

Magnum as a superbattery

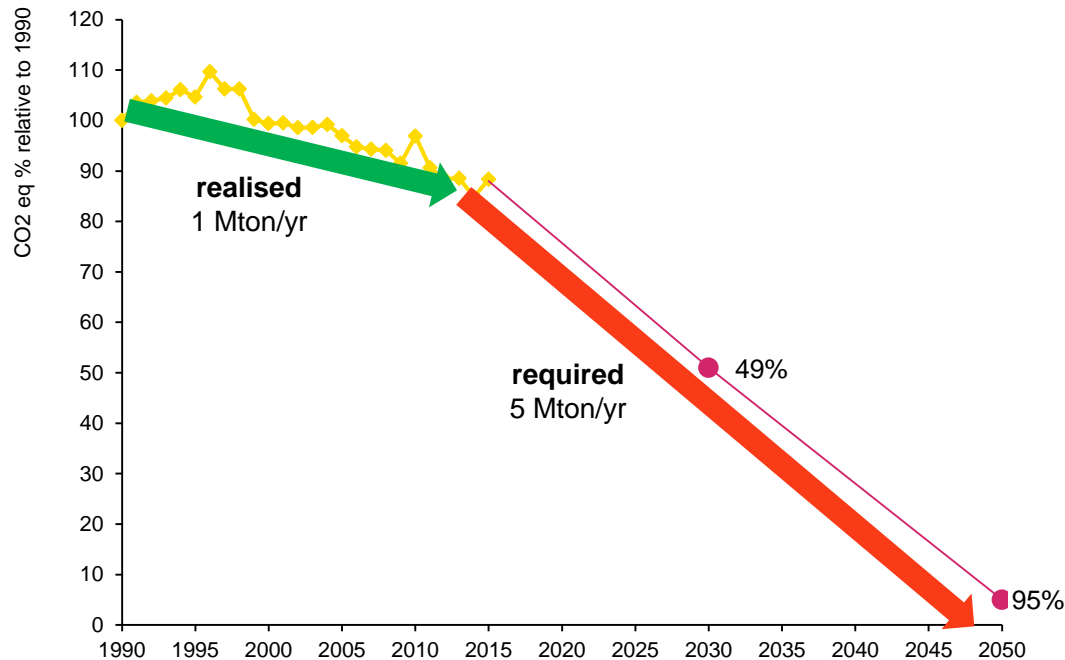
Use of CO₂ neutral hydrogen in flexible gas plants



Geert Laagland - Director of Engineering

BA Heat – OU Heat Projects

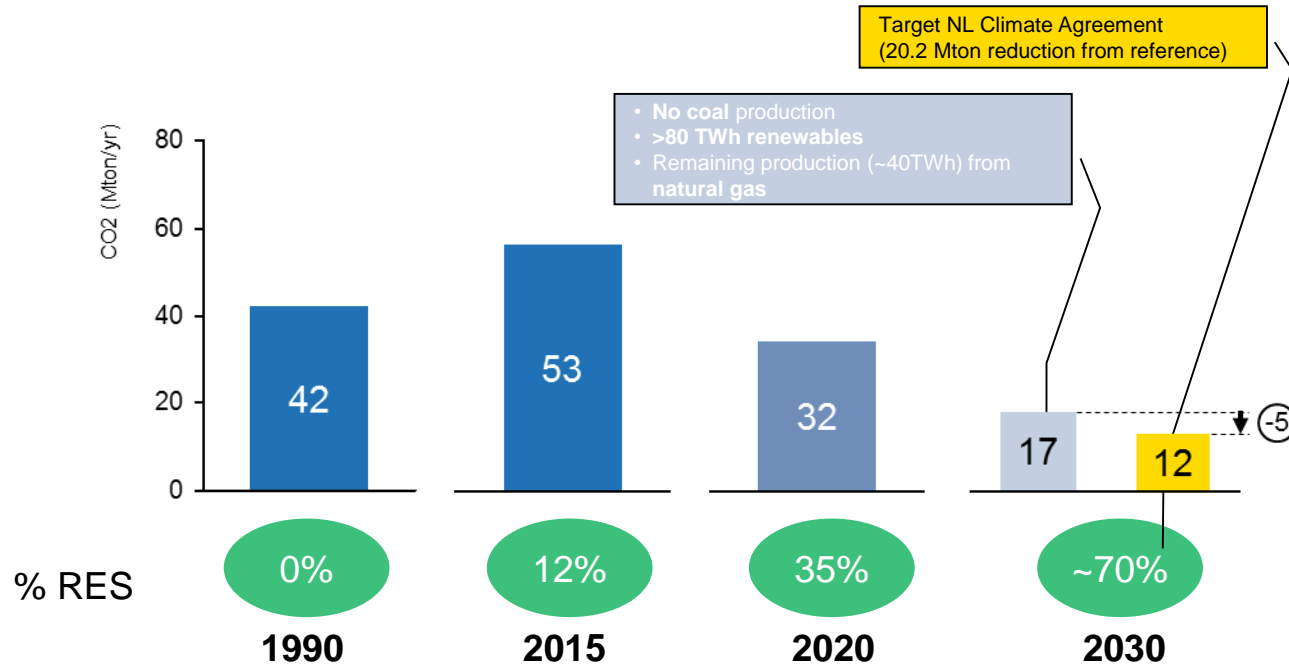
Towards a CO₂-free and reliable energy system



Our main challenges:

- Achieve deep CO₂ reduction
- Accelerate
- Keep the energy system stable

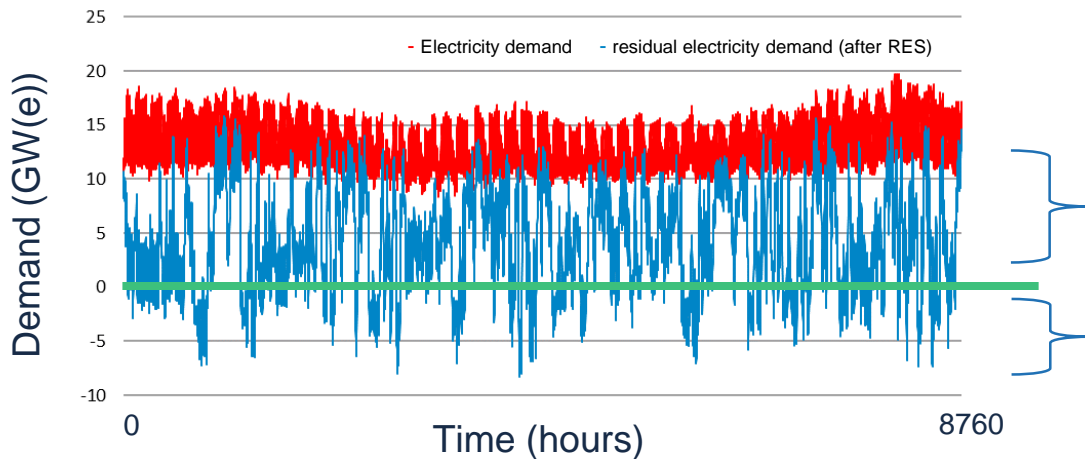
Approximately 30% of gas plants will need to be decarbonized to meet reduction target for power sector





RES=Renewable Energy Supply from wind and solar

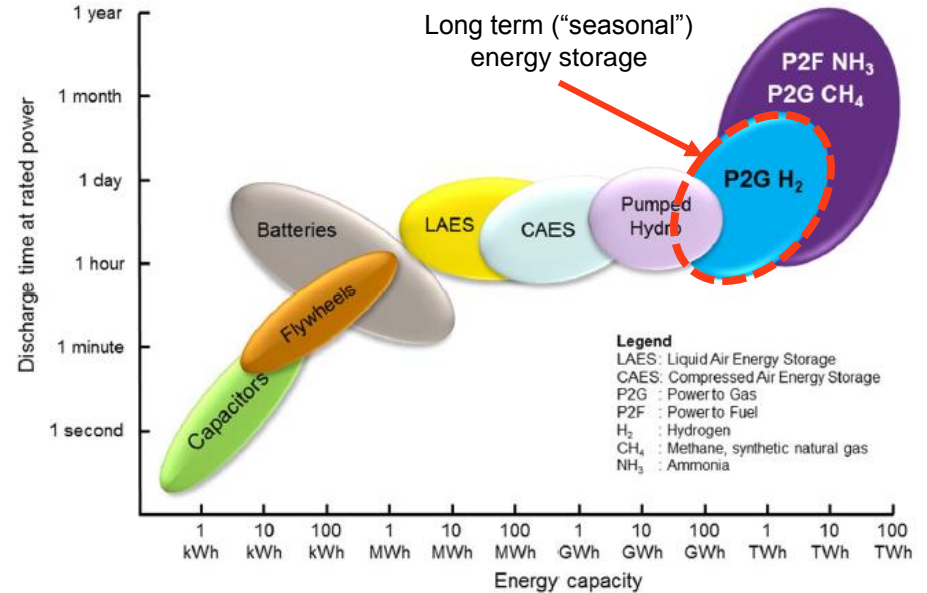
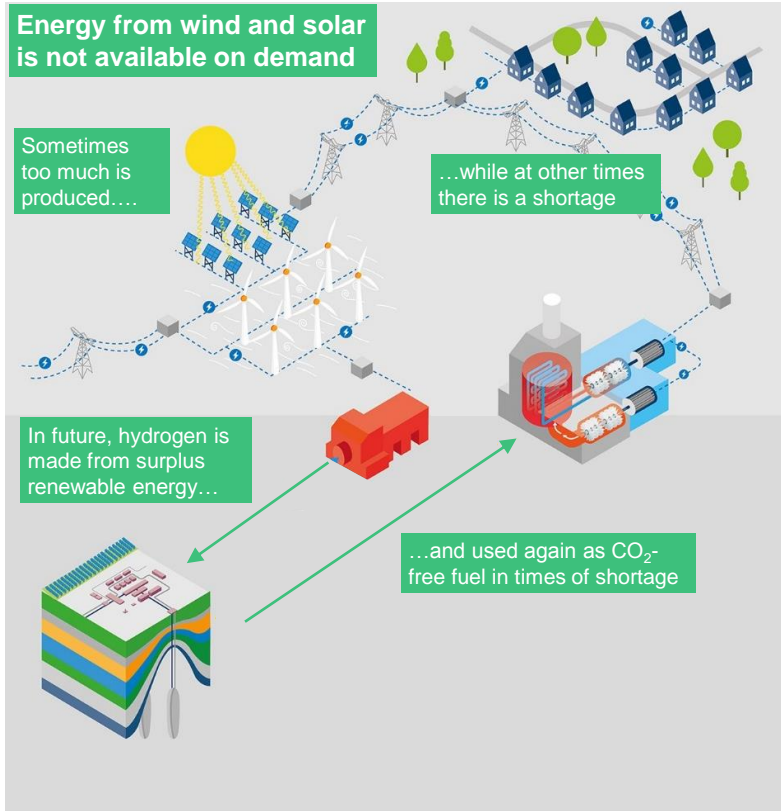
Gas plants will provide flexible capacity to balance RES, but will need to be CO₂ free

Electricity demand NL (2030)



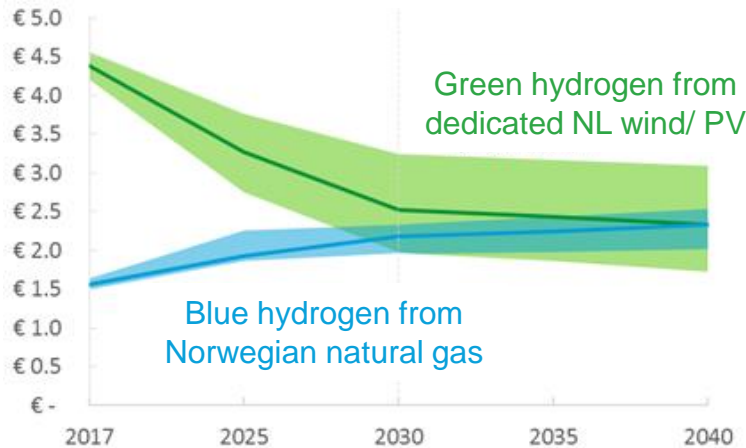
-  Too little production from wind/ solar: **flexible capacity needed** to fulfill demand
-  Too much production from wind/ solar: **Possible curtailment** of useful energy

Magnum as superbattery with green hydrogen (H₂)



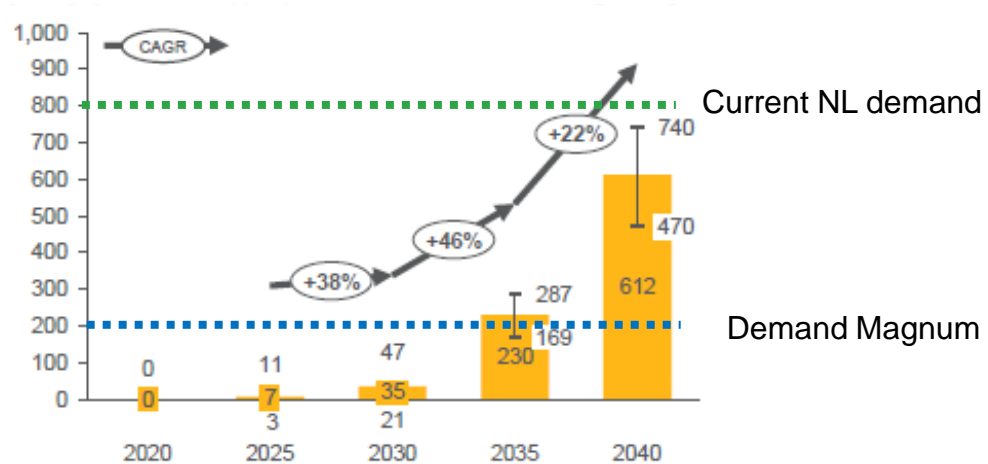
100% green H₂ not yet feasible on short to medium term

Integrated costs



From: CE Delft "Waterstofroutes Nederland - Waterstof ketens voor blauwe en groene en import"

H₂ production potential from "excess electricity"



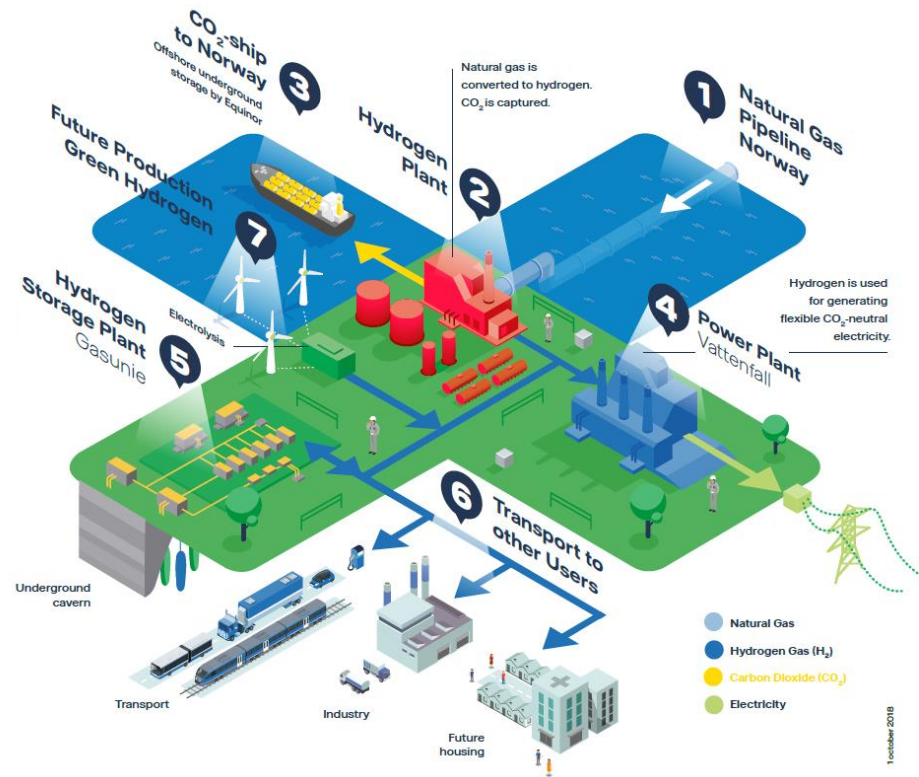
From: Navigant study (proprietary) into development of excess electricity in The Netherlands; (NL with interconnection; basispakket 49% scenario)

H2M Project: a first step in the development of a low-carbon hydrogen economy

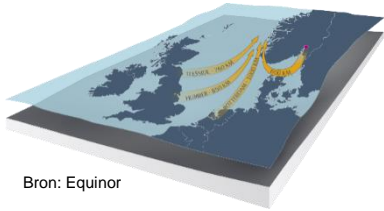
- Goal: 1 Magnum turbine on blue H₂ by 2025
- Location H₂ plant: Eemshaven
- Supply to other customers
- Gradual transition to 100% green H₂



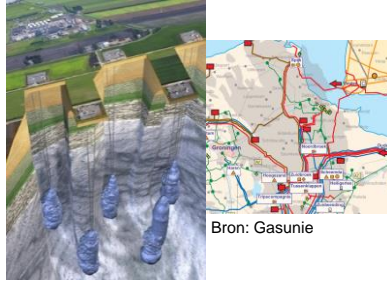
- Kick-start H₂ economy:
 - Realisation of hydrogen infrastructure
 - Development of hydrogen demand
- CO₂ emission reduction: up to 2 Mt/yr



H2M Project: a first step towards development of a “low-carbon” hydrogen economy



Bron: Equinor



Bron: Gasunie



**Lareg scale demand
“blue” hydrogen**

**kick-start for development
hydrogen infrastructure**

**facilitates
“green” hydrogen**