Navigating the Energy Transition:
From a fossil-based economy to a meaningful hydrogen economy

Leon Stille

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´Energy Transition is the biggest challenge of our lifetime ´

- Independent energy expert with own label New Energy Institute
  - CCO Hovyu BV
  - Manager Education of Impact Hydrogen
  - Lecturer at universities and business schools
- Hydrogen Europe, Illuminum, International Gas Union, European biogas association scientific advisor
- BSc and MSc in Geology and Earth Sciences
- Ongoing PhD in energy policy
- 15+ years experience in the international energy sector
- Focus:
  - Consultancy; expert advice, business development, representation
  - Education; courses, in house training and speaking/moderating events
  - Technology: R&D projects; Hycooker, Hyperion, ZEUS, Hydrogen Lift

Leon Stille (He/Him)

New Energy Expert and Educator | Energy Transition | ESG | Innovation | Education | Hydrogen | CCUS | Green Gas | Speaker | Moderator

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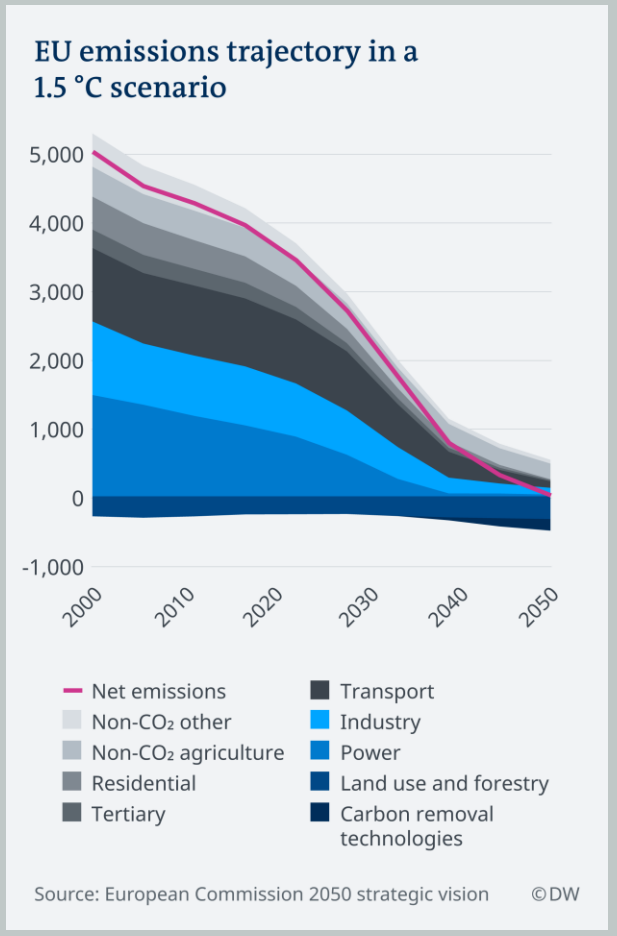
The challenge

- Limit global warming to 1.5 degrees C preferably
- Decrease emission to 0% compared to today
  - Possible negative emissions required
- Completely climate neutral by 2050 (EU)

Requires complete rethinking and redesign of the current systems:

- Energy
- Food
- Water
- Industry
- Transport



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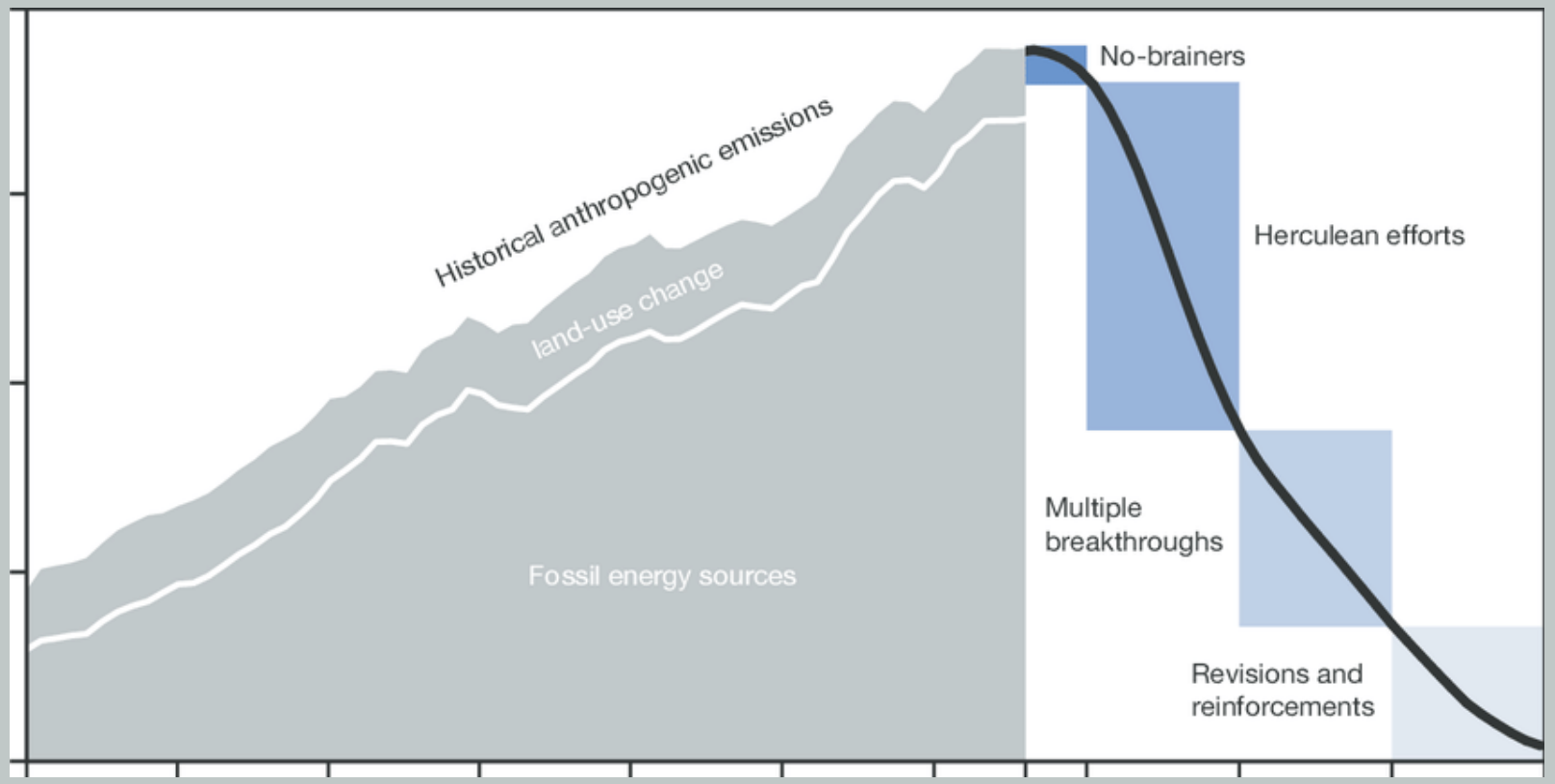
Steps to be taken to reach the goals



https://www.researchgate.net/figure/2-3-Carbon-roadmap-for-stepwise-decadal-decarbonization-The-emissions-shown-are-based_fig4_312159541

- It would limit average global temperature rise to 2 °C above pre-industrial levels (when coupled with energy efficiency);
- It would avoid up to 12 gigatonnes of energy-related CO2 emissions in 2030
- It would result in 24.4 million jobs in the renewable energy sector by 2030, compared to 9.2 million in 2014;
- It would reduce air pollution enough to save up to 4 million lives per year in 2030;
- It would boost the global GDP by up to USD 1.3 trillion.

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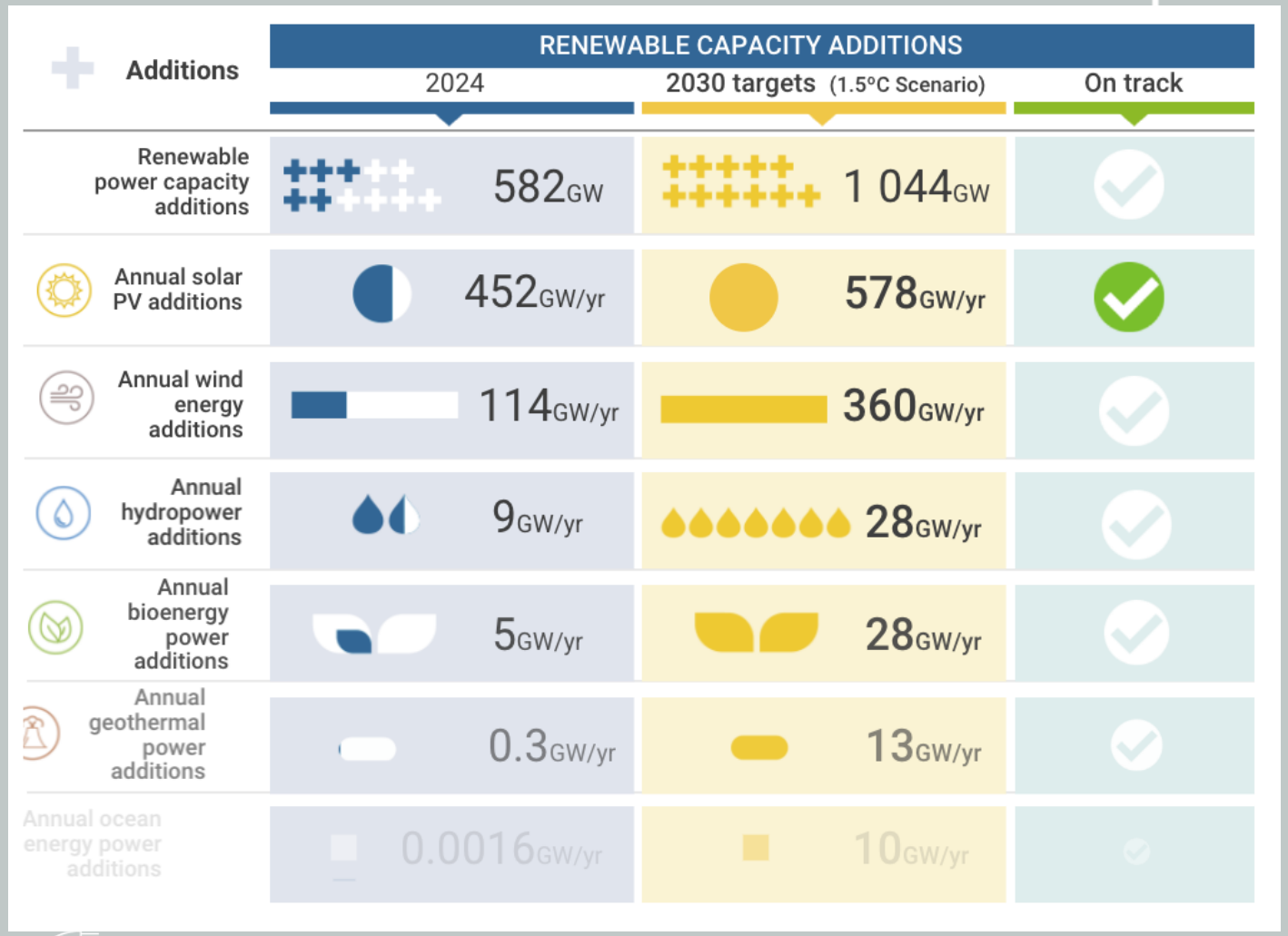
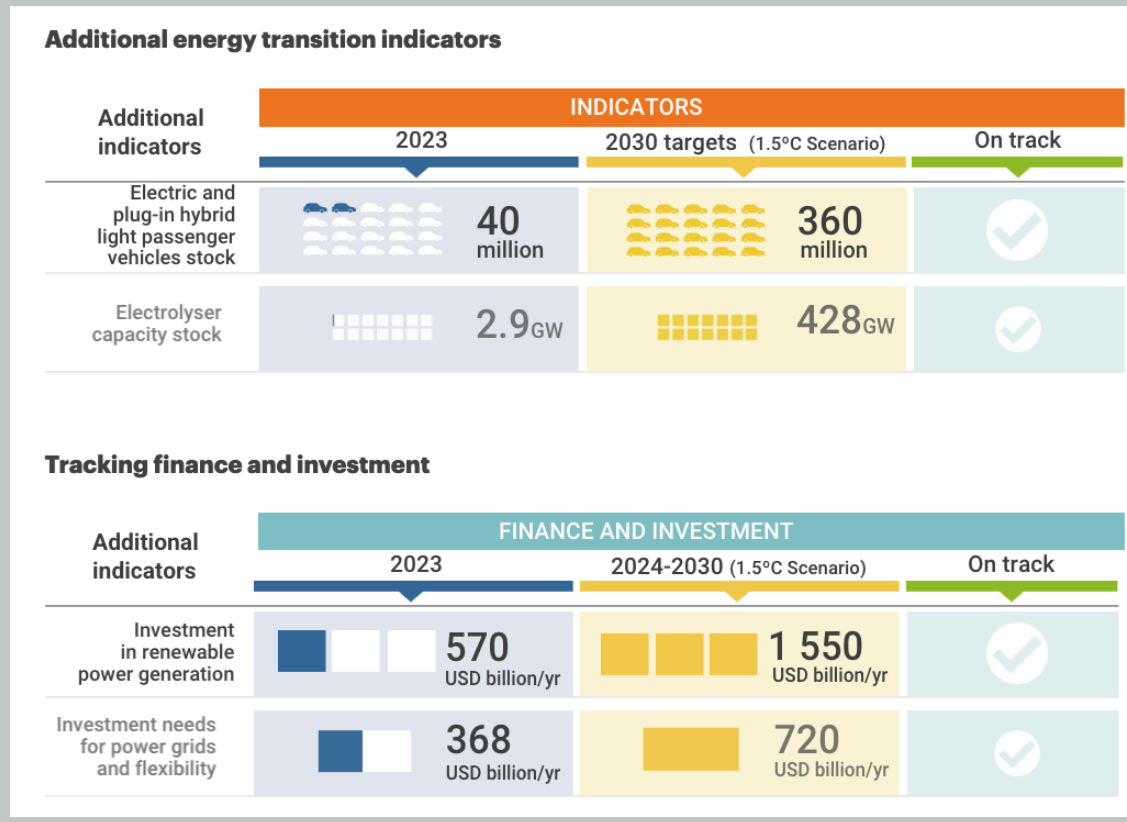
Where are we in the transition?





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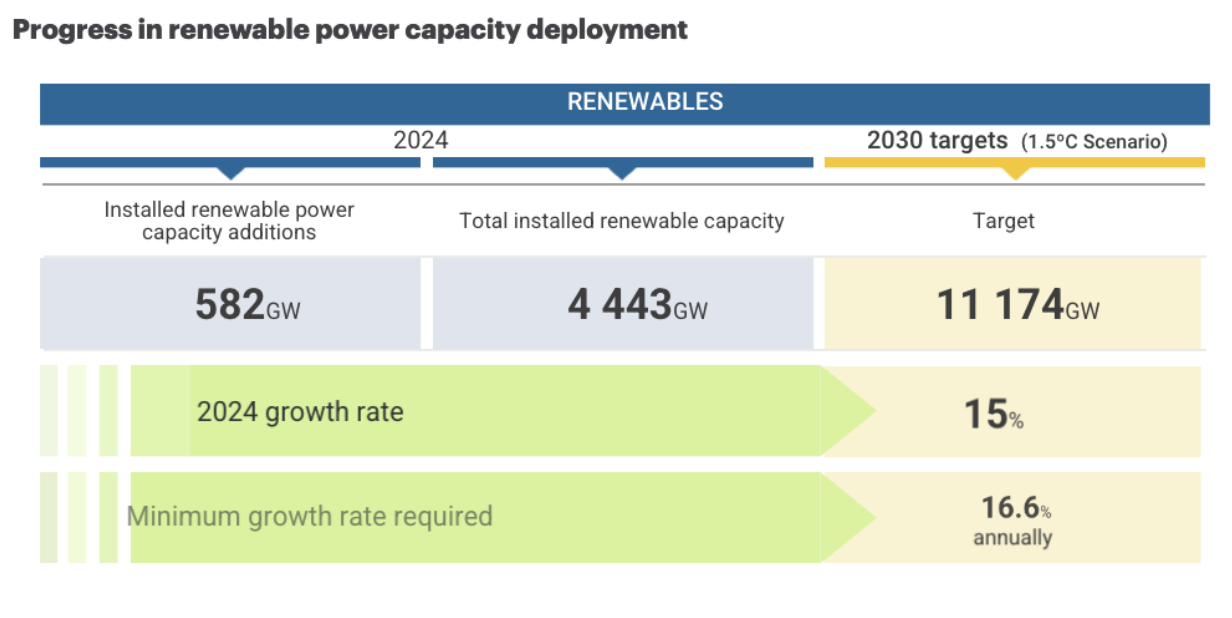
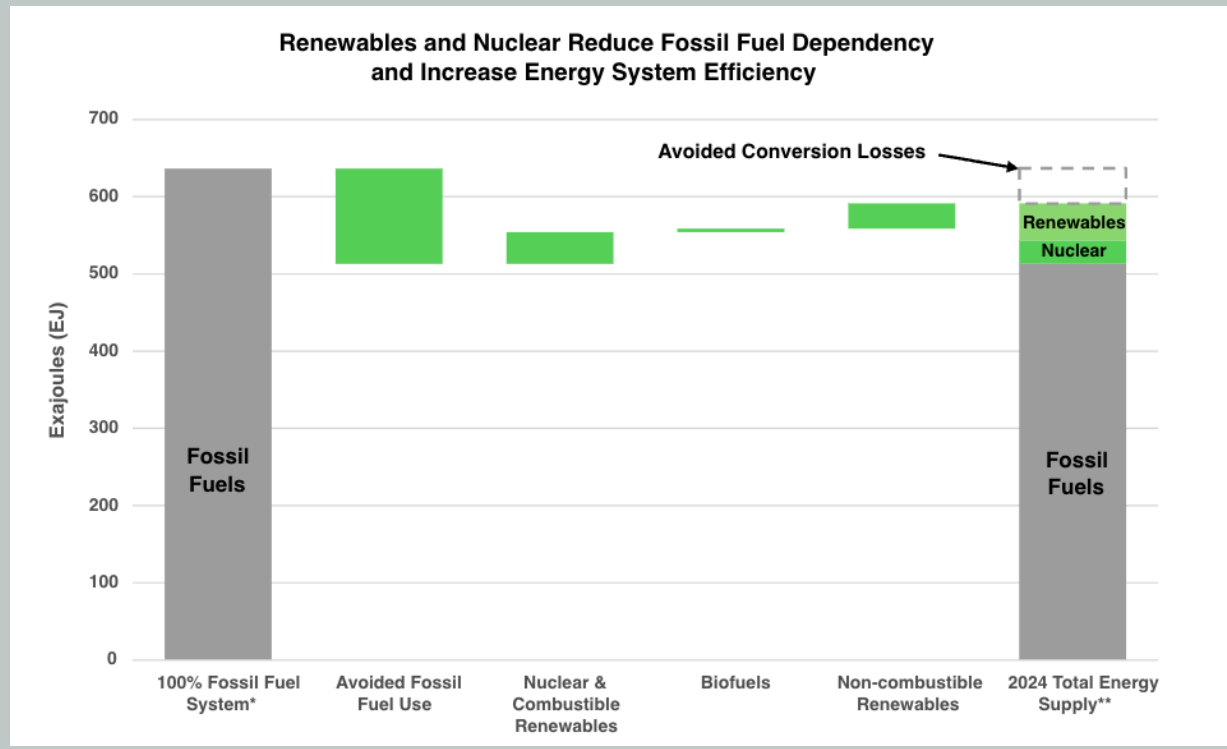
https://www.irena.org/Energy-Transition/Outlook/Tracking-progress#key-data

Key metrics; growth and efficiency



https://www.irena.org/Energy-Transition/Outlook/Tracking-progress#key-data

IEA: Oil 1%, NG 1.5% and coal 1.3% growth



https://www.energyinst.org/statistical-review

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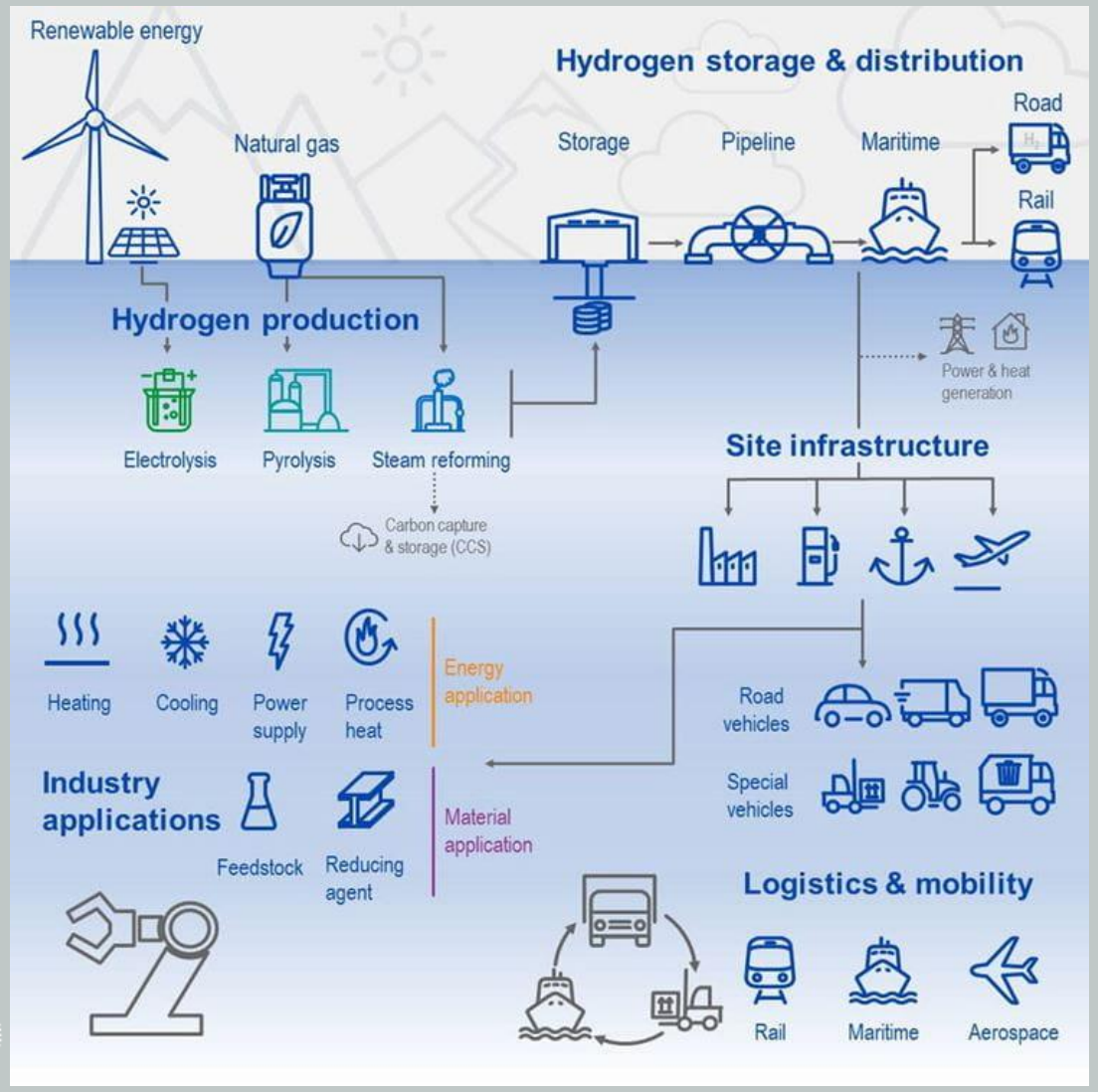
So what about hydrogen?

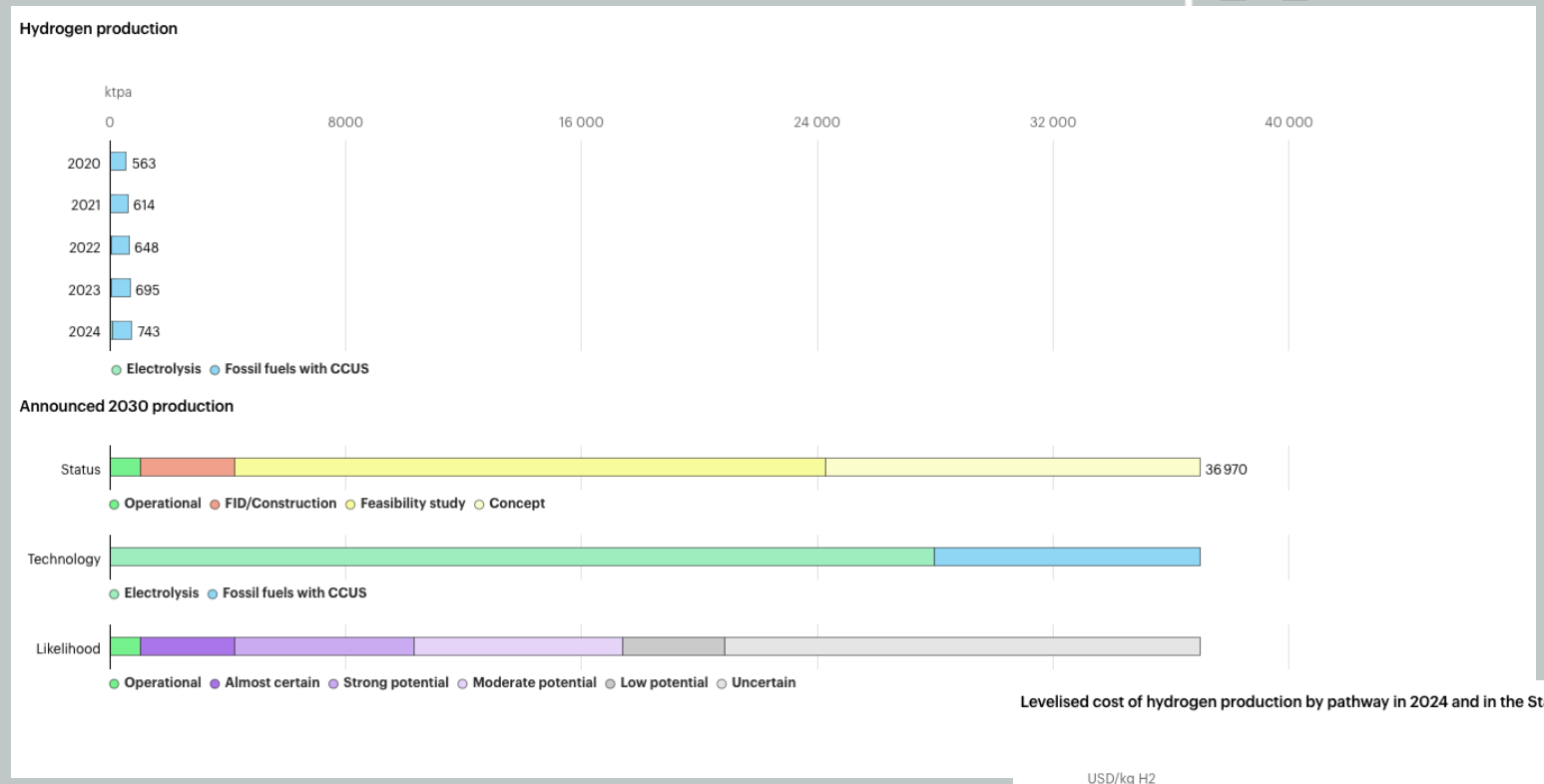


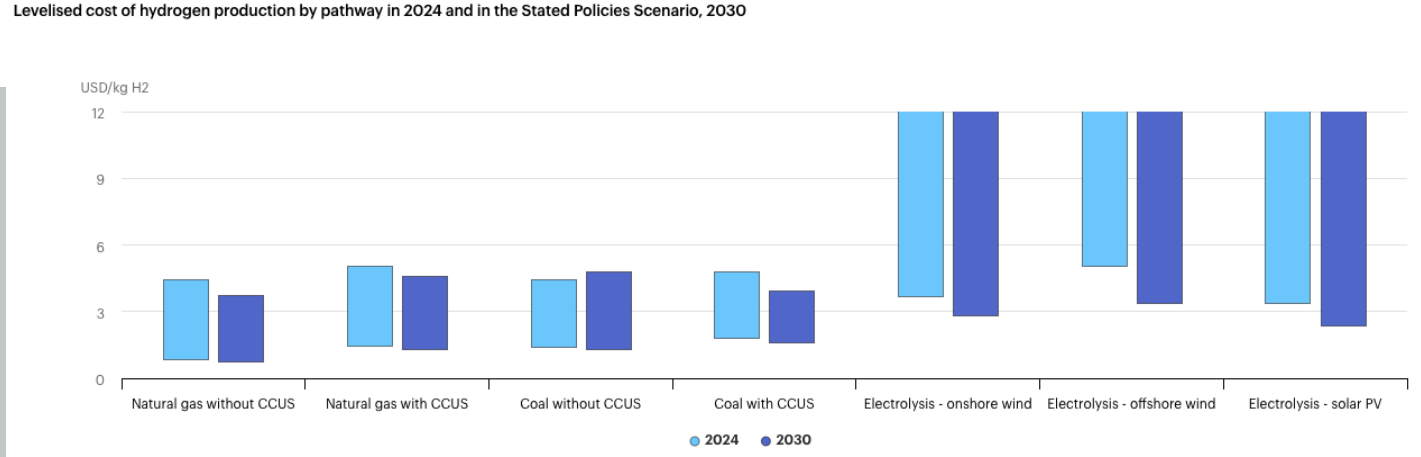
1. Hydrogen is very versatile
2. It can be stored for long periods of time
3. The molecule itself is reactive and a chemical building block
4. Fuel cell and direct use options are being developed
5. Potential for gas infrastructure re use
6. No direct emissions
7. Scalable solutions
8. Fit's in current supply chains

BUT

<u>Not all sectors are technically or economically viable</u>

But we do not see this happening





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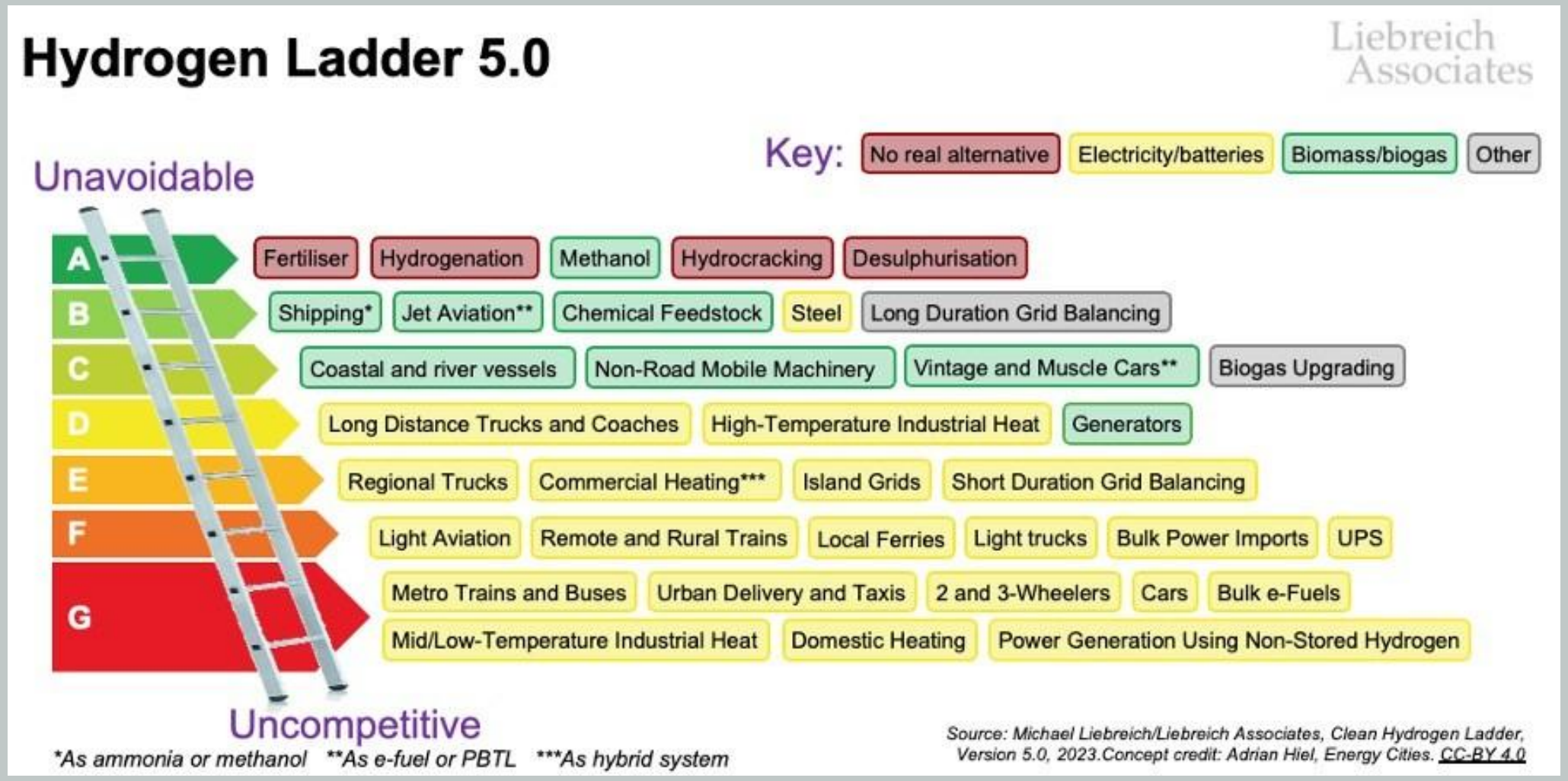
https://www.iea.org/data-and-statistics/data-tools/hydrogen-tracker

Instead focus is applied to key sectors



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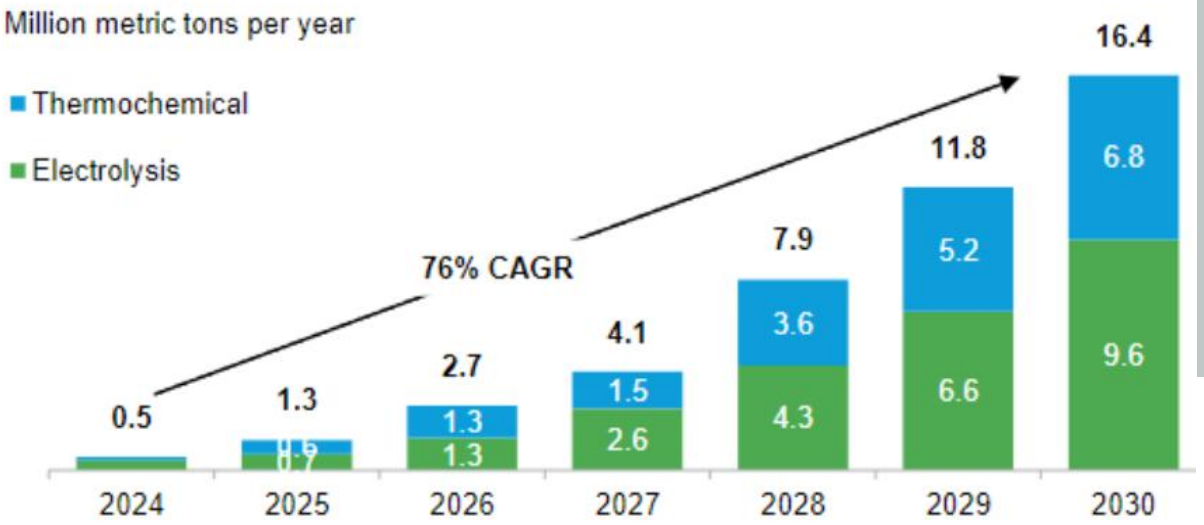
In line with what is actually happening

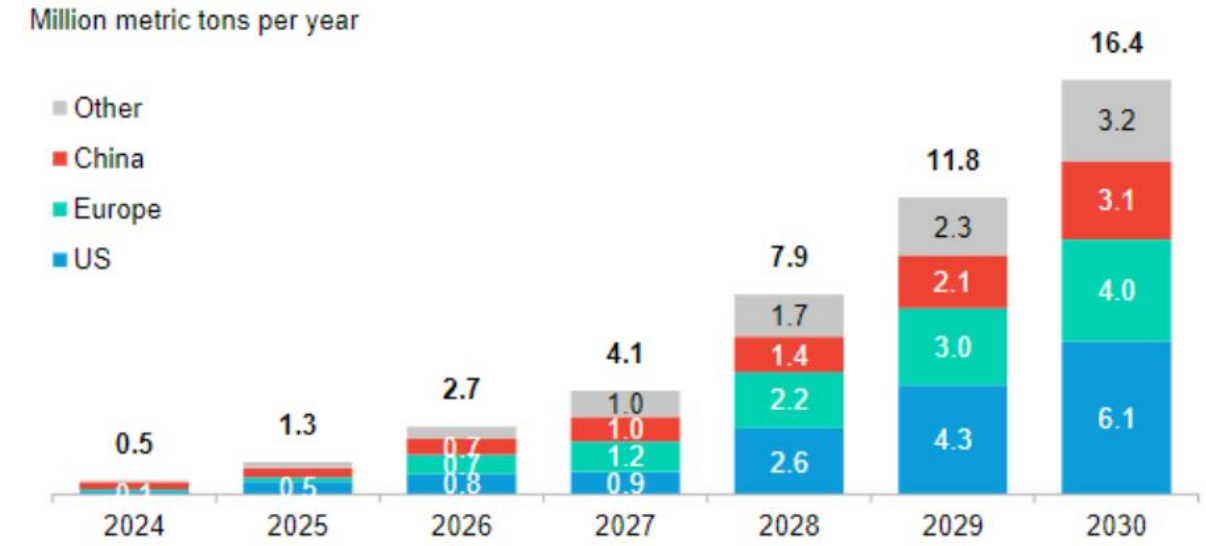
Figure 1: Forecast annual low-carbon H_2 supply by production method and commissioning year



Source: BloombergNEF. Note: 'Thermochemical' includes all low-carbon pathways using fossil fuels as feedstock. 'CAGR' stands for compound annual growth rate.

https://about.bnef.com/insights/clean-energy/hydrogen-supply-outlook-2024-a-reality-check/

Figure 2: Forecast annual low-carbon H_2 supply by market and commissioning year



Source: BloombergNEF

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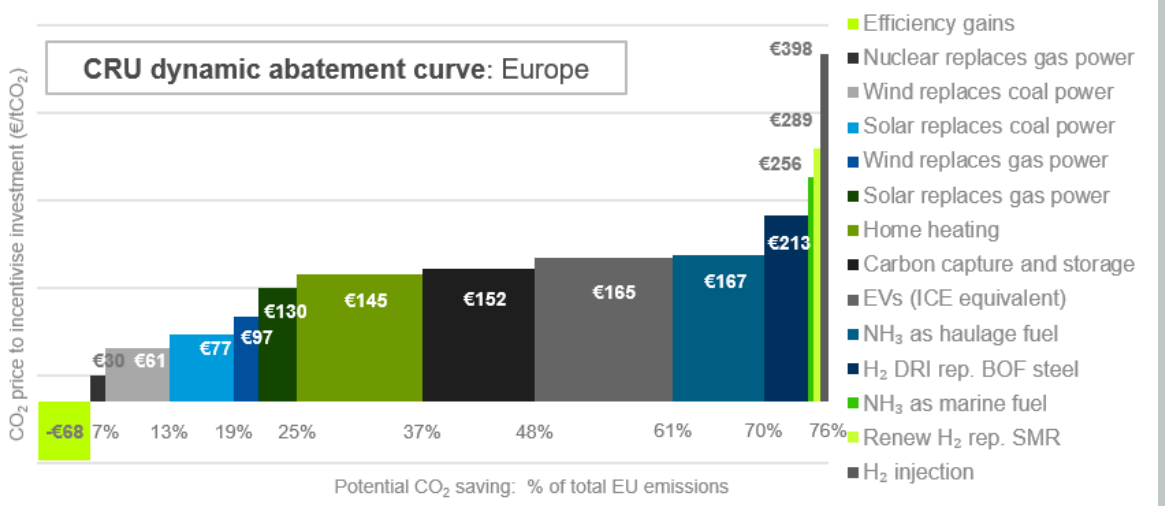
Why? Because of the huge success of renewables

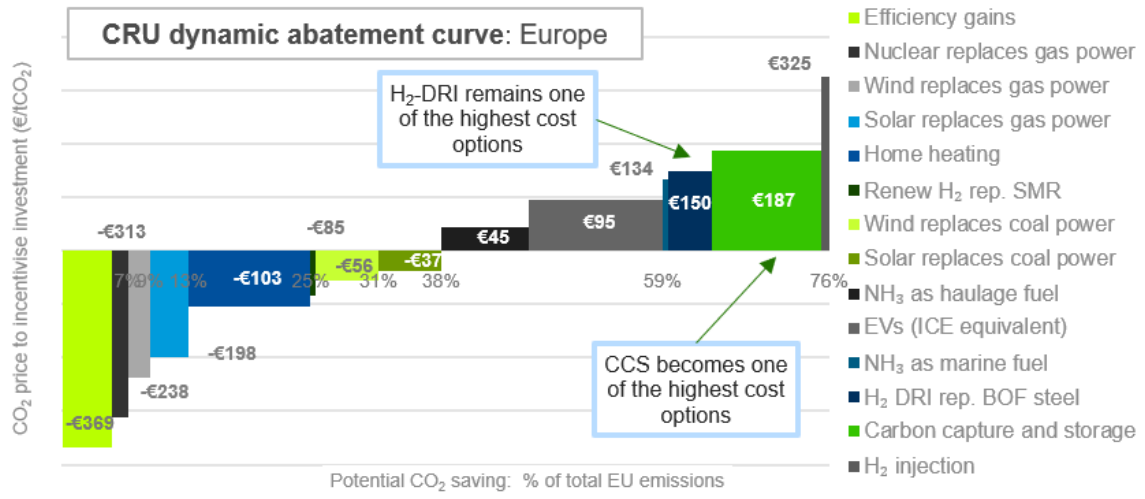
Figure 5: A carbon price of >€250 /t is needed to fully decarbonise EU economy



DATA: CRU Sustainability analysis; Note: abatement curve based on 2030 investment costs, steady-state fossil energy prices and reported on a real 2020 basis

Low electricity prices

Figure 6: Current high energy prices pull the abatement curve down drastically



DATA: CRU Sustainability – dynamic carbon abatement curve; Note: abatement curve based on 2030 investment costs, curren [very high] fossil energy prices and reported on a real 2020 basis

https://www.crugroup.com/en/communities/thought-leadership/sustainability/high-energy-prices-help-not-hinder-decarbonisation/

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Is this a problem?....Not really

By 2030, even if we fully prioritise hydrogen for the “no-real-alternative” sectors on the Hydrogen Ladder, global hydrogen demand is likely only ~65–80 Mt (or ~90–110 Mt including declining refining), corresponding to roughly 1–2% of global energy demand.

That translates roughly to 100-200 billion USD per year in value!

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https://research.open.ac.uk/news/our-us10-trillion-global-energy-bill-dwarfs-whats-needed-limit-global heating?utm_source=chatgpt.com

Thank you

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