RESEARCH & INNOV

RESEARCH AND INNOVATION TO TURN CO_2 INTO A RESOURCE

Jan Mertens , Chief Science Officer ENGIE Research & In

Professor @ University

GHENT UNIVERSITY

ENGIE

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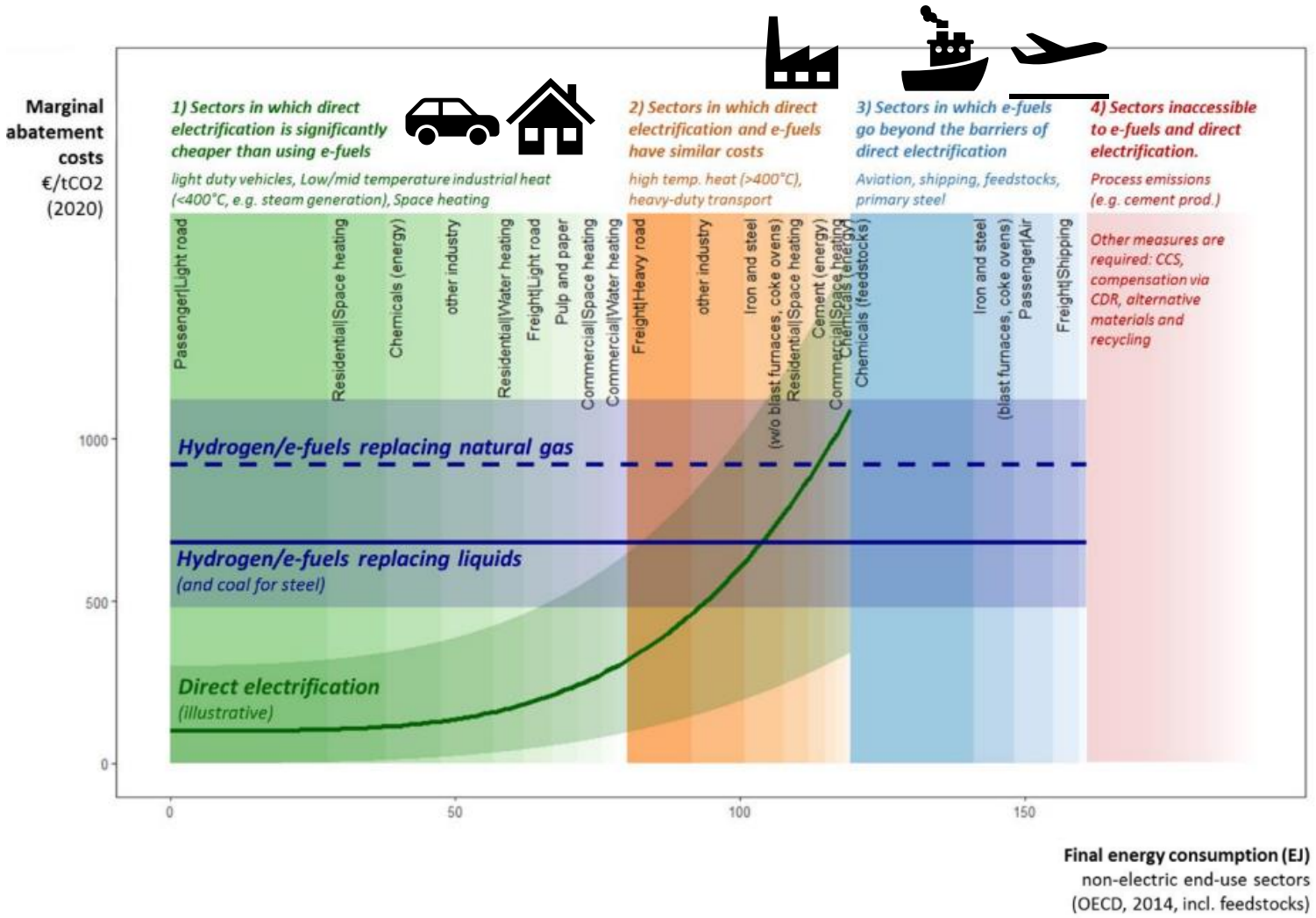
Molecules needed for the ‘hard to abate sectors’, long term energy storage and long-distance energy transport

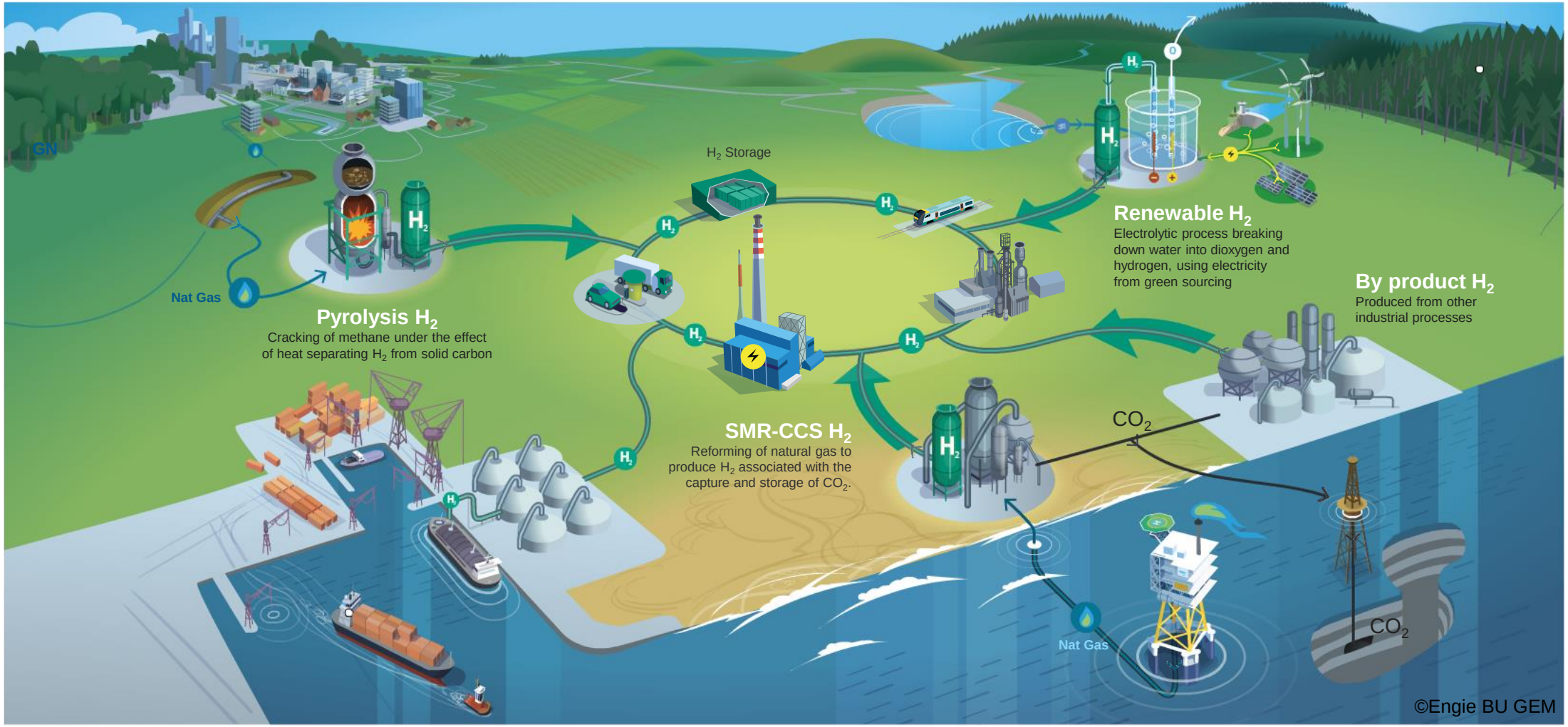
3 steps towards C-neutrality

- **Energy efficiency first**
- **Electrify where possible** with renewable energy
- **Green/carbon neutral molecules** where needed



Source : Falko Ueckerdt et. Al., Potential and risks of hydrogen-based e-fuels in climate change mitigation, 2021

Hydrogen is a low carbon energy solution with a lot of potential but …

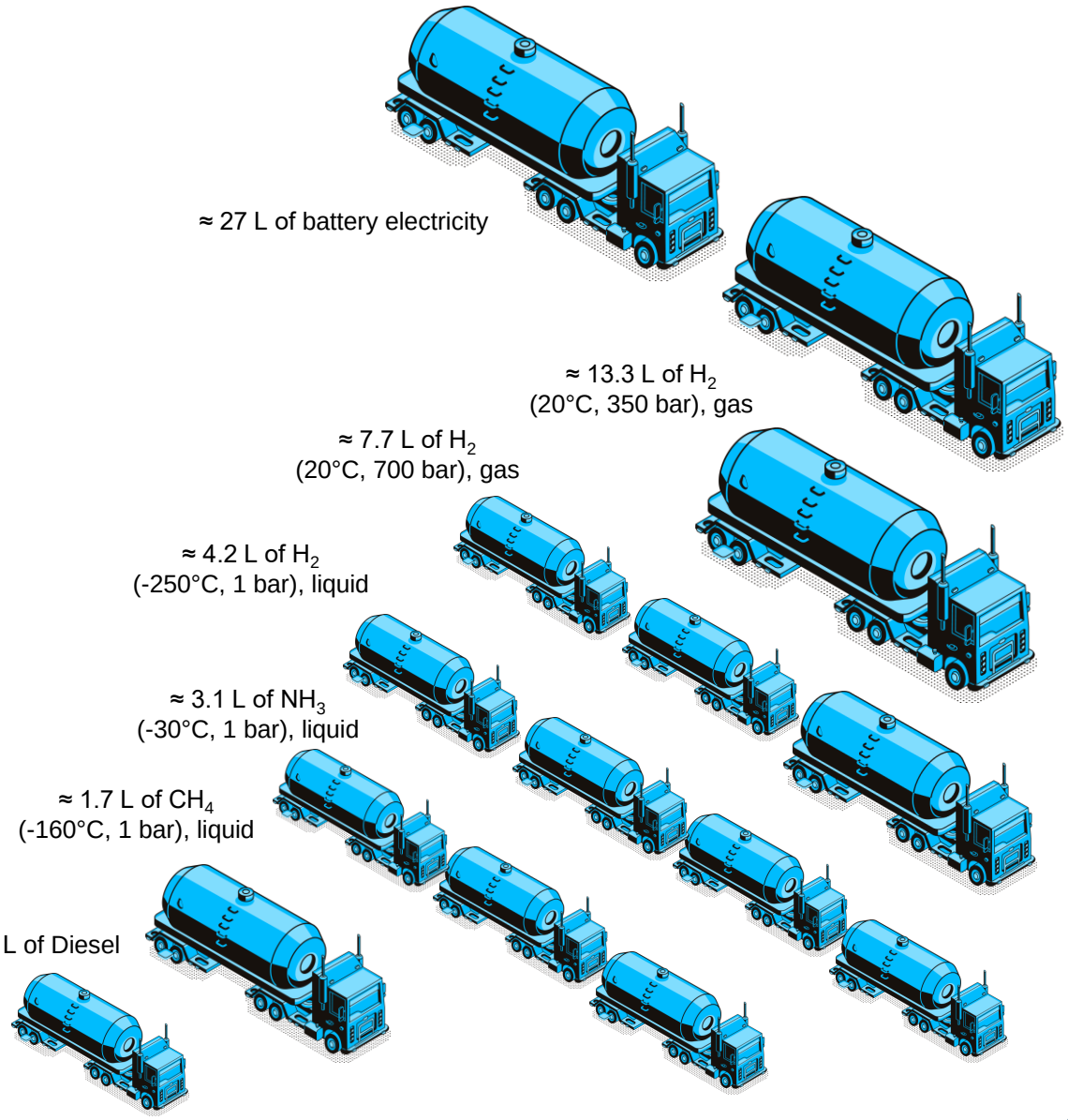


… but

Has a very low energy density and is thus extremely hard and expensive to store and move around

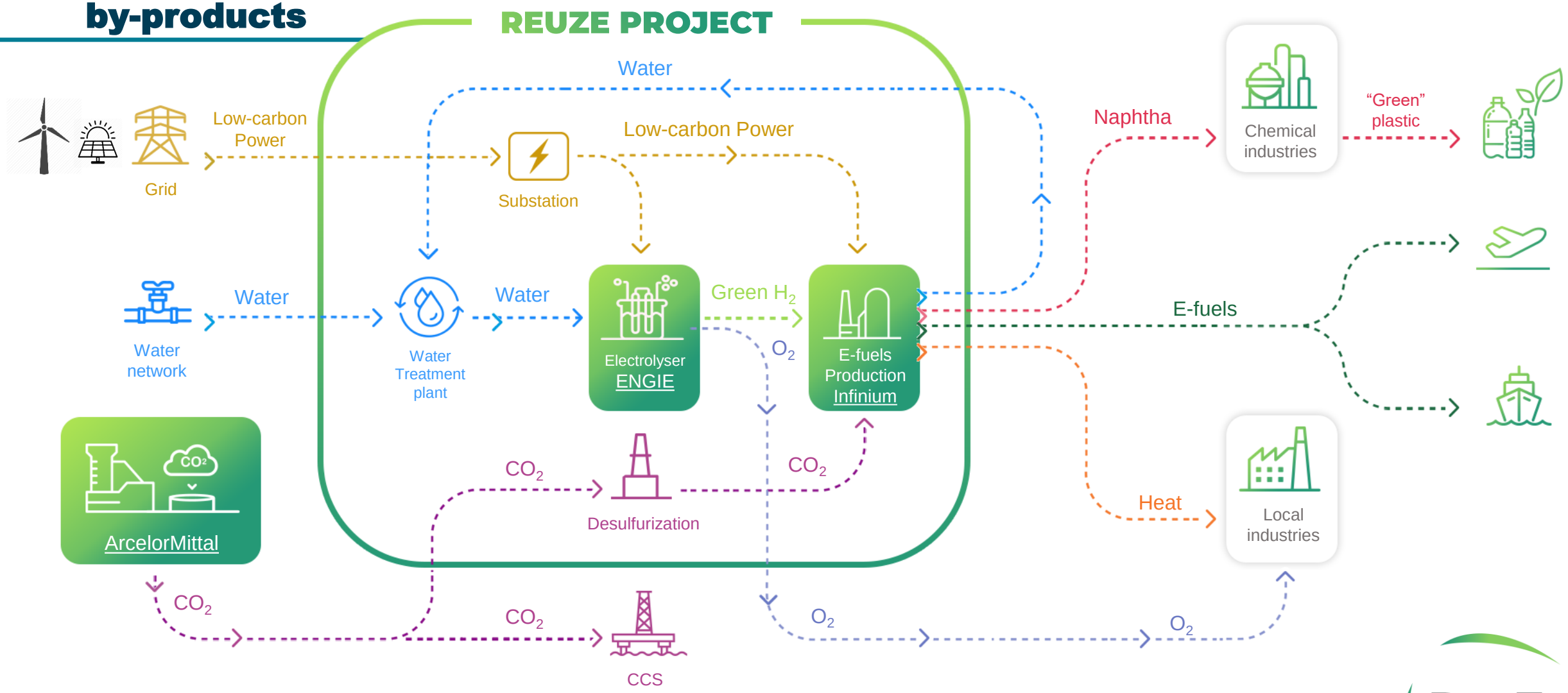
→ Need for synthetic hydrocarbons!*

How to transport or store 10kWh of energy?



* Mertens, J., R. Belmans and M. Webber, 2020. Why the carbon neutral transition will imply the use of lots of carbon. *C-Journal of Carbon research*, 6 (39), 1-8

R&I crucial: ReuZe project: Integrated project allowing to re-use by-products

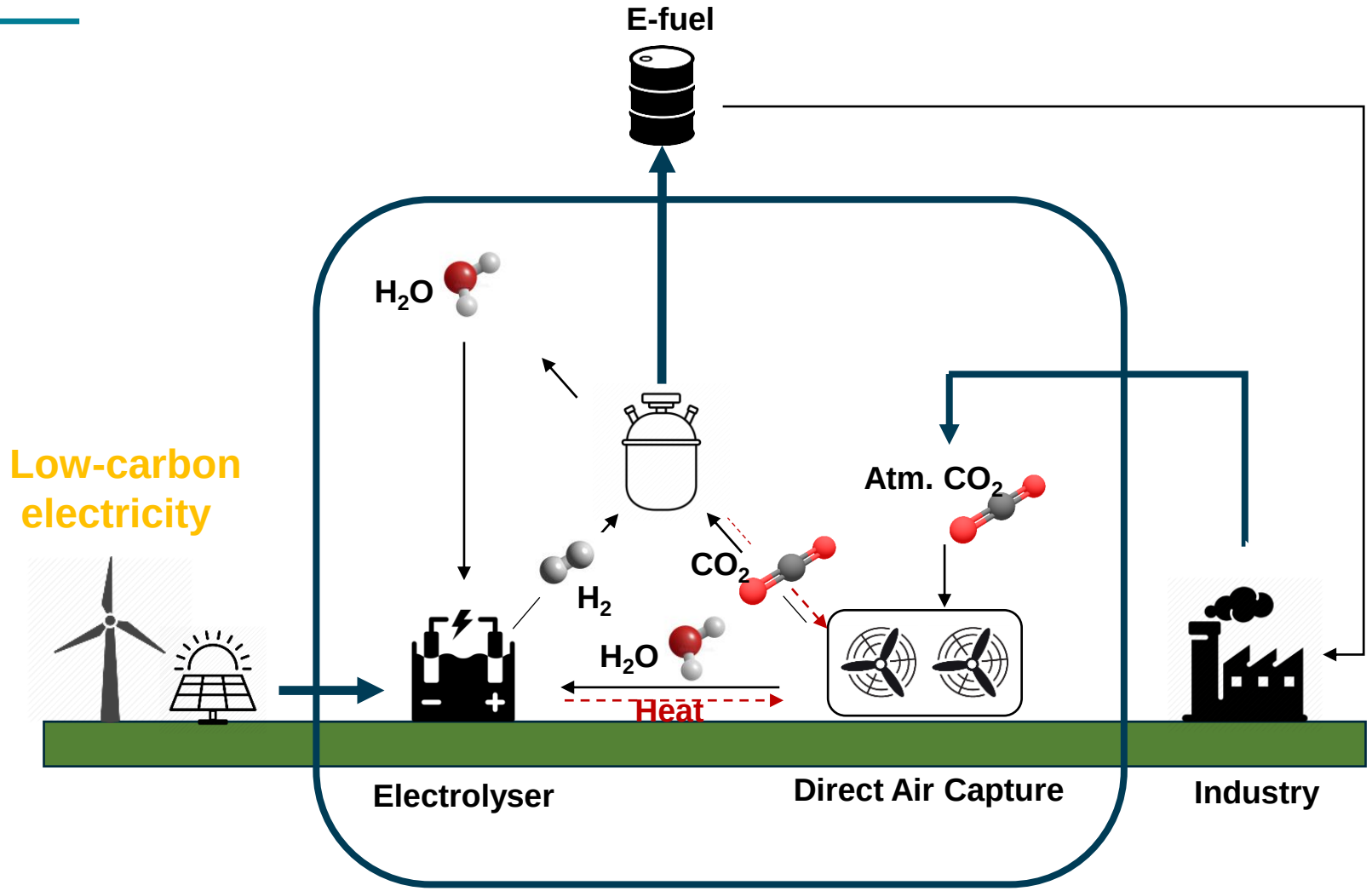


Electrolyser size 400 MW

R&I crucial: CirculAIR fuels: converting low-carbon electricity to e-fuels in a fully circular manner!

With renewable electricity as only input, we can produce e-fuels for use in industry, heavy mobility, long distance transport or storage of energy, …

As alternative to Direct Air Capture, we can **also capture CO_2 (i) from seawater** which could be useful for example for **producing e-fuels off-shore** where off-shore wind is abundantly available or (ii) **anaerobic digestion** installations that produce biogas*,[1]



* For this to be fully circular, water for electrolysis may be required unless wastewater is available and be purified.

[1] Goffart De Roeck F., A. Buchmayr, J. Gripekoven, J. Mertens and J. Dewulf, 2022. Comparative life cycle assessment of Power-to-Methane pathways: biological vs catalytic biogas methanation. *Journal of Cleaner Production*, in press