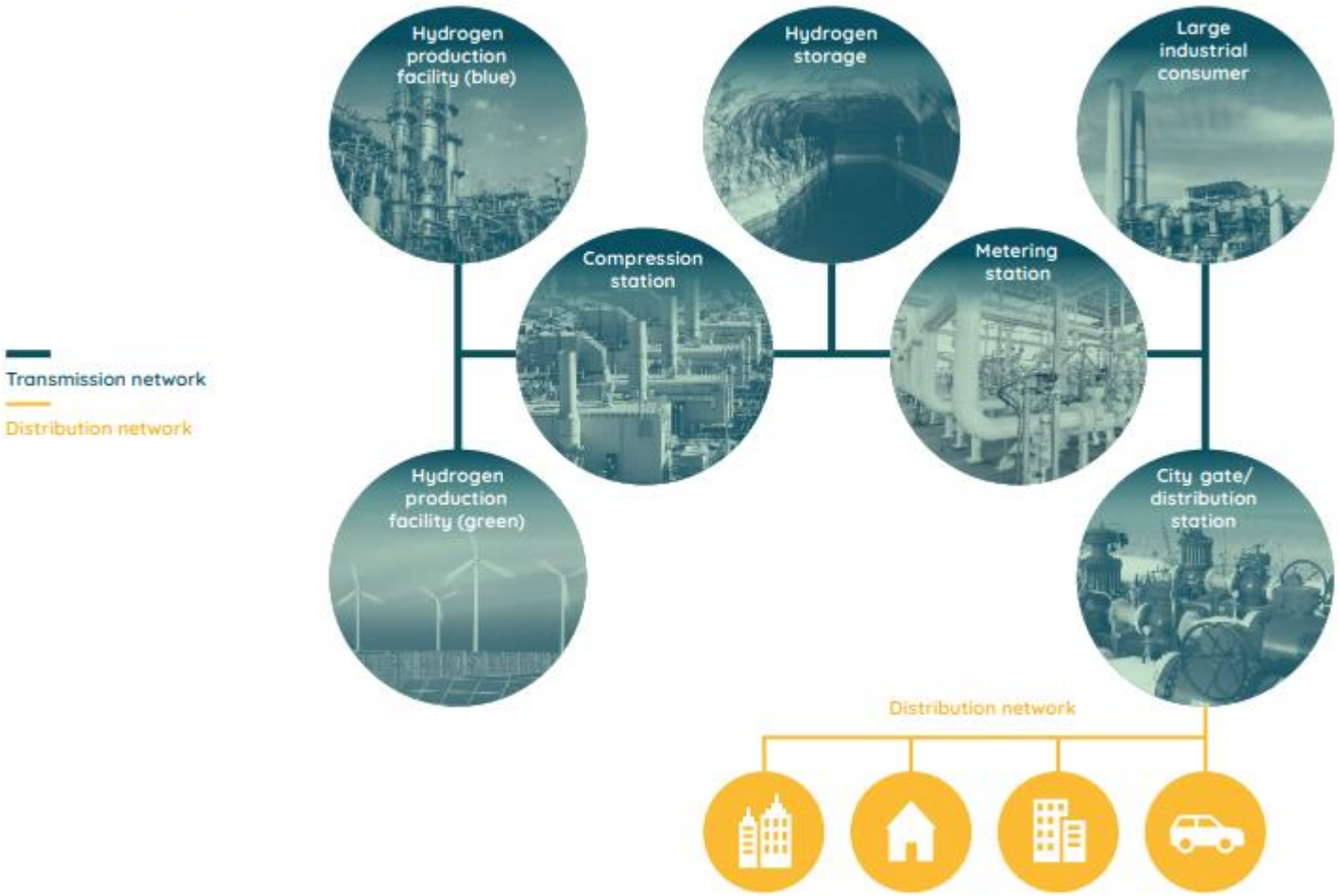
HyBlend
U.S. DEPARTMENT OF ENERGY

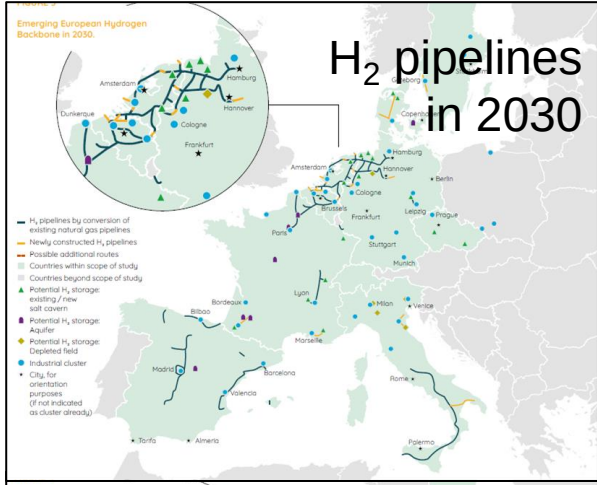
Source: NREL, https://www.nrel.gov/news/program/2020/hyblend-project-to-accelerate-potential-for-blending-hydrogen-in-natural-gas-pipelines.html/

Infrastructure – EU Hydrogen Backbone

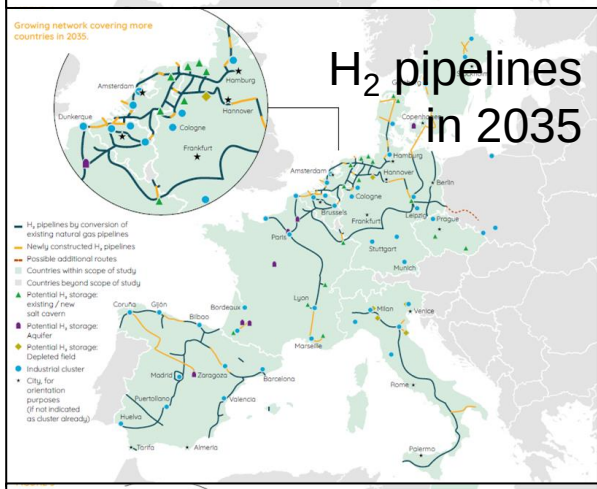
FIGURE 2.

The European Hydrogen Backbone transports hydrogen from producers to consumers via pipelines.

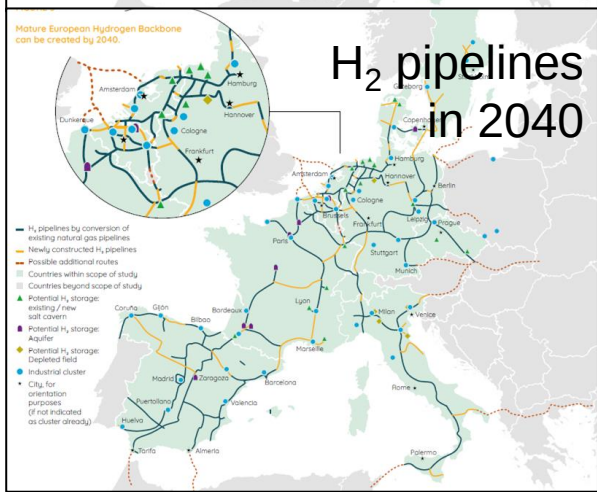




H_2 pipelines in 2030



H_2 pipelines in 2035



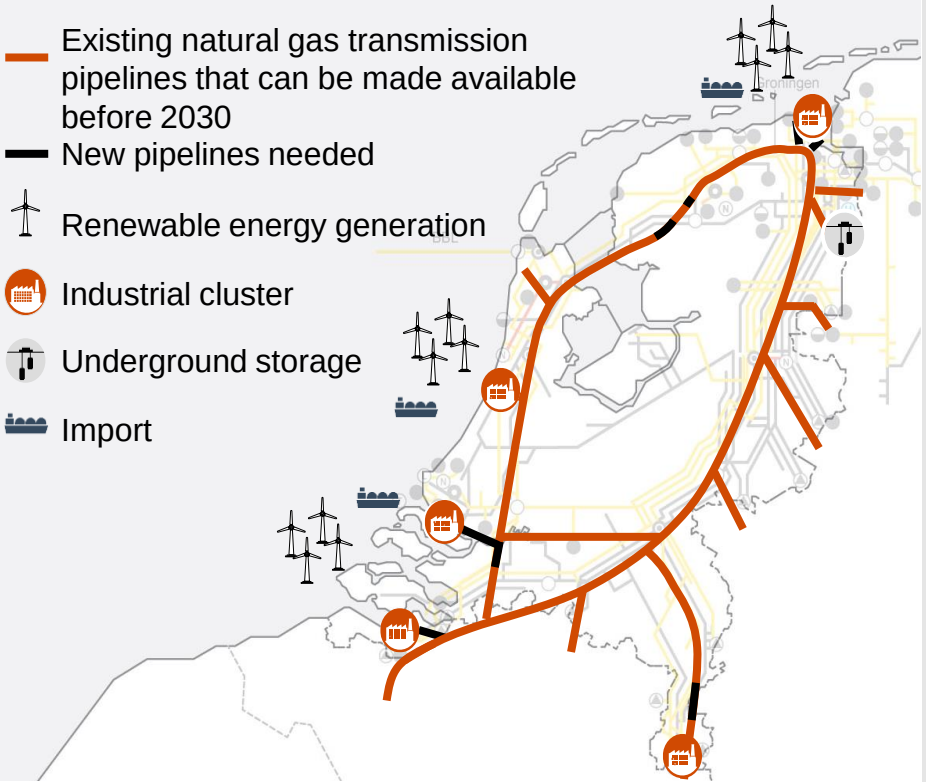
H_2 pipelines in 2040

Source: European Hydrogen Backbone, https://gasforclimate2050.eu/wp-content/uploads/2020/07/2020_European-Hydrogen-Backbone_Report.pdf

Infrastructure – HyWay27

Technically possible hydrogen network based on existing natural gas grids in 2030

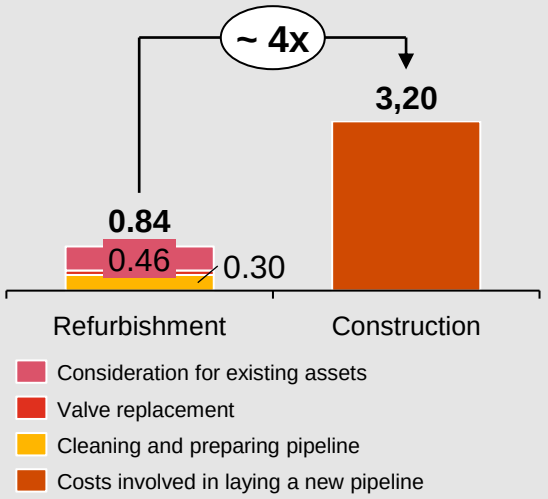
- Existing natural gas transmission pipelines that can be made available before 2030
- New pipelines needed
- Renewable energy generation
- Industrial cluster
- Underground storage
- Import

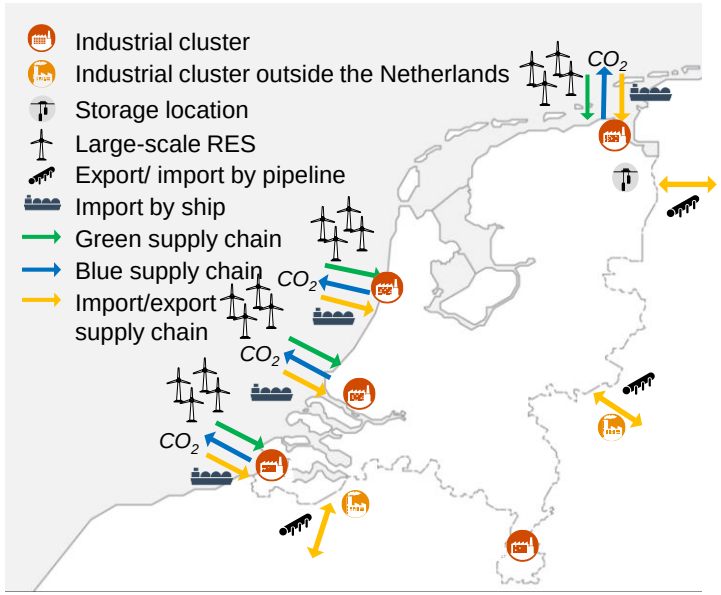


Comparison of per-km investment required for reuse and new-build
(millions of € per km, based on: 36-inch pipeline and route covering 1,183km)

~55% of the investment in conversion consists of a payment for taking over existing assets from GTS, at regulated asset value (GAV)

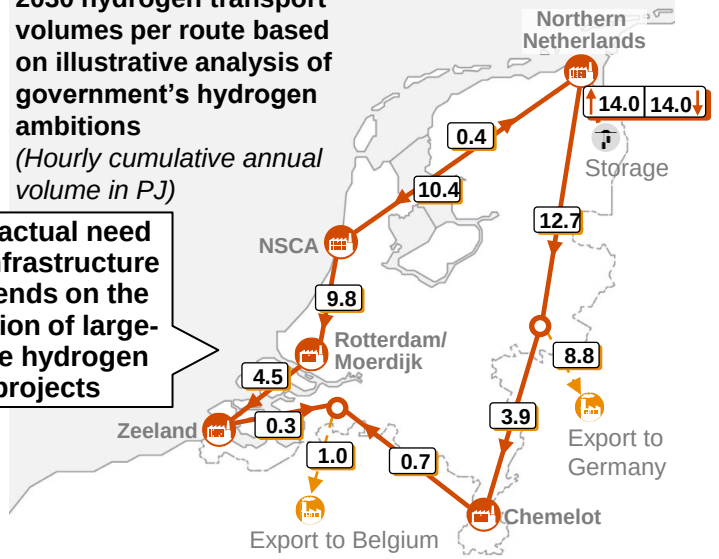
~45% consists of actual conversion costs, i.e. cleaning and preparation of the pipelines, also depending on the desired purity of hydrogen





2030 hydrogen transport volumes per route based on illustrative analysis of government's hydrogen ambitions
(Hourly cumulative annual volume in PJ)

The actual need for infrastructure depends on the location of large-scale hydrogen projects



Source: HyWay 27, https://www.hyway27.nl/en

H2 storage project at Bad Lauchstädt gas storage facility

- Large-scale power-to-gas project “Energiepark Bad Lauchstädt”
- Investigate the production, transport, storage, and economic use of green hydrogen on an industrial scale
- Large-scale electrolysis plant of up to 30 MW will produce green hydrogen using renewable electricity from a nearby wind farm
- The green hydrogen will be temporarily stored in a salt cavern and fed into the hydrogen network of the chemical industry based in central Germany via a converted gas pipeline

Source: Energiepark Bad Lauchstädt, https://energiepark-bad-lauchstaedt.de/

Conclusion

- Hydrogen blending will become a crucial factor in the transition phase towards carbon neutrality
- Investments in infrastructure are already on the way
- Pilot projects test the restrictions, boundaries and possibilities of blending hydrogen in the gas grid
- Still requires R&D for cost-efficient deployment

Source: H2 news, https://h2-news.eu/gassektor/avacon-und-dvgw-mischen-erstmals-20-wasserstoff-dem-gasnetz-bei/
Esders, https://www.esders.de/2021/05/auswirkungen-der-beimischung-von-wasserstoff-zum-erdgas-auf-den-explosionsschutz-von-gasmess-und-gaswarngeraeten/

Thank you for your time.

If you have questions, feel free to contacts us.

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