CARBON NEUTRAL FUELS

TO ENABLE

THE ENERGY TRANSITION

CATO meets the projects – Utrecht 2017.11.15

Geert Laagland – Head of Engineering – BA Heat – OU Heat Projects
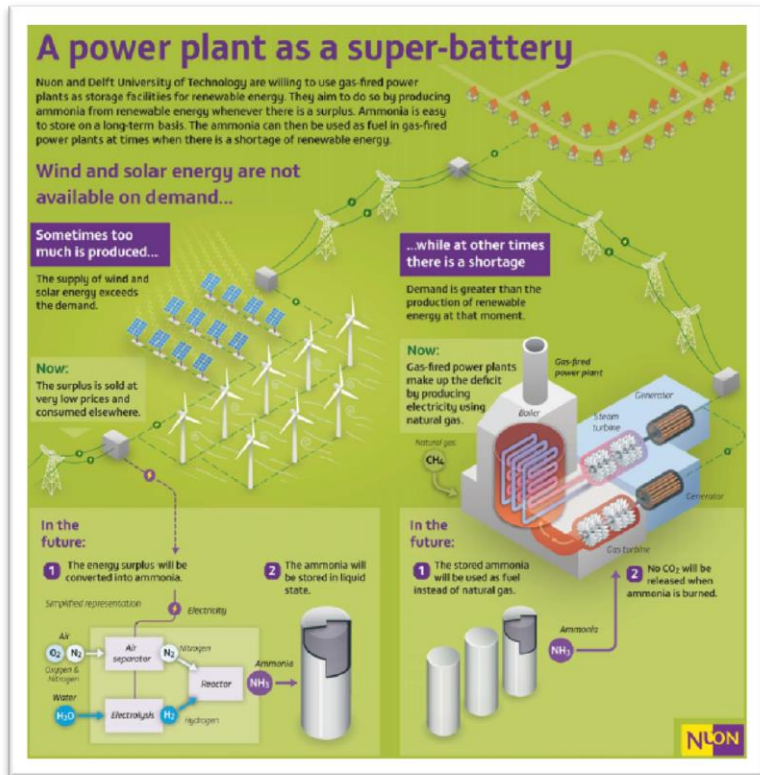
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PURPOSE STATEMENT

As Vattenfall we exist to:

POWER

… 100% free from using fossil fuel throughout the entire value chain of energy production in one generation

CLIMATE SMARTER

… using the word "smarter" indicates continuous improvements

LIVING

… for everyone; a way of working, a way of living today and for the future

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CO$_2$ TARGETS REQUIRE RENEWABLES, STORAGE & IMPORT

Source: Final Report Power-to-Ammonia, 2017 (See: http://www.ispt.eu)

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MAGNUM AS A SUPERBATTERY

A power plant as a super-battery

- 3x MHPS 701F4 gas turbine combined cycles (CCGT)

- Output 3x437 MW_e, (2 million households)

- State of the art, year of commissioning 2013

- Flexible (daily start/stop) and high efficient

- Good logistic options (seaways)

- Excellent grid connection (2x1400 MW_e, 380 kV)

- Engineered for coal gasification (declined) and so:

  - Multi fuel turbines

  - 45 ha plant area, 40% occupied

  - Oversized $DeNO_x$

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ROUTES FOR SUPPLY AND USE OF CO_2 NEUTRAL H_2/ NH_3
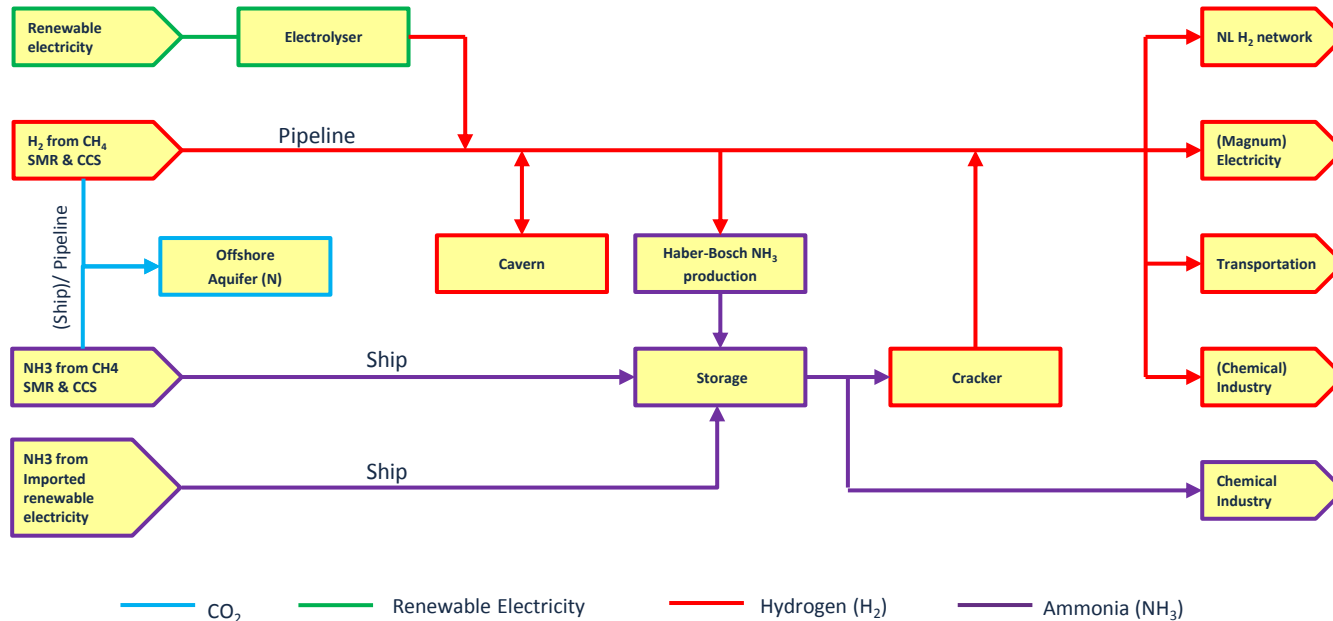
COOPERATING WITH OTHER PARTIES IS KEY TO SUCCESS

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SUPPLY OPTIONS H$_2$ FROM CH$_4$ + CCS

Option 1:
H$_2$ production in Norway
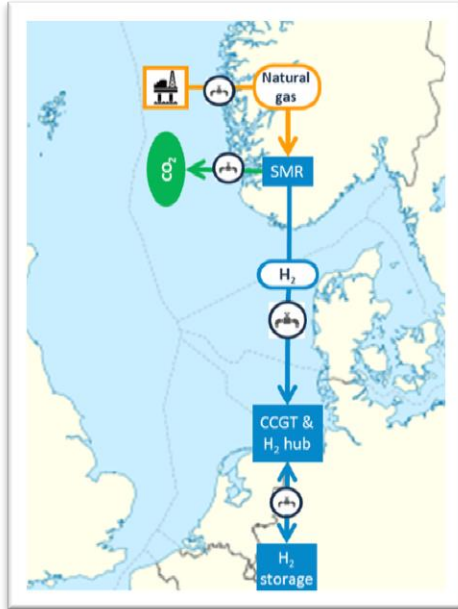
Option 2:
H$_2$ production in NL
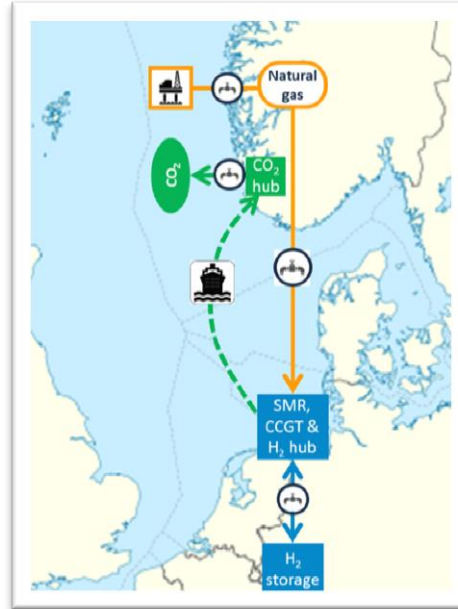
Option 3:
NH$_3$ production in Norway
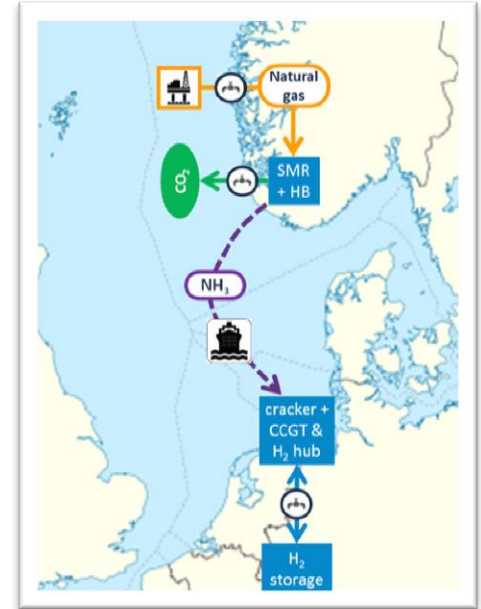
STATOIL - GASUNIE – NUON H_2 & NH_3 VALUE CHAINS

HIGH LEVEL TIMELINE

Development and realization of the value chain

Operation on CO2-neutral fuel

Project initiated

Conversion
1st CCGT

Local large scale NH_3 / H_2
production

2016

2018

Ca. 2020

2023

2026

2030

Permit application

Investment decision

Conversion
2nd and 3rd CCGT

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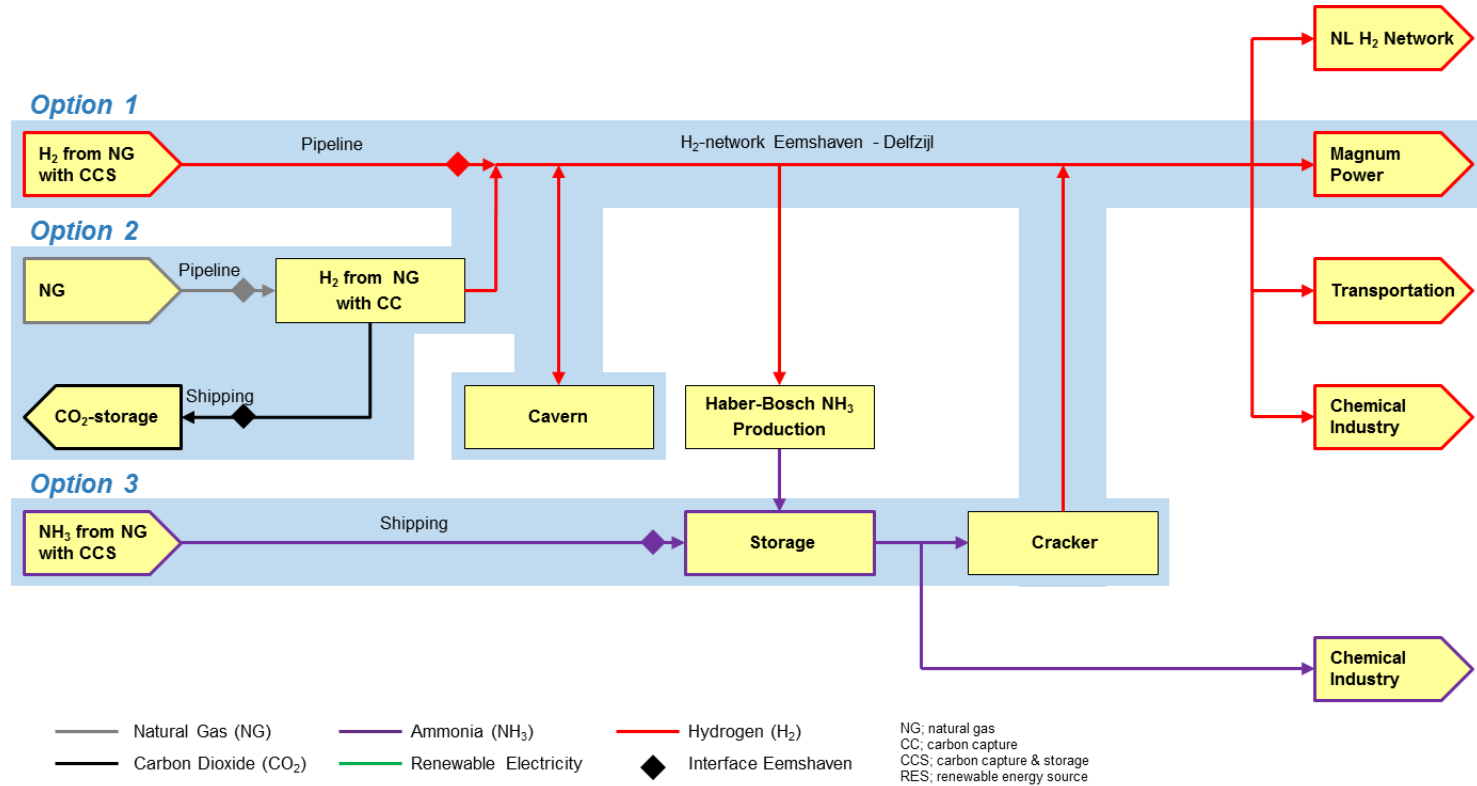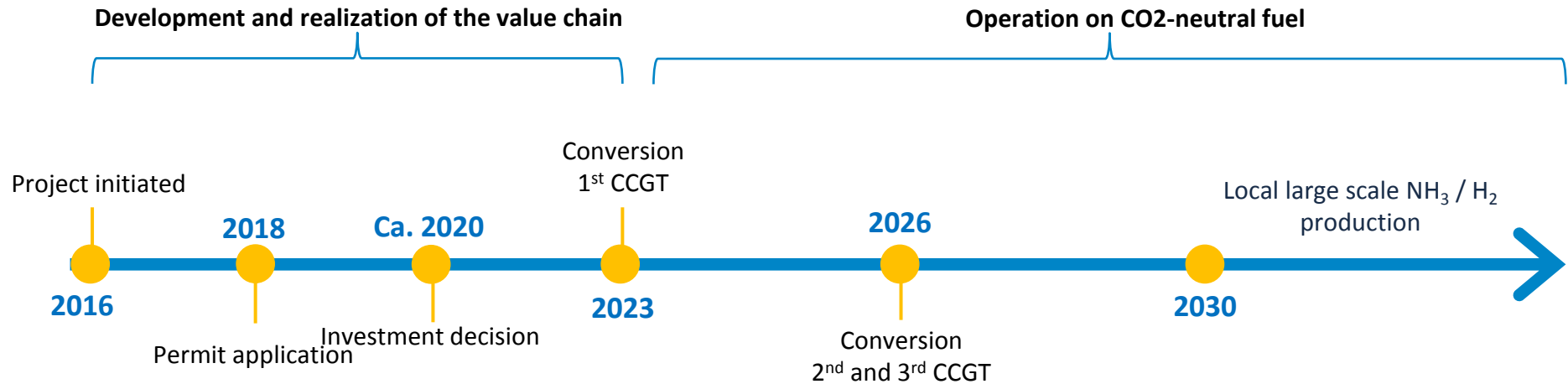
KEY BENEFITS OF THE USE OF CO_2 NEUTRAL FUEL IN CCGTS

- Direct significant reduction of CO_2 emissions (Mton/a) in The Netherlands by replacing CO_2 emitting fossil fuel by CO_2 neutral fuels

- Facilitating integration of wind and solar capacity in the energy system by means of flexible capacity

- Optimal use of already existing capacity of natural gas fired power stations

- Catalyst for a H_2 based economy, facilitating transition to CO_2 neutral fuels and feedstocks in other sectors (industry, transport and heating)

- Technology fitting in the end objective: facilitating the growth of a CO_2-free H_2 economy and facilitating the feed-in of H_2 from renewable sources in time within the same system

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THANK YOU FOR YOUR ATTENTION!