NEW ENERGY

FORUM

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Breaking Barriers

New Energy Forum 2025

Methane splitting: a dual opportunity for clean hydrogen production and carbon utilization

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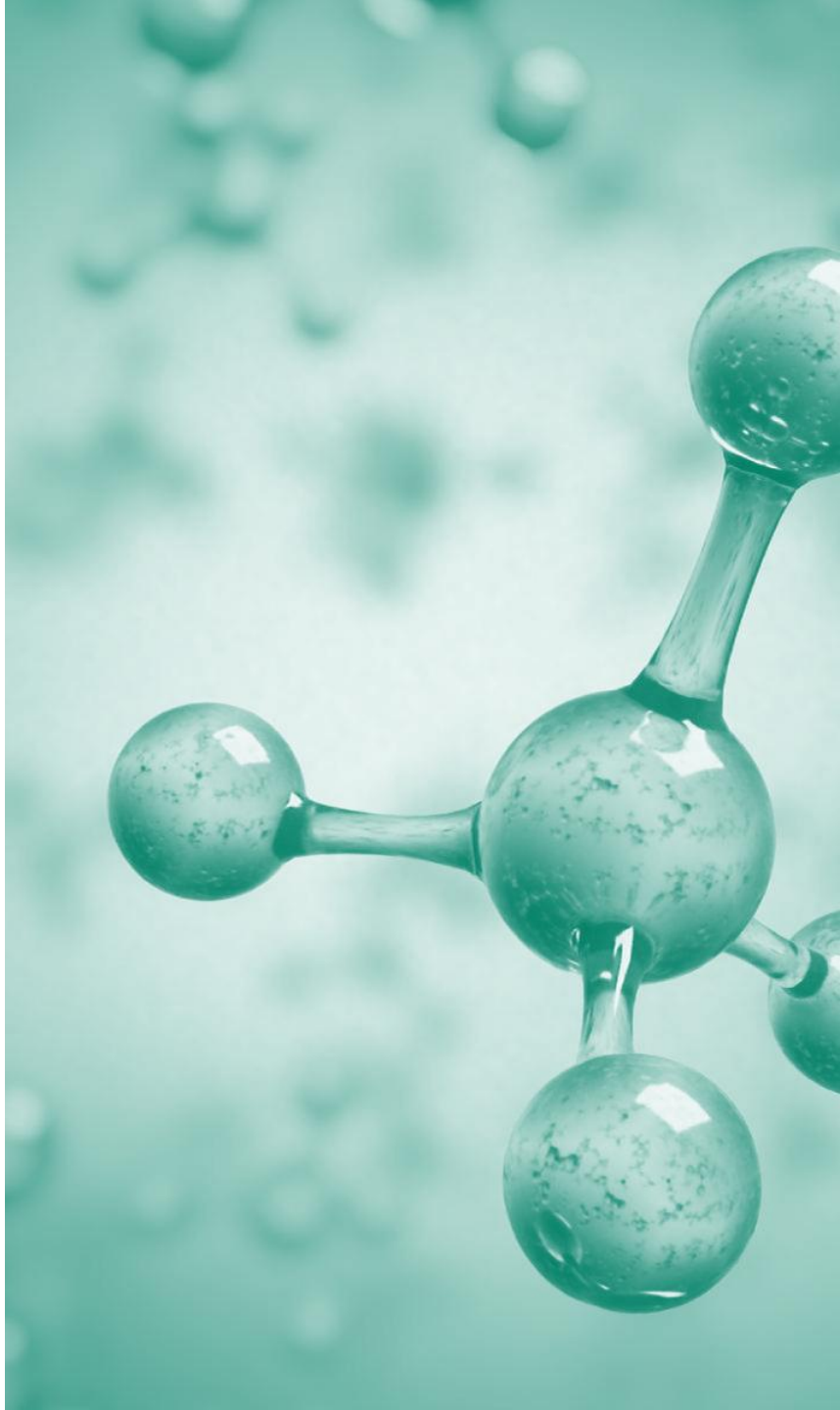
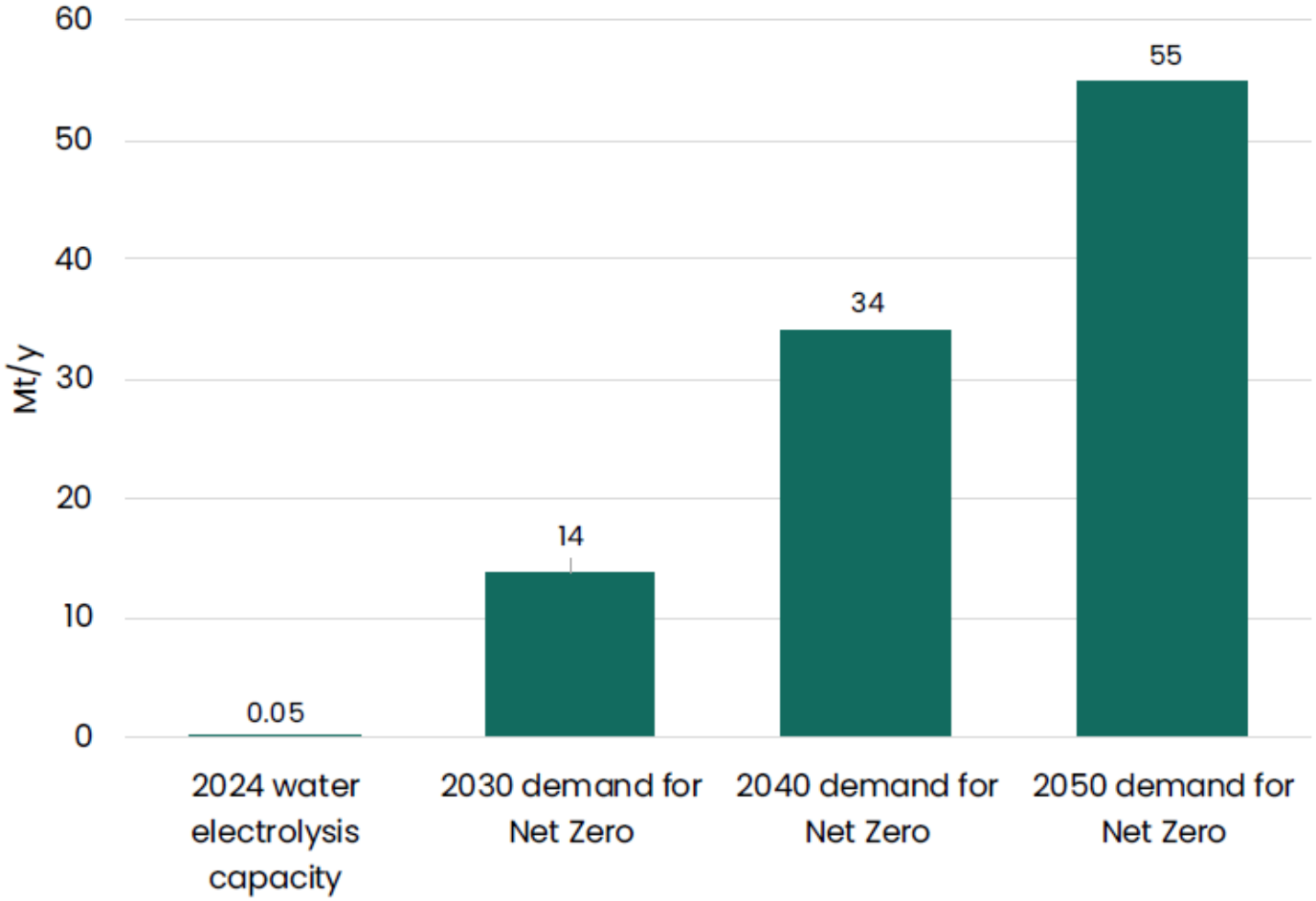
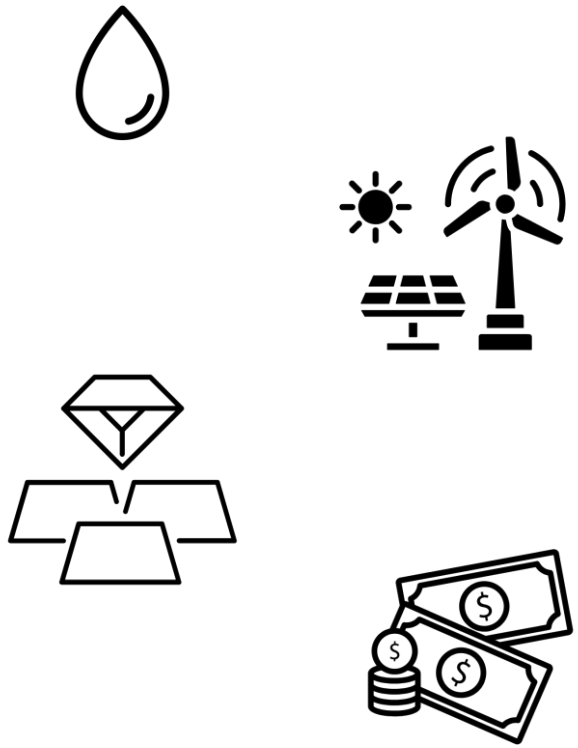


The need for alternative clean hydrogen production

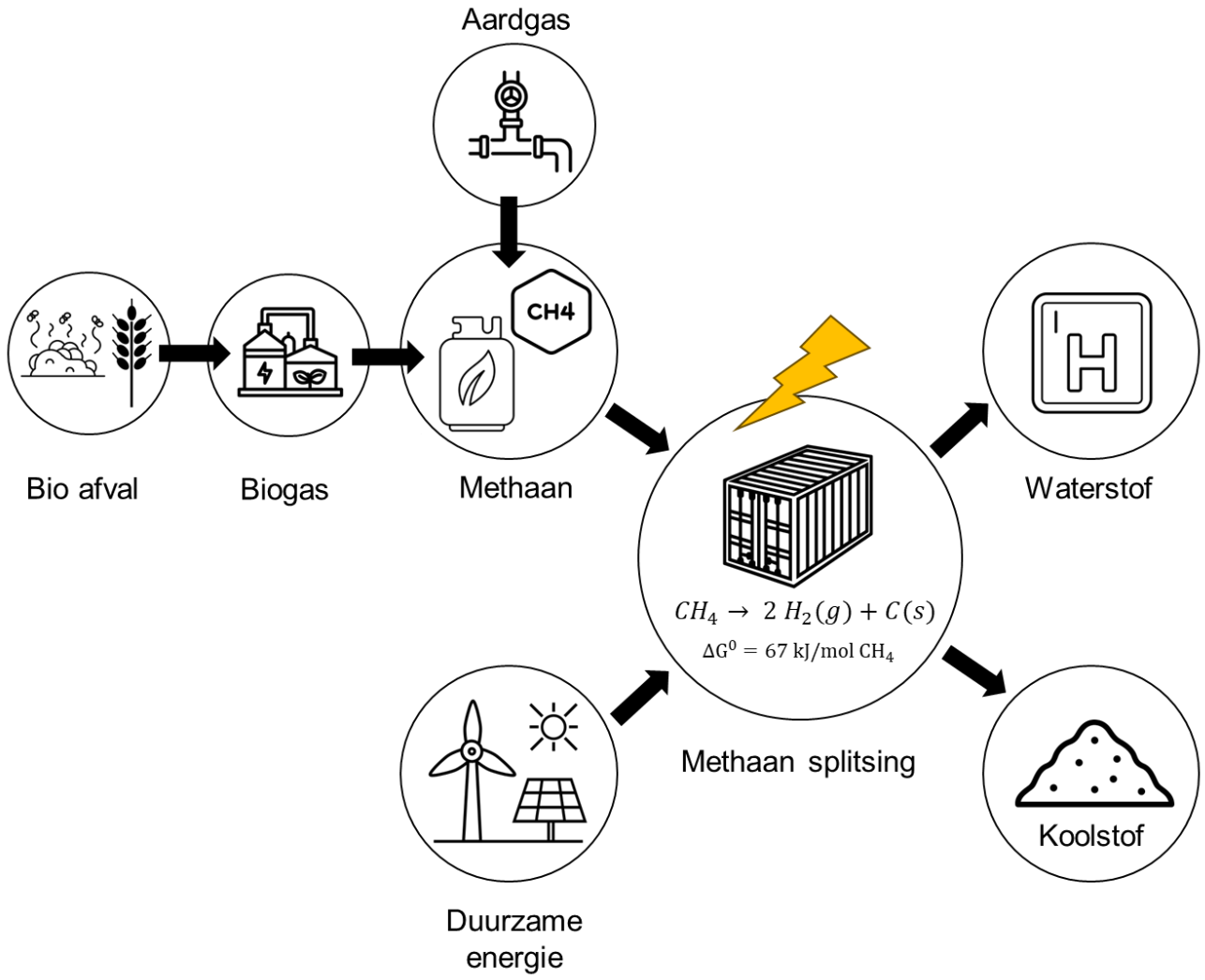
Hydrogen consumption required for Europe to achieve Net Zero by 2050 vs 2024 European water electrolysis capacity



Source: Hydrogen Europe, BNEF 2024

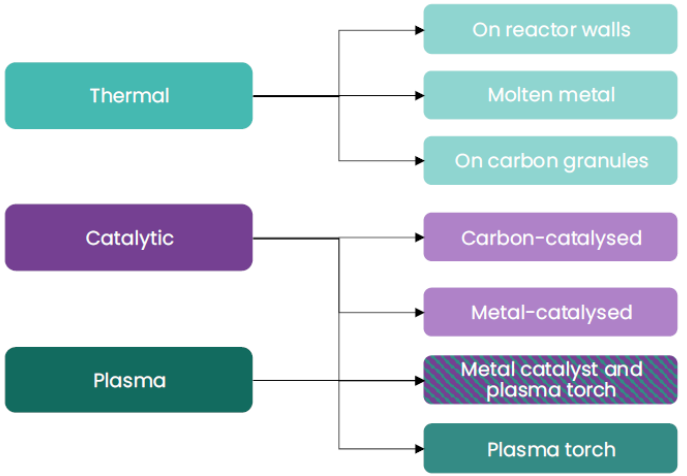


Methane splitting into hydrogen and solid carbon



Opportunities:

- ✓ No CO_2 emissions.
- ✓ Low energy consumption (15 kWh/kg H_2 vs. 50 kWh/kg H_2 for water electrolysis)
- ✓ Negative CO_2 emissions with biomethane as input gas
- ✓ Carbon byproduct with high quality and purity



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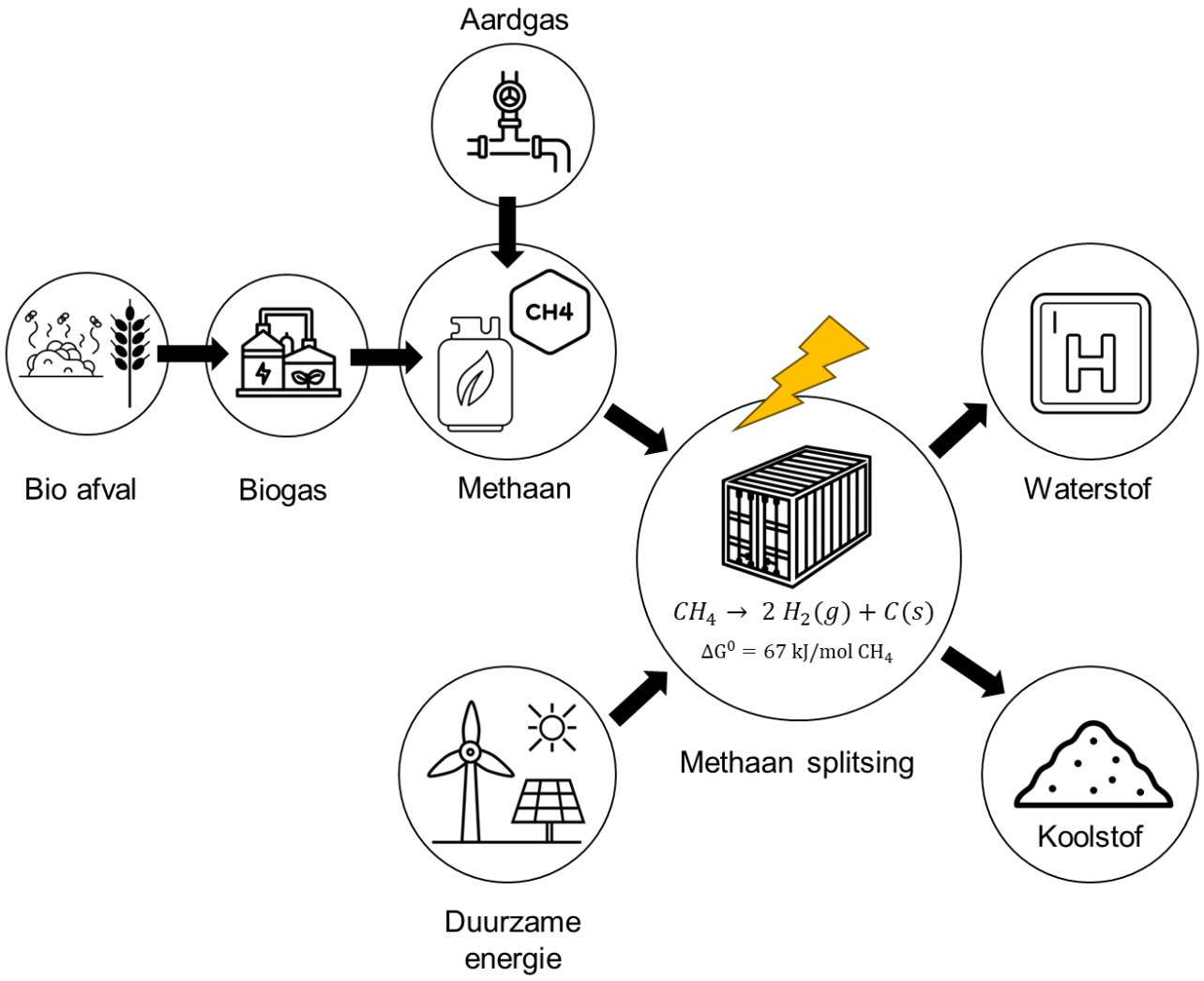

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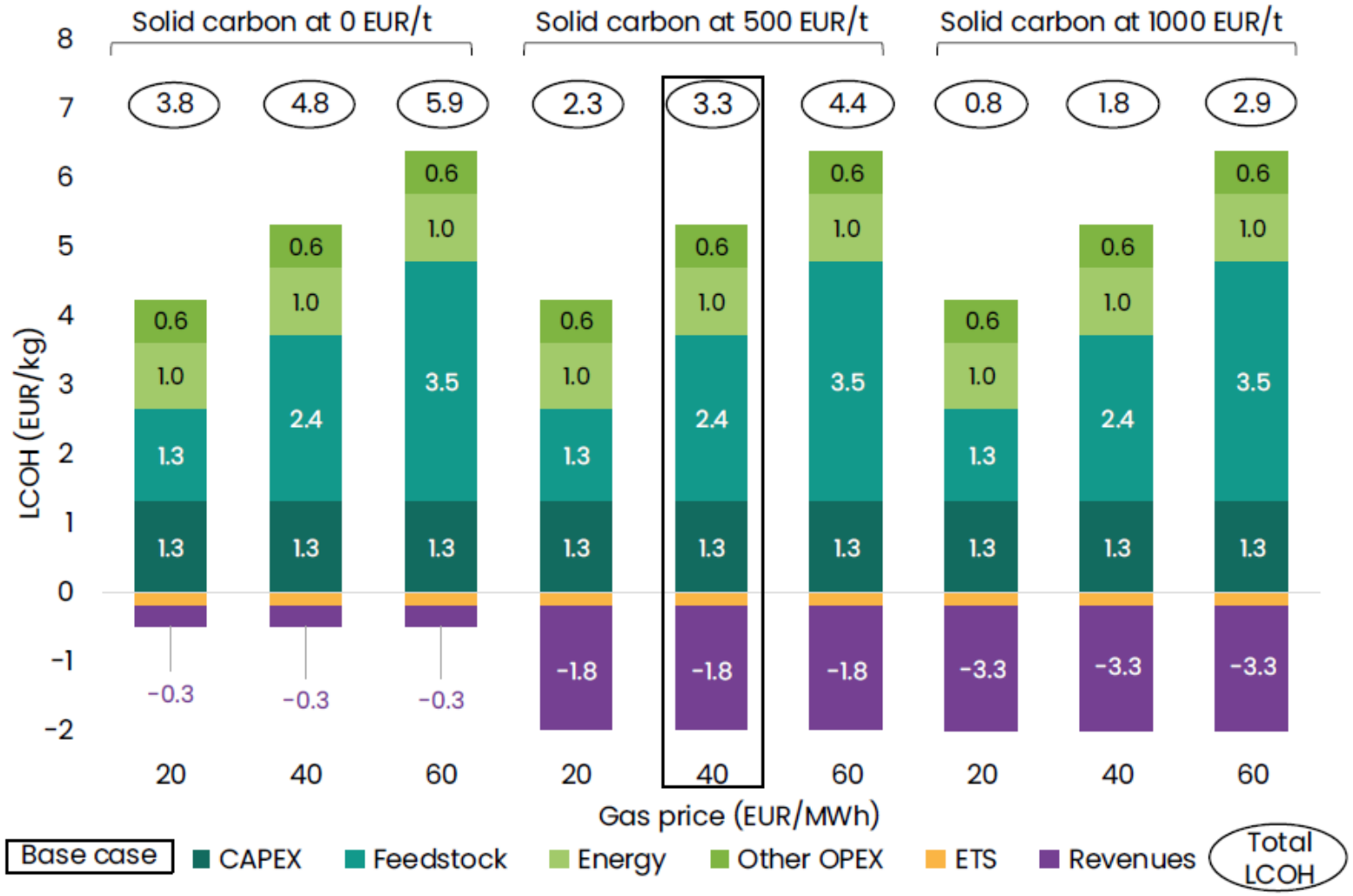
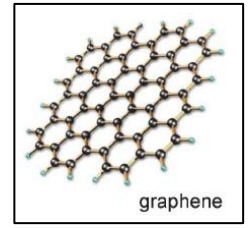
Challenges:

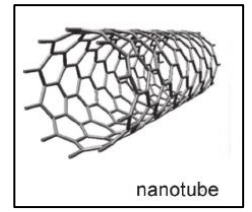
- ✓ High CAPEX costs
- ✓ Heavily reliant on revenues from solid carbon by-product

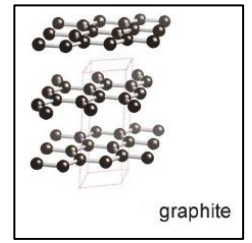
Carbon as valuable by-product

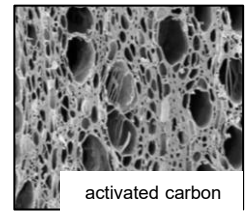
LCOH for methane splitting depending on price of gas and solid carbon

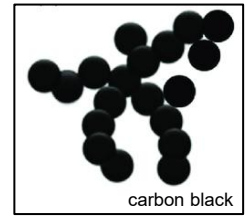












Source: Hydrogen Europe, Intratec 2024

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Examples of carbon applications

Automotive

Inks/coatings

Plastics

Elektrodes

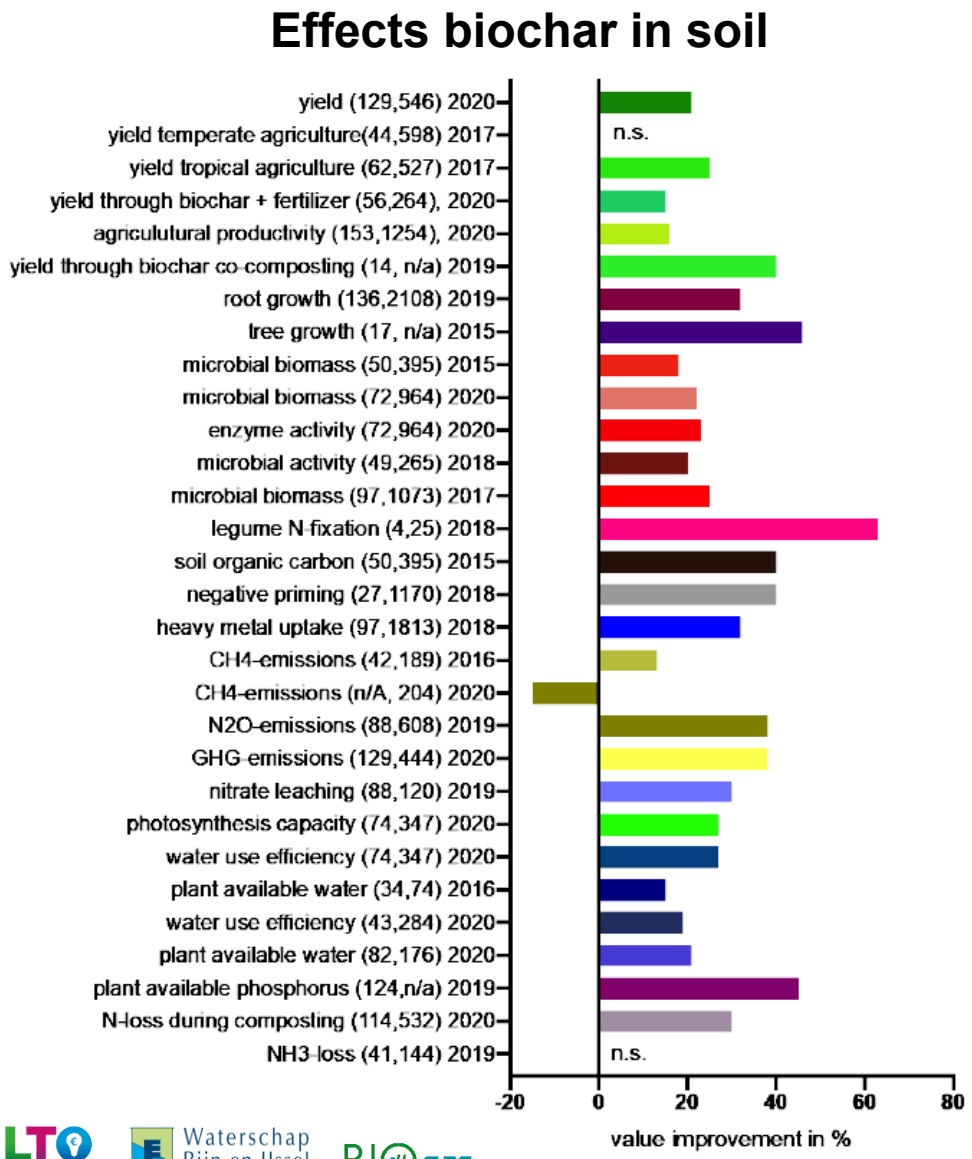
Steel

Building material

Asphalt

Soil improvement

Carbon for soil improvement



Source: Agroscope, Schmidt (2021)

- Manure digestion → biogas (CH_4) as input gas
- Increase organic matter content, water and nutrient retention, and carbon sequestration.
- Contributes to circular agriculture.

Preliminary results:

- No toxic compounds
- High water holding capacity
- Enhanced plant growth under drought conditions[1]

→ Pot and field experiments with WUR

[1] Prohaska, 2024

Conclusions

- Methane splitting promising way to produce clean hydrogen and carbon
- LCOH largely dependent on carbon revenues and electricity price
- Carbon suitable for variaty of applications
- Carbon shows potential in soil enhancement

Thank you! Questions?