Synergy Action TSO 2020

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SYNERGY ACTION TSO2020 Objective

- The TSO2020 Action combines the energy of the PCI 1.5 Denmark –Netherlands interconnector, currently known as the “Cobra Cable”, with the TEN T Comprehensive Network (E232 and E22) for multi modal transport and the TEN T Core Network on the North- Sea Baltic and Rhine-Alpine corridors.

- The Action will:

  1. Demonstrate the technical and commercial viability of power to hydrogen solutions in the context of the Groningen region (NL);
  2. Study the possibilities of scale up to 300 MW electrolysis in the Delfzijl-Eemshaven region;
  3. Assess the replicability of the TSO2020 solutions to other regions.


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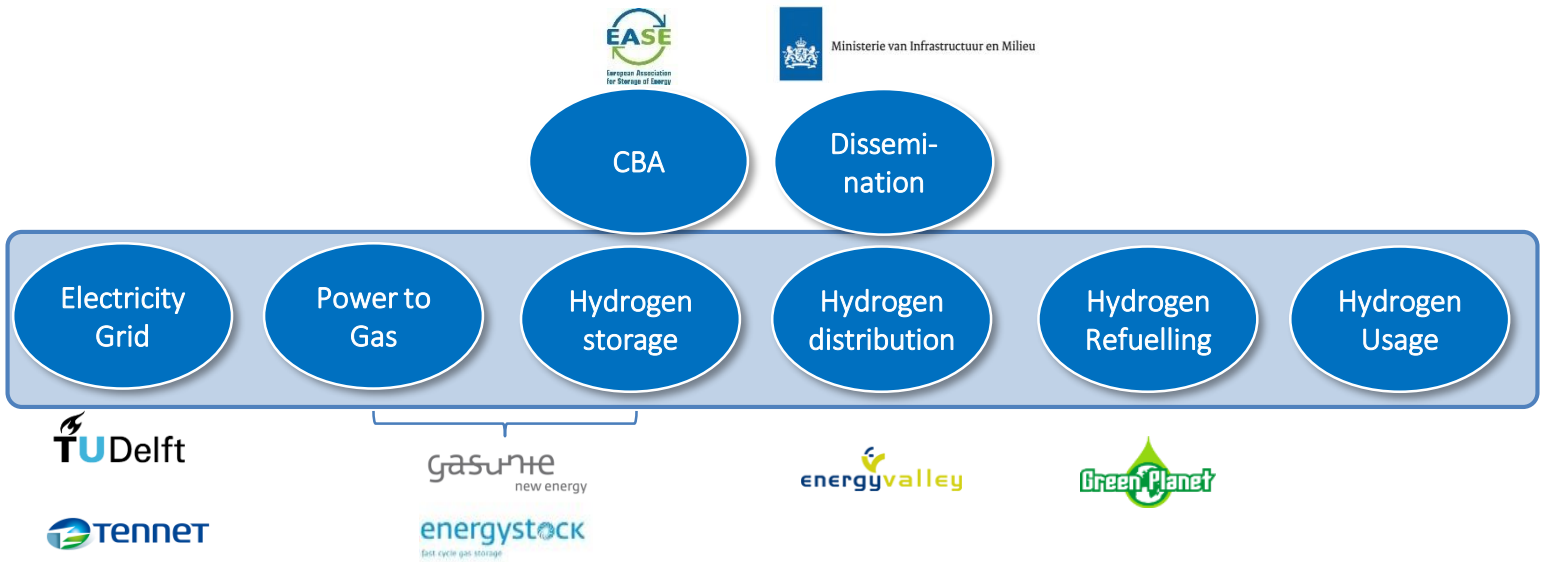
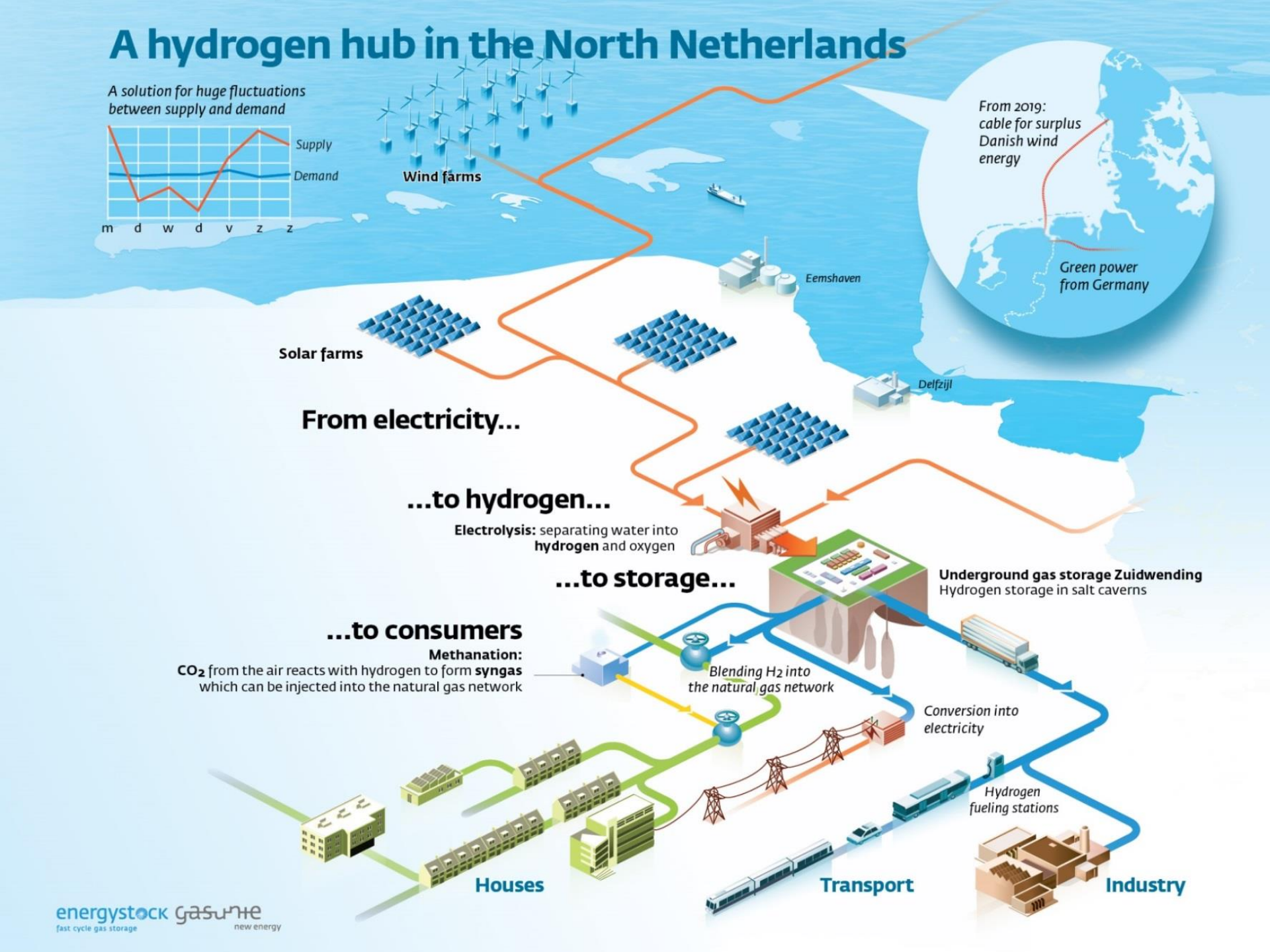
TSO2020 Project in which partners along the power to hydrogen value chain cooperate to develop pilots and studies to scale up

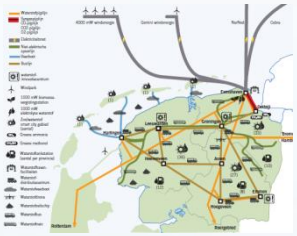


- TSO2020 combines parties from the entire value chain of power to hydrogen
- The project aims to demonstrate the power to hydrogen chain with a 1 MW electrolyser and several hydrogen usage outlets
- The project is further backed up by studies on the technical scale up potential in the Northern Netherlands and assesses societal and economic aspects in a Cost Benefit Analysis (CBA)
- Besides parties are organized to disseminate the results and potential of the power to hydrogen chain in Europe

A hydrogen hub in the North Netherlands



Towards Synergized Infrastructures in the EU. Connecting sectors and industries via hydrogen.



2018 **2020** **2030** **2050**

2018 – 2020

Early adopters

- HyStock 1.1 MW electrolysers in Northern Netherlands
- Several refueling stations
- First H_2 pipeline in Southern Netherlands

2020 – 2030

Upscaling

- 10MW scale electrolysers
- Dozens of refueling stations
- Multiple H_2 pipelines

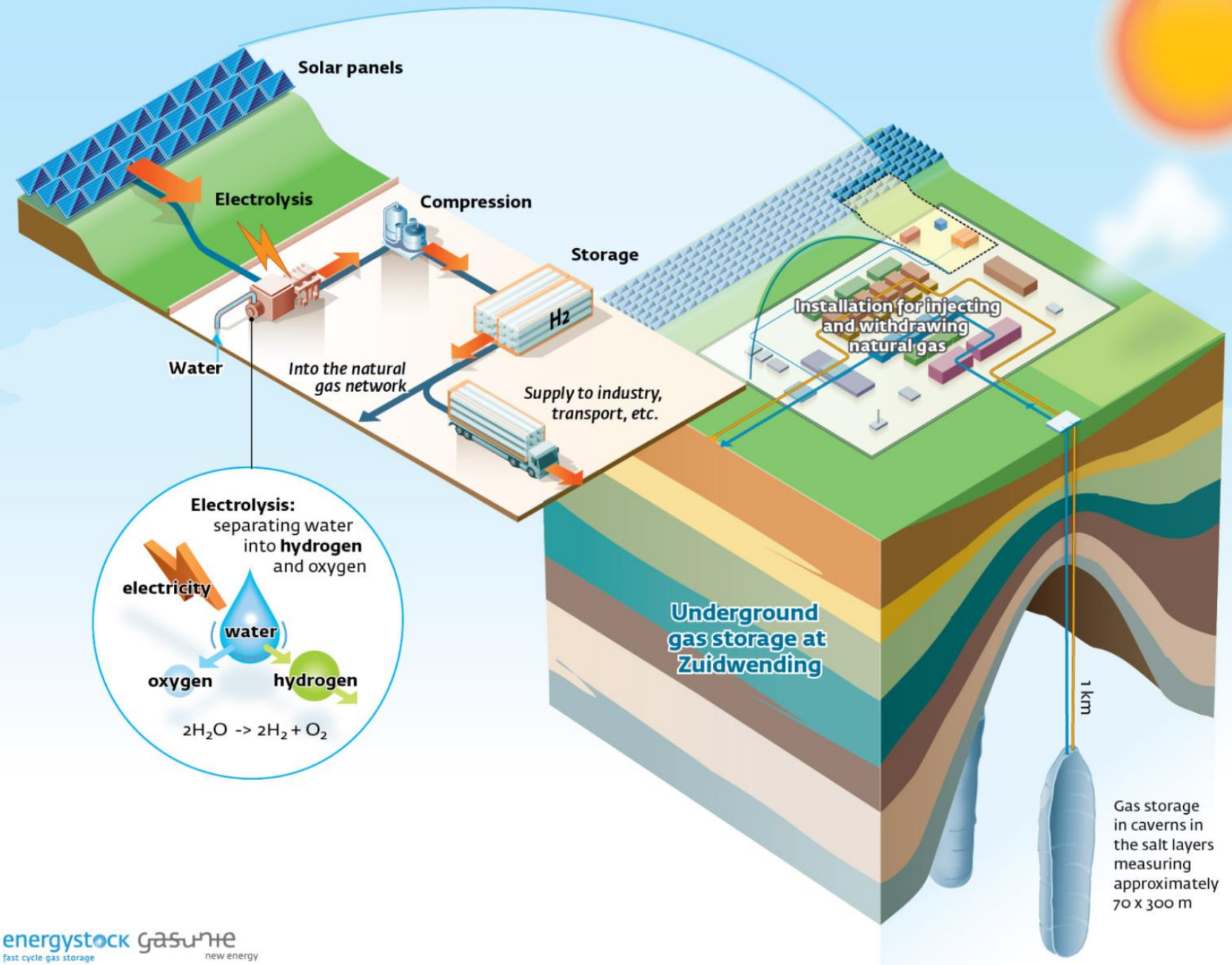
2030 – 2050

Mass market

- 100 MW electrolysers
- Hundreds of refueling stations
- Hydrogen grid
- Offshore grid combining cables and pipes

HyStock pilot project

Hydrogyn produced with solar energy stored in the natural gas buffer



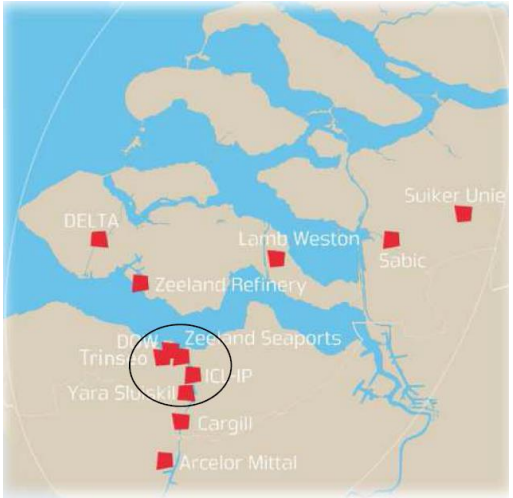
energystock fast cycle gas storage

gasunie new energy

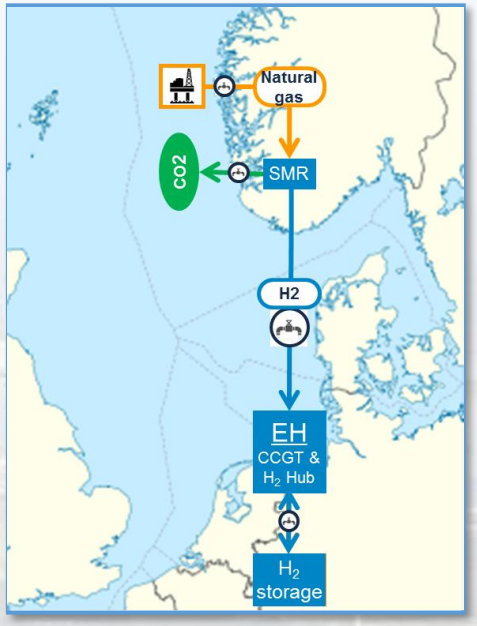
Project Symbiose, Synergies between industries
Refit natural gas pipeline to hydrogen

Region of Zeeland in Southern Netherlands

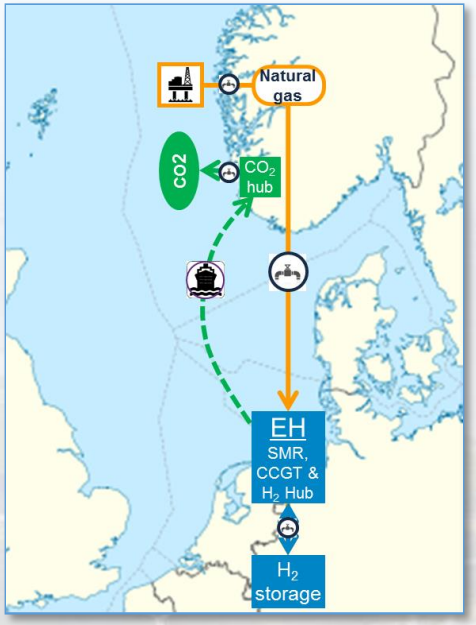
- Refitting an existing natural gas pipeline to hydrogen transport
- DOW has excess hydrogen after Nafta cracking
- YARA uses hydrogen for fertilizer production



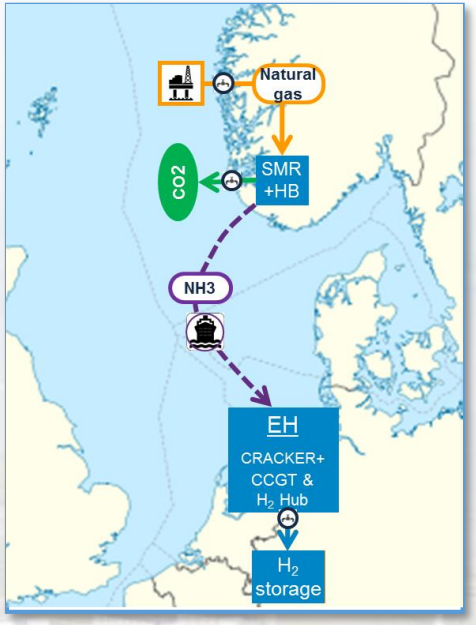
Refit Nuon Magnum power plant from natural gas to blue hydrogen (natural gas via SMR/ATR + CCS).



Option 1:
H2 production in Norway



Option 2:
H2 production in NL



Option 3:
NH3 production in Norway

EH: Eemshaven;
CCGT = Magnum power plant;
SMR = steam methane reforming plant to split natural gas into hydrogen and CO2;
HB = Haber Bosch process to convert hydrogen into ammonia

Parallel with chemical industry, blue hydrogen might be an intermediate solution towards green hydrogen from electrolysis as there is only one investment cycle before 2050 for most processes.

North Sea Wind Power Hub consortium. Big Synergies between Gas and Electricity

- 180 GW offshore wind in North Sea to meet COP21 targets
- Sheer volumes of wind require innovative solutions to balance and transport electricity.
- Electricity only cannot be incorporated by the electricity system. Hydrogen is an obvious solution.
- Hydrogen is a perfect solution to balance and transport energy and to supply renewable hydrogen to transportation and industry
- Doggers bank as 'Power Link Islands' in central North Sea.