

ENERGIETRANSITIE - TRANSPORT GEVAARLIJKE STOFFEN



De opgave

With the world's present CO₂ emission, the 1,5 °C Paris goal will become impossible within a few years.

The Paris agreement at a glance

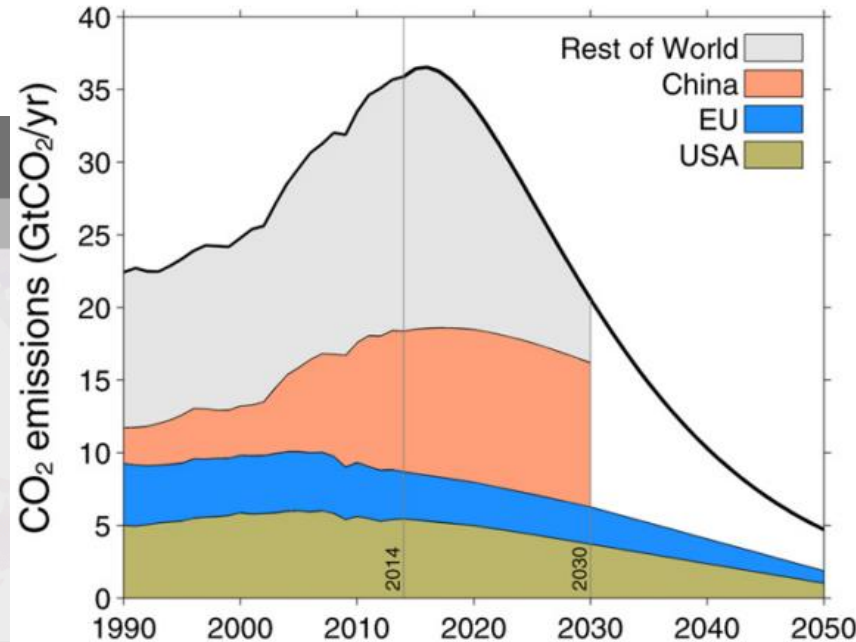
The warming level



below 2.0°C

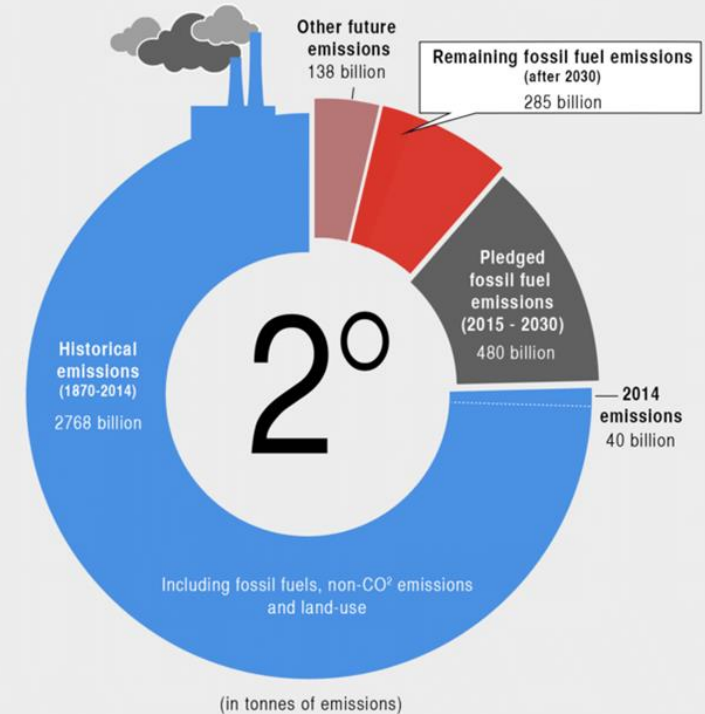
aim for 1.5°C

The agreement commits nations to keep temperatures "well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C".



The carbon budget

To keep warming below 2°C we can emit a total of around 3.6 trillion tonnes of greenhouse gases. But this only gives us a 66% chance. For a better chance, or for a lower warming limit, we'll have to emit much less.



Source: Peters et al 2015, iopscience.iop.org; and Le Querre et al 2015, www.earth-syst-sci-data.net

The Paris Agreement calls for **global emissions to peak "as soon as possible"**, and for a balance to be achieved between the rate of greenhouse gas emissions and the removal of these gases from the atmosphere by some time between 2050 and 2100.

De haven roert zich...

Zeescheepvaart zet eerste stap naar schonere toekomst

De internationale scheepvaart belooft de uitstoot van broeikasgas per 2050 te hebben gehalveerd. Maar de echte test komt nog

Haven wil uitstoot CO₂ veel duurder maken



Topman Rotterdamse haven:

'Schepen moeten schoner'

Rotterdam komt met eigen CO₂- beleid

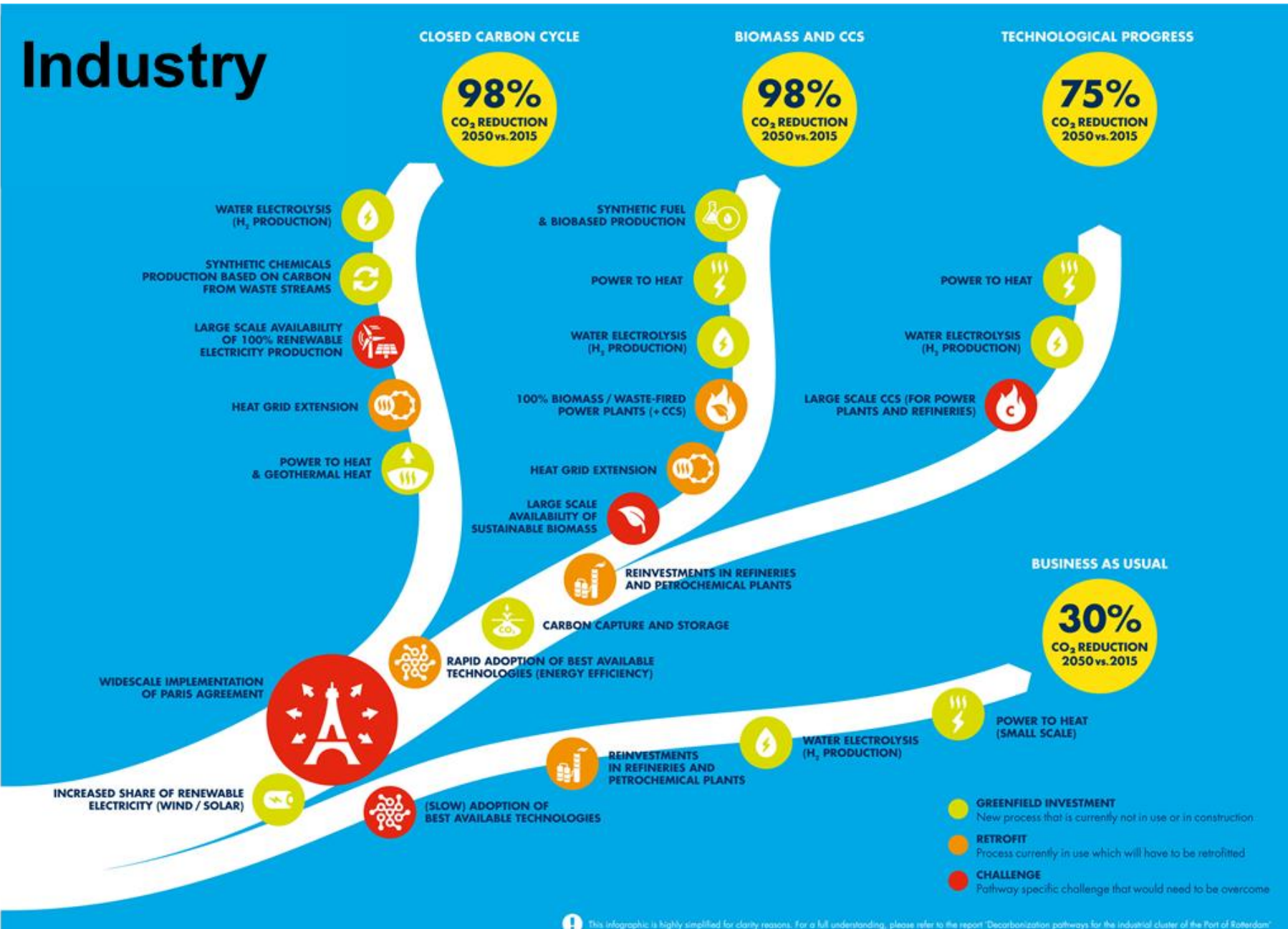


Topman Rotterdamse haven wil hogere prijs voor vervuiling

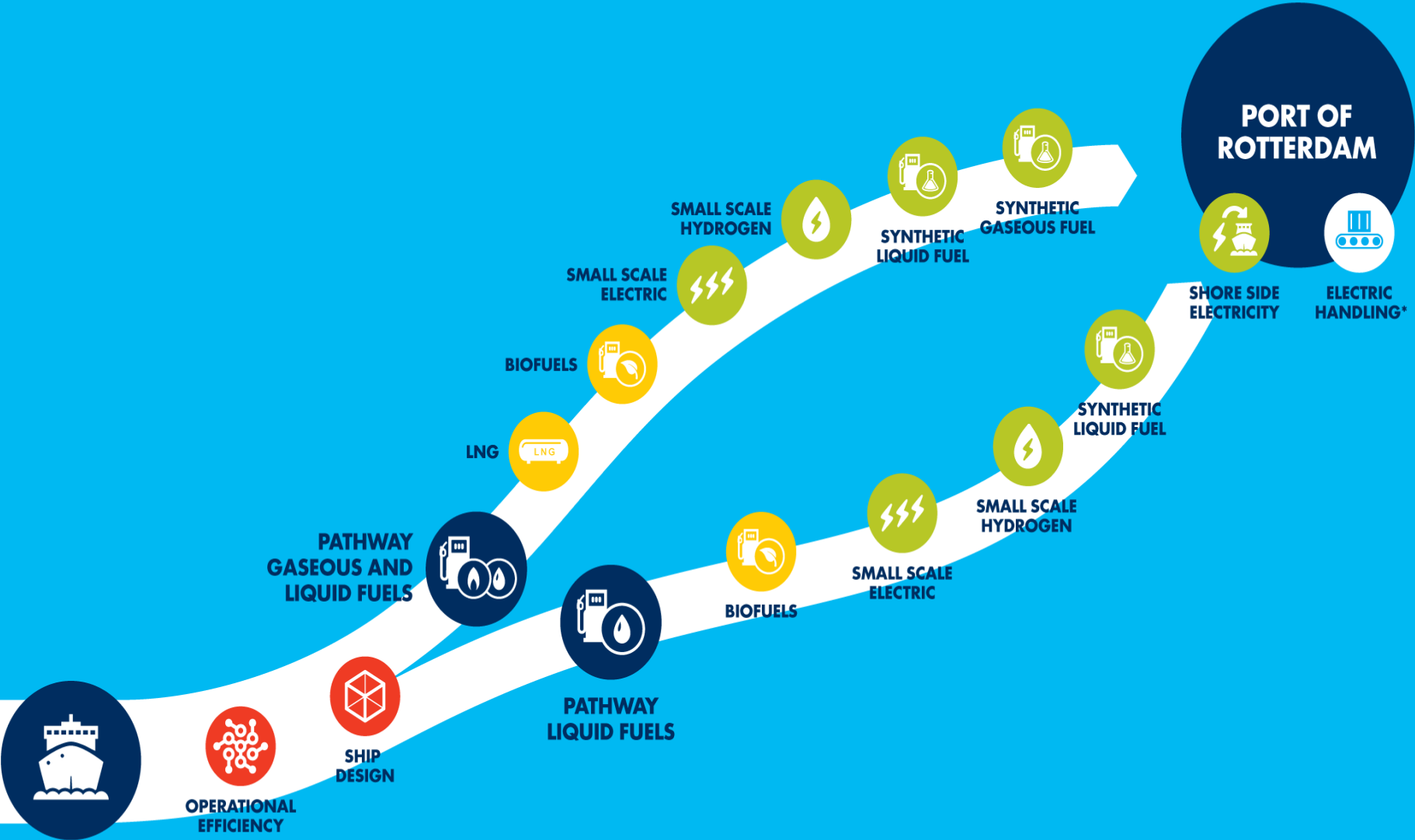
de landen in Noordwest-Europa gezamenlijk is de prijs voor het broeikasgas zo laag dat...

- Trendinalia NL
@trendinaliaNL
1. #energyintransition
 2. #BP18
 3. #NVVP2018
 4. Brabantse Pijl

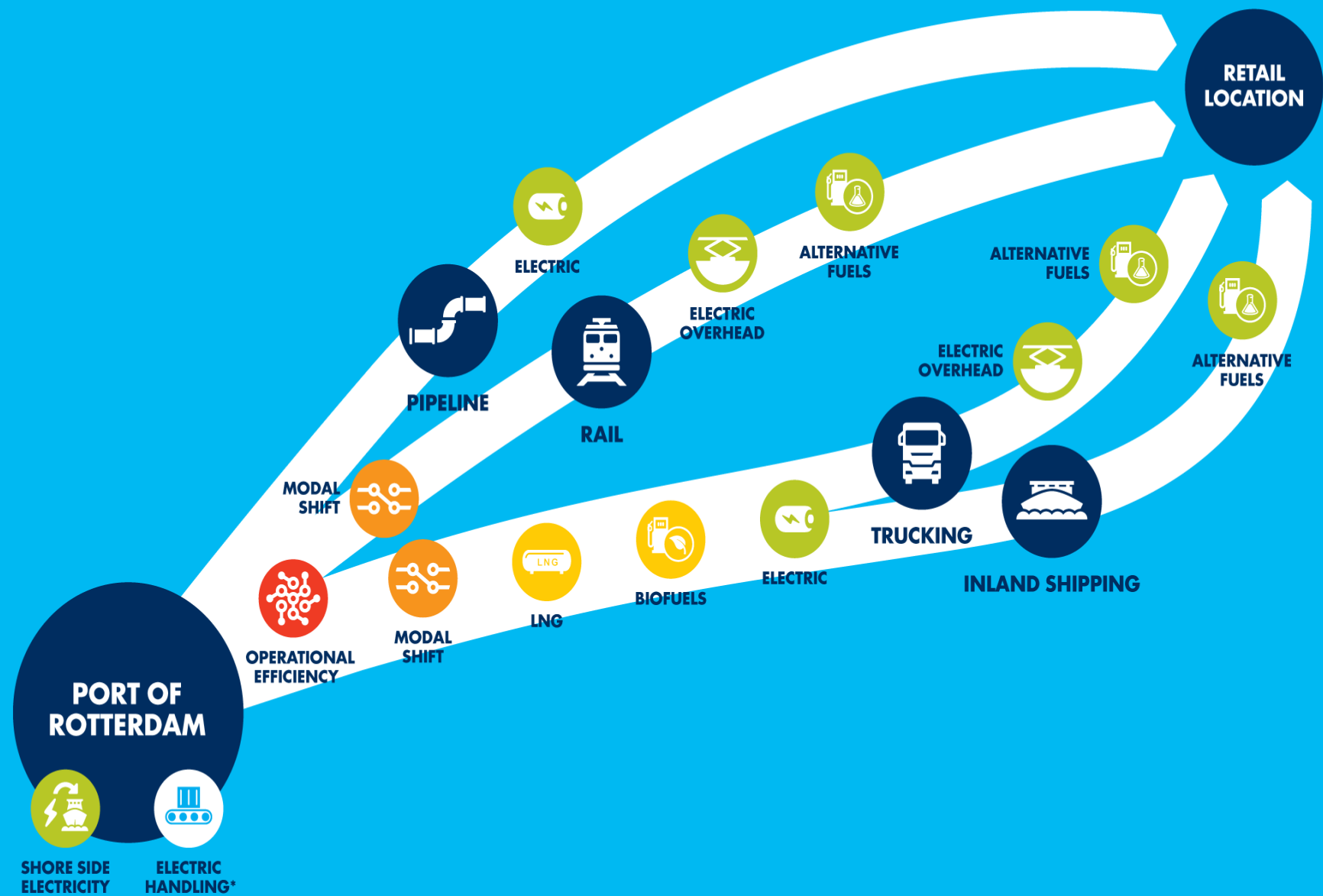
Onderzoek: Wuppertal I: Industrie



Onderzoek: Wuppertal II: Transport



Onderzoek: Wuppertal II: Transport





Chemie

Van Petrochemie naar

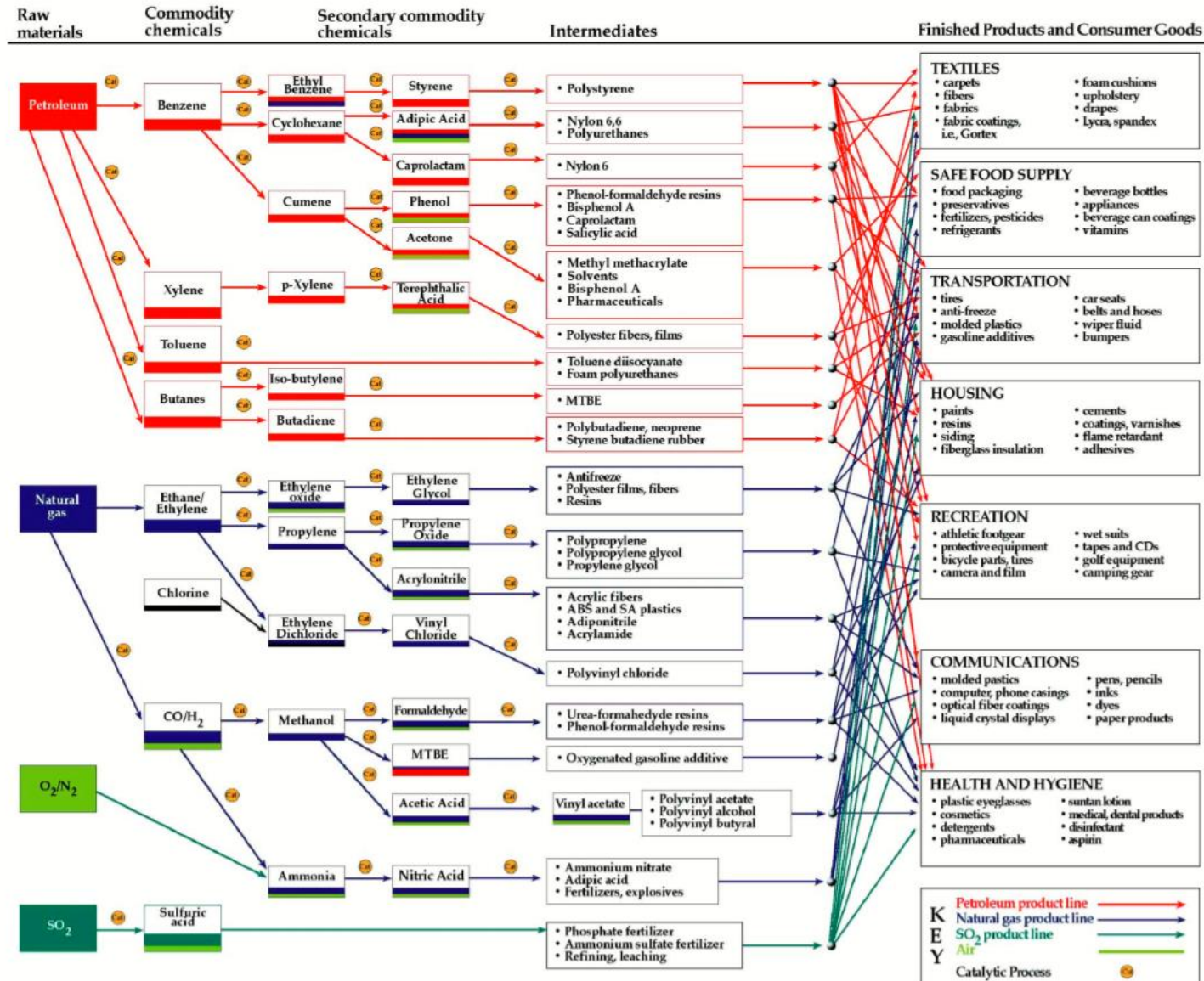


Figure 2 – An Example of a Flow-Chart for Products from Petroleum-based Feedstocks

Biobased Chemie?

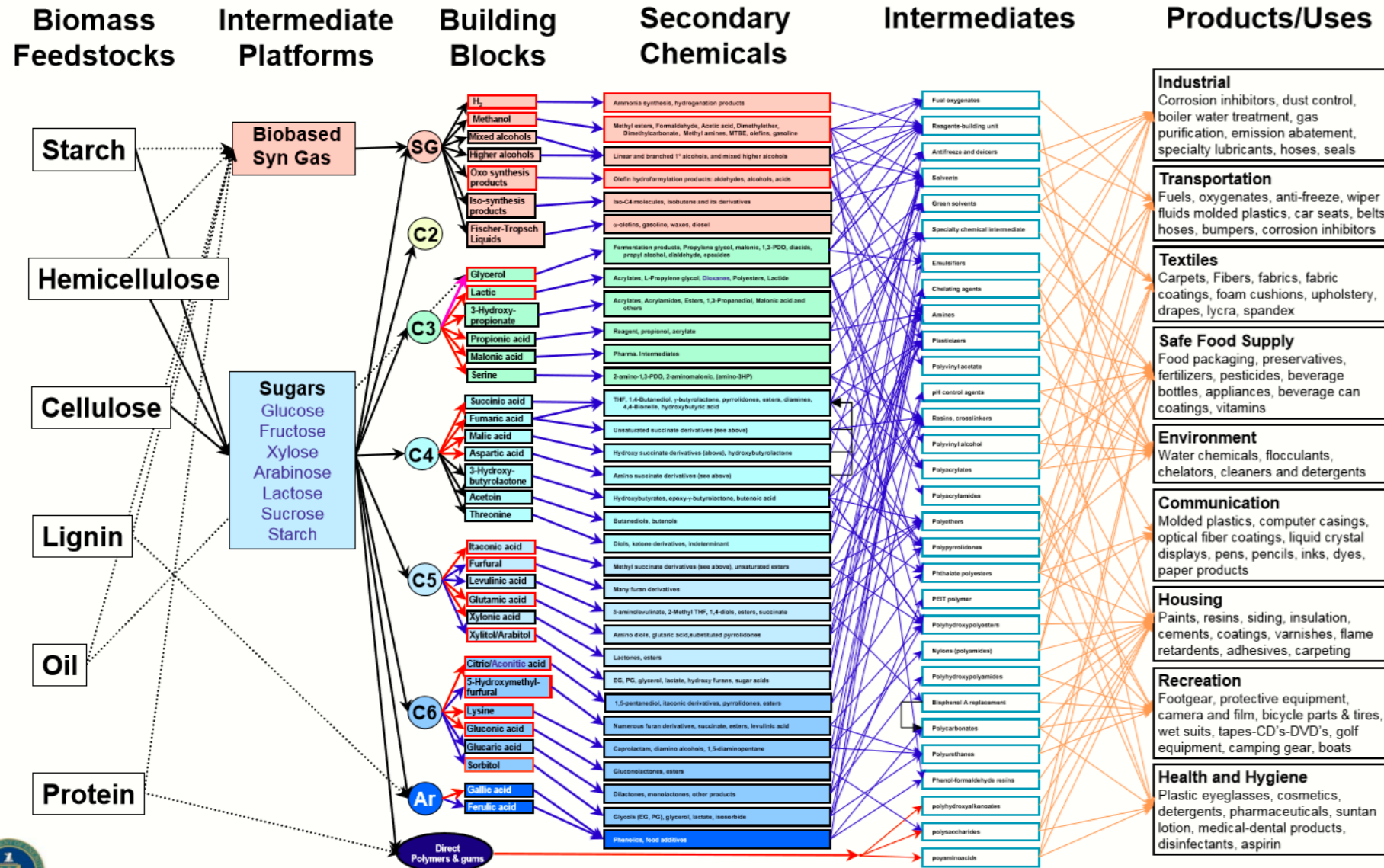
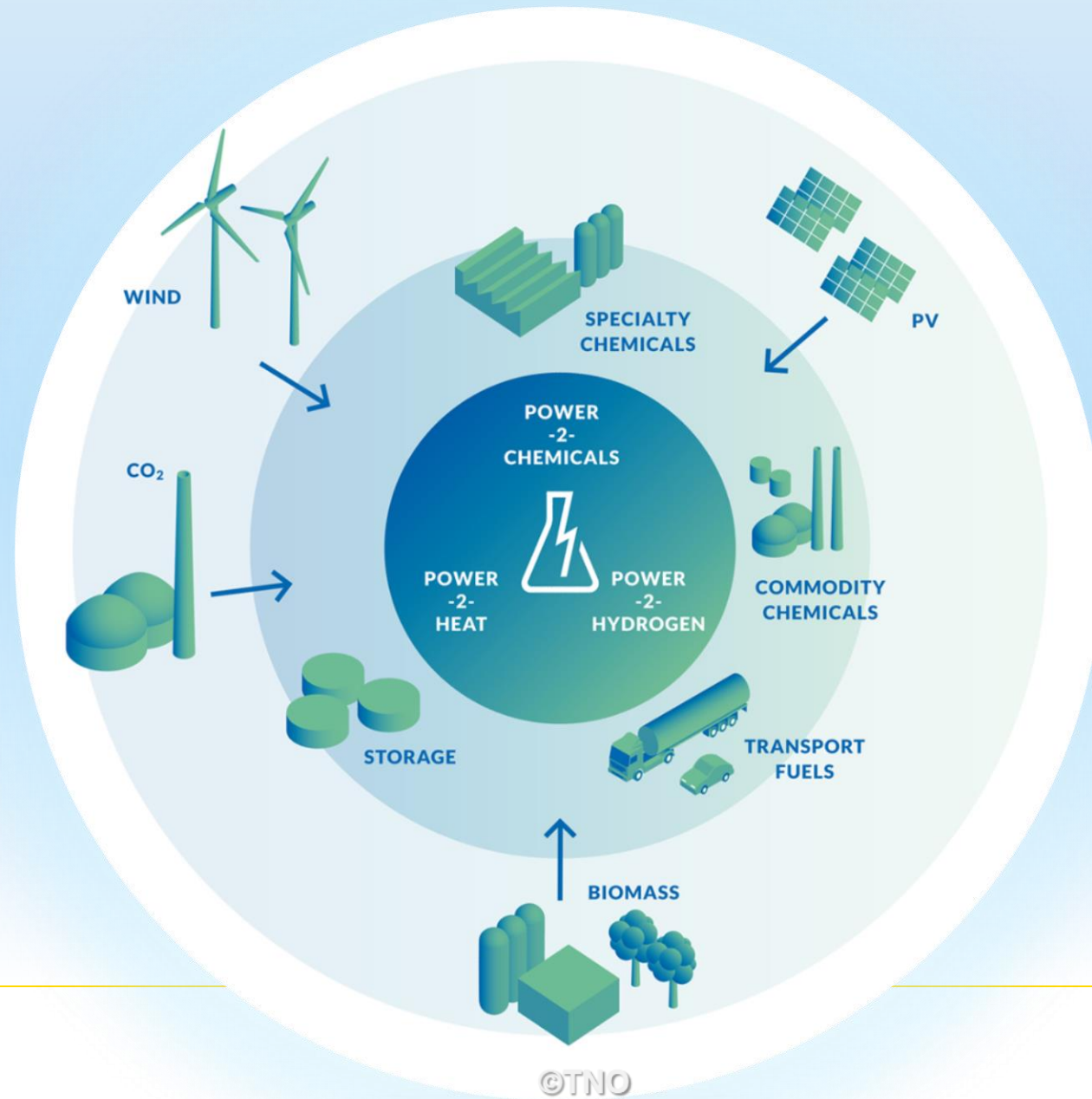


Figure 3 – Analogous Model of a Biobased Product Flow-chart for Biomass Feedstocks

Elektrificatie?



Groene stroom

Renewable Energy - Wind at sea

The port's need: 175 PJ renewable energy:

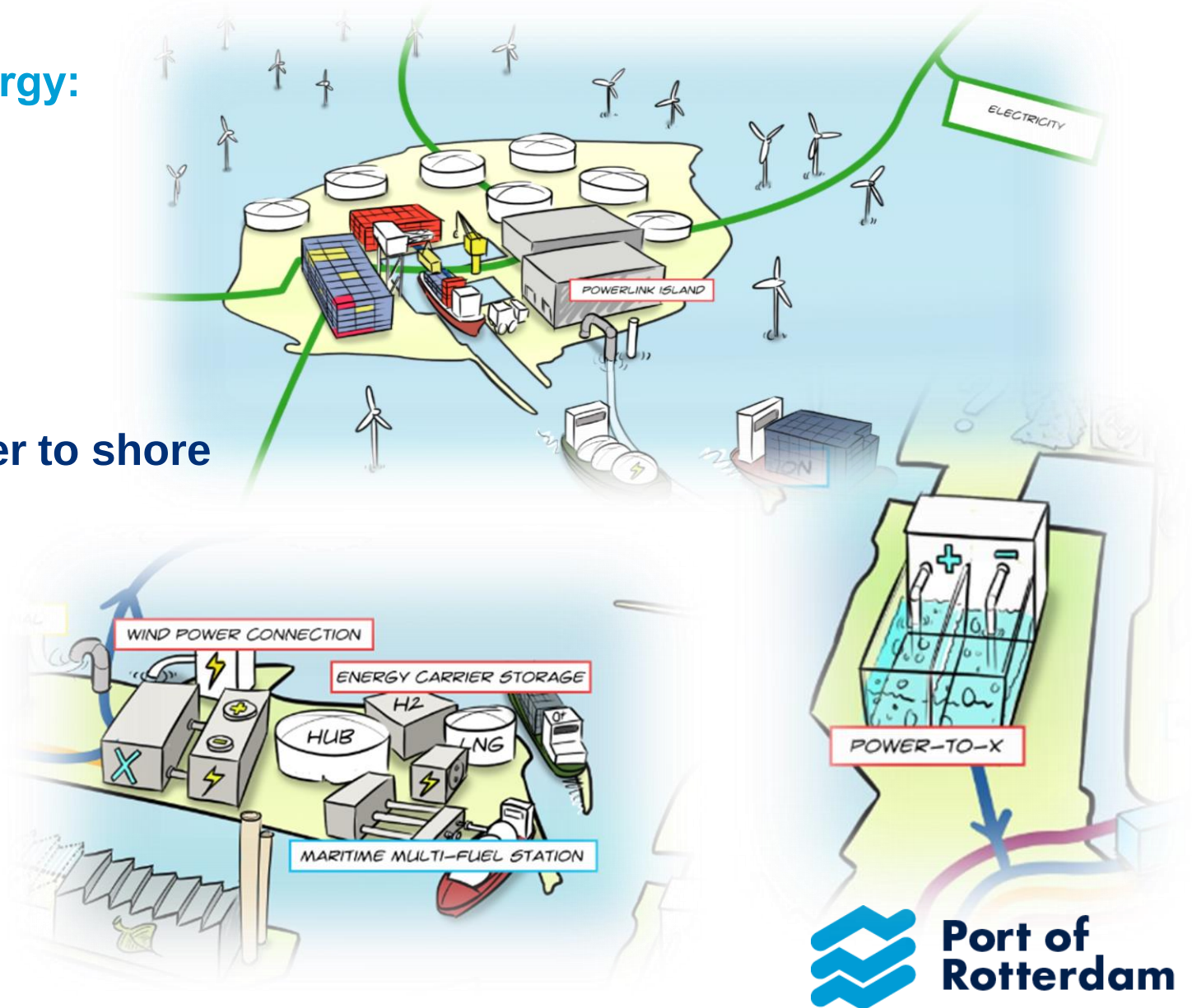
That means:

- 12000 MW wind at sea
- 1500 Wind turbines (8 MW each)
- 2500 square kilometers

The challenge: how to get all that power to shore

The Solution:

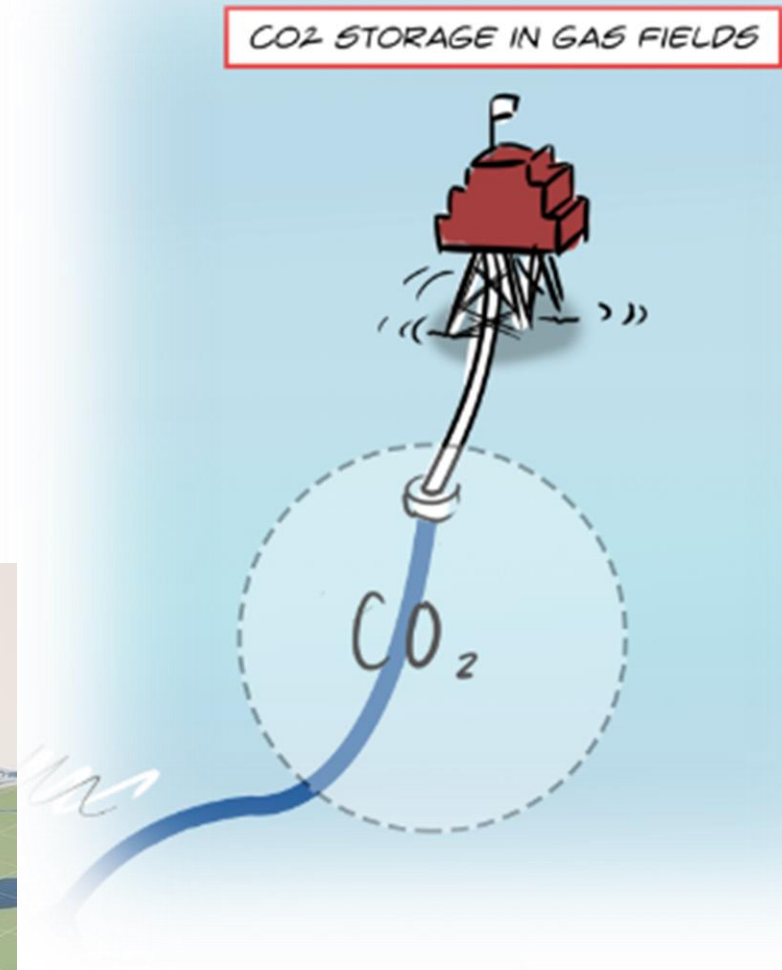
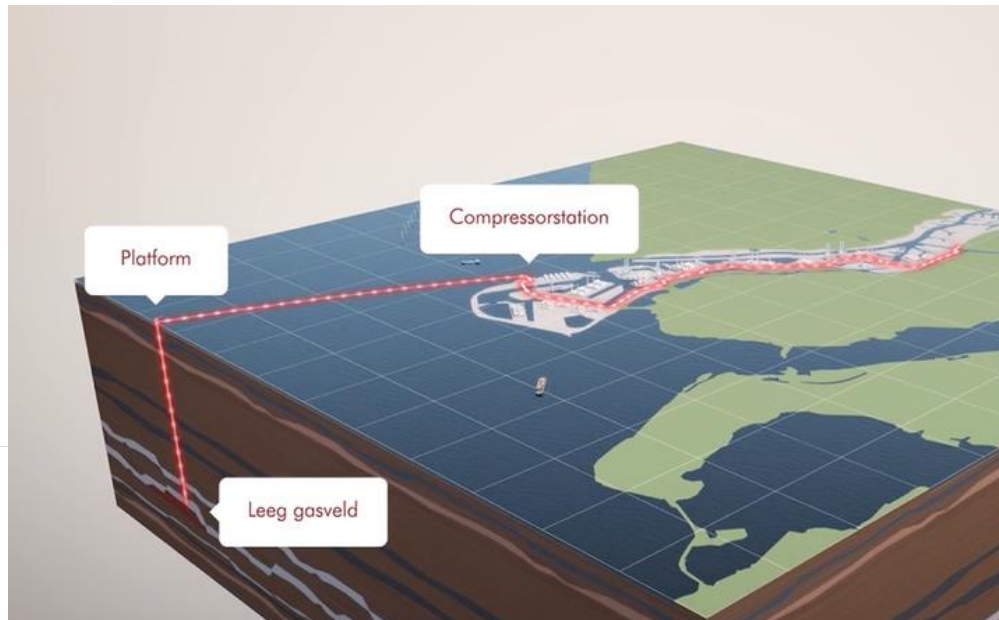
- Large windfarms at sea,
- Connected to an artificial island
- Transport of power:
 - as electricity
 - or power-to-X



CO2

CCUS

- To reduce large CO₂ emissions now, CCS is a must.
- It will give the present industrial clusters a way to continue to produce, while developing new ways to become fossil-free.
- Later, the CO₂ can be used as a valuable resource



CCUS – Porthos project

- Loop system for transport and storage of CO₂ in empty offshore gas fields
- Feasibility study EBN, Gasunie and Port of Rotterdam Authority – in consultation with EZK and companies
- CO₂-reduction: 2-5 million ton p/a



Transport



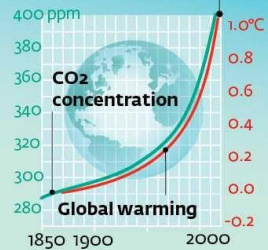
Waterstof

Alles op waterstof?



Moving towards 2030 and 2050 with hydrogen

The earth has warmed up by 1.1°C since 1850



If we do nothing the global temperature will rise by another 4°C by 2100

22 April 2016

Paris Agreement

Global warming set at a max. 2°C. This requires CO₂-reductions in the Netherlands of:

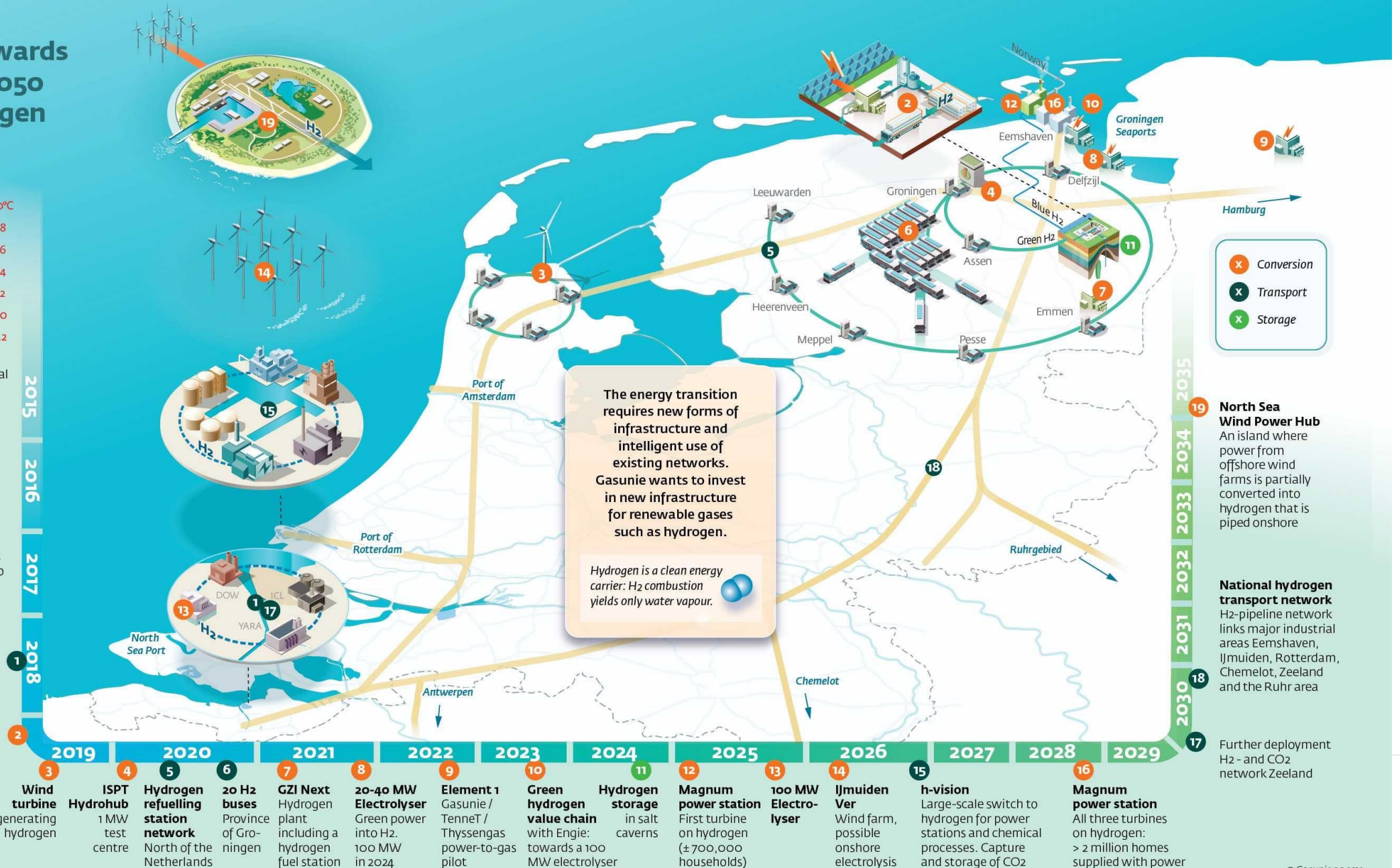
- 40-50% by 2030
 - 85-100% by 2050
- Hydrogen as a fuel and as a raw material can help to achieve CO₂-reduction targets

Hydrogen pipeline

Linking hydrogen industries in Zeeland and the Delta region

Pilot project HyStock

Converting solar energy into hydrogen in Zuidwending



Transport



LNG

Nederland op LNG?

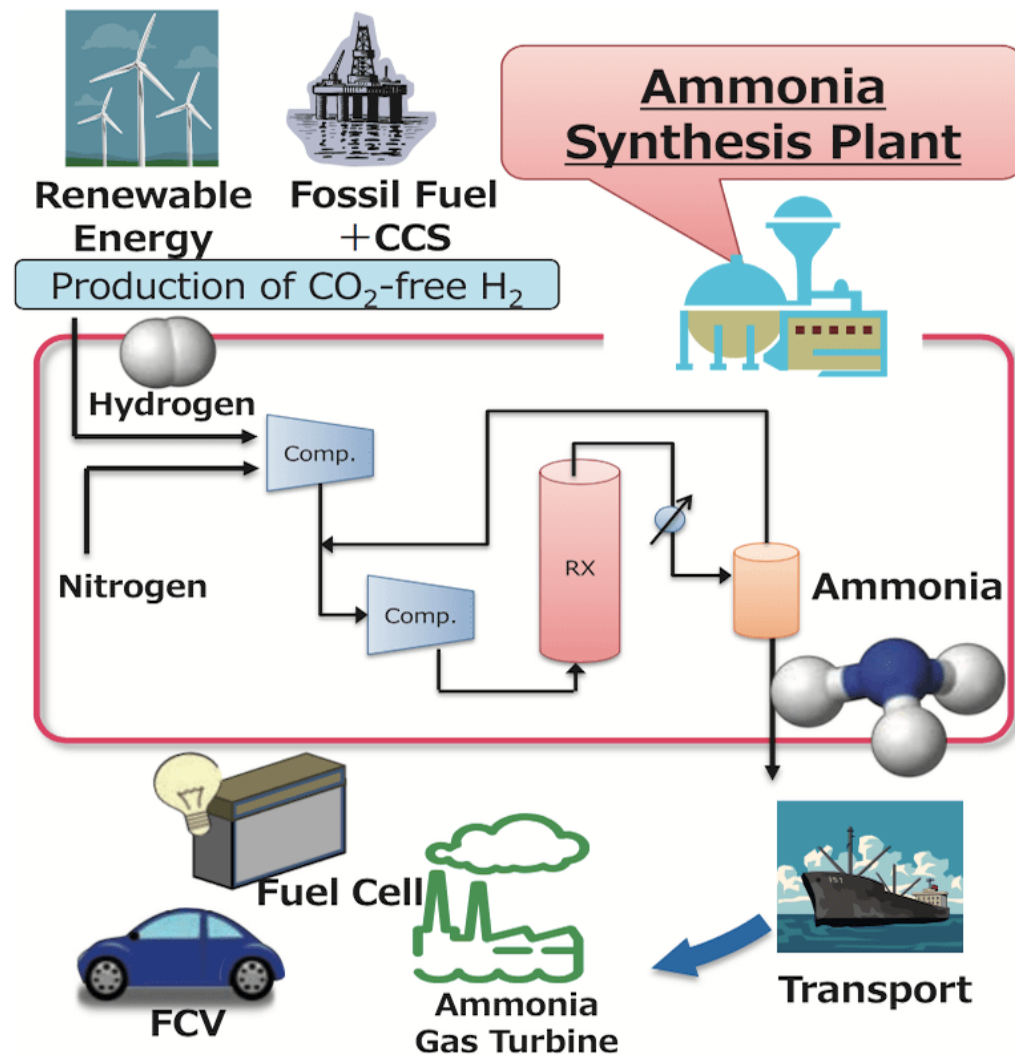
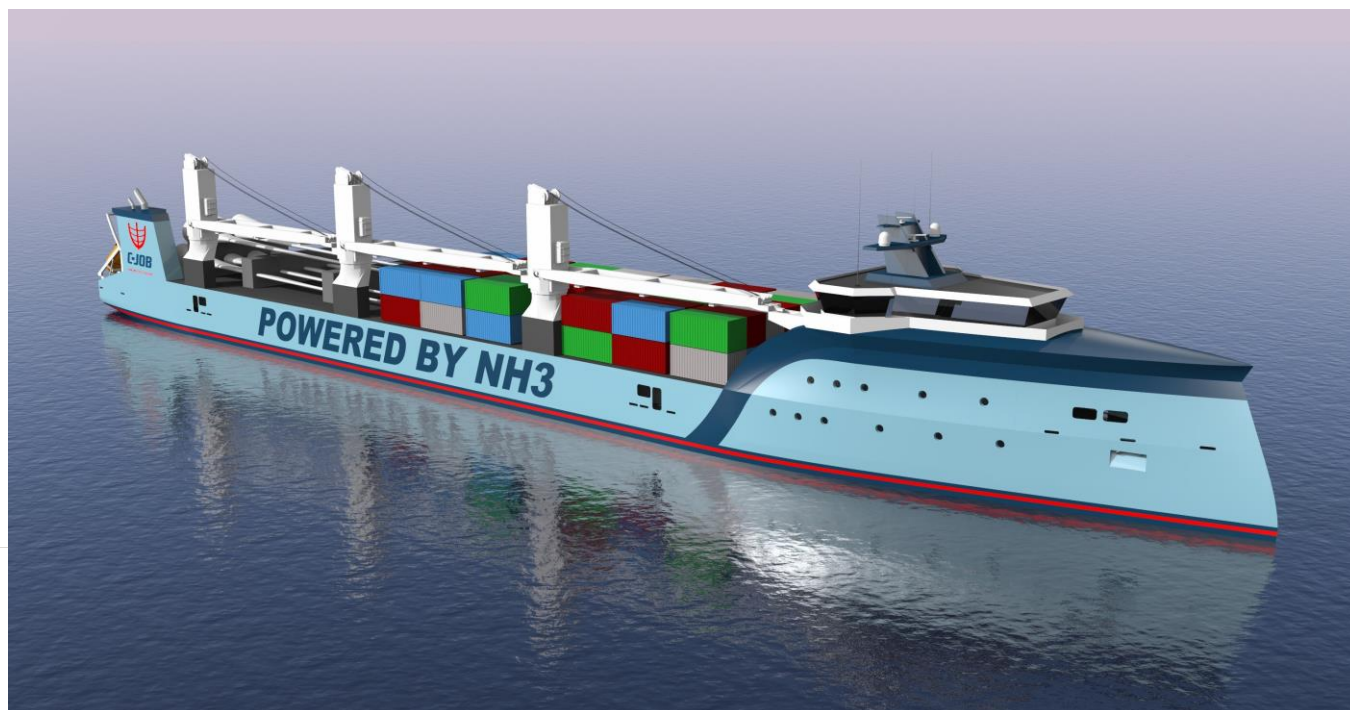


Transport



Ammoniak

Nederland op Ammoniak?



Transport



Methanol

Nederland op Methanol?



Transport



Dit was mijn glazen bol...
Wat denkt u?

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