

# Offshore Energy

**IRO / CEDA-NL meeting**

Martijn Duvoort | Director Energy Transition Arcadis



# Current policy builds on 2020 Northsea Energy Outlook

VAWOZ, PAWOZ, EIPN, PEH,...

But most of all:  
What energy vector do we need:  
electrons/molecules?

## Windenergie op de Noordzee



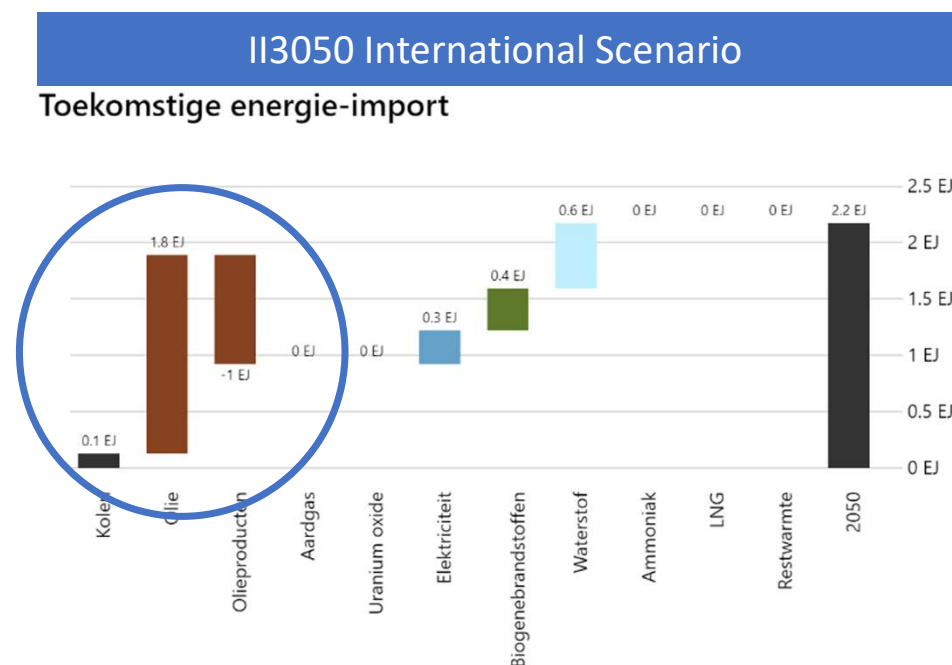
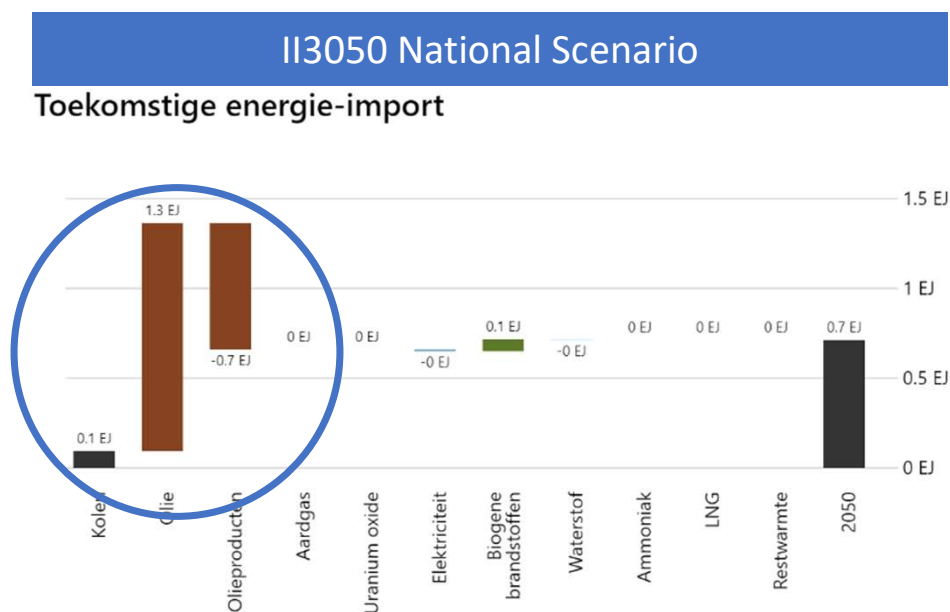
- > Het aandeel wind op zee zal doorgroeien
  - Rond 2030 ca 21 GW
  - Rond 2040 ca 50 GW\*
  - Rond 2050 ca 70GW\*

\*Dit is een onderzoekopgave/belangenafweging die gemaakt wordt in het Programma Noordzee 2022-2027

- > Routekaart Windenergie op zee 2030/2031
  - Concrete projecten voor komende jaren
- > Visie kabinet: kamerbrief september 2022
  - Aankondiging van het Energie Infrastructuur Plan Noordzee 2050

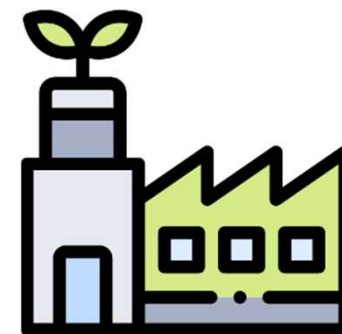
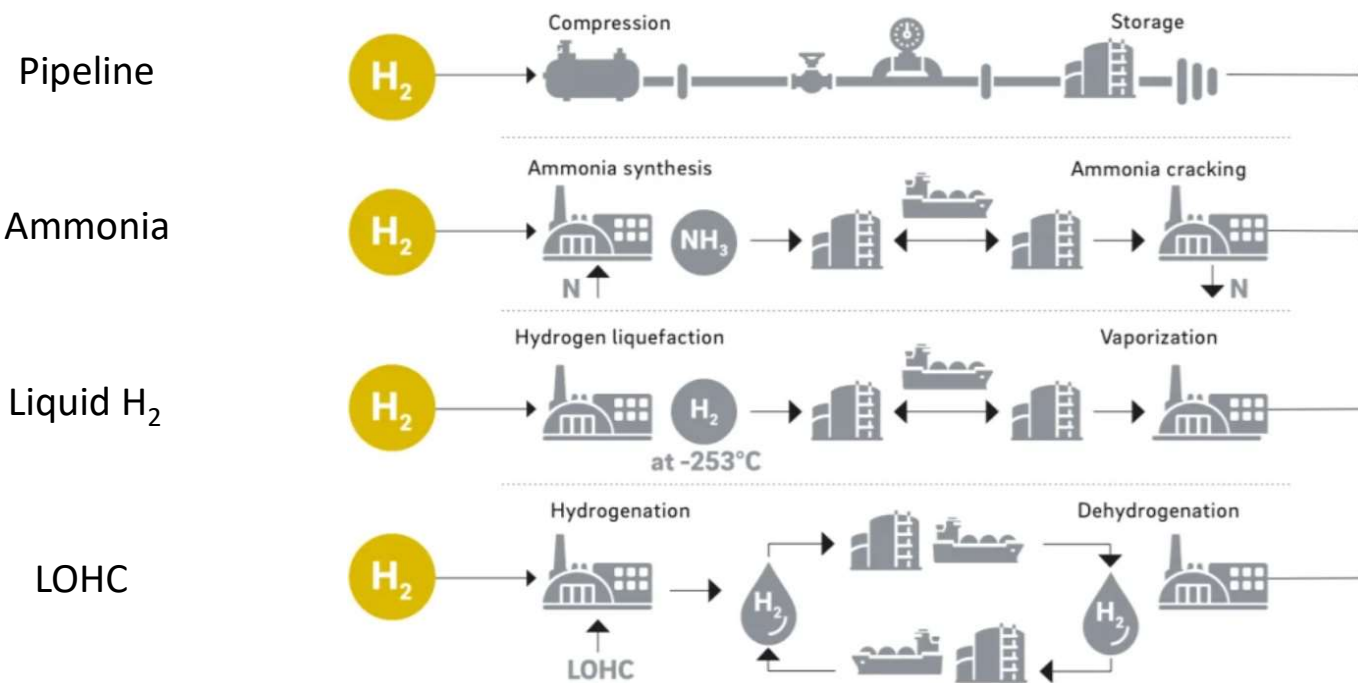


## Even in 2050, NL is net energy importer



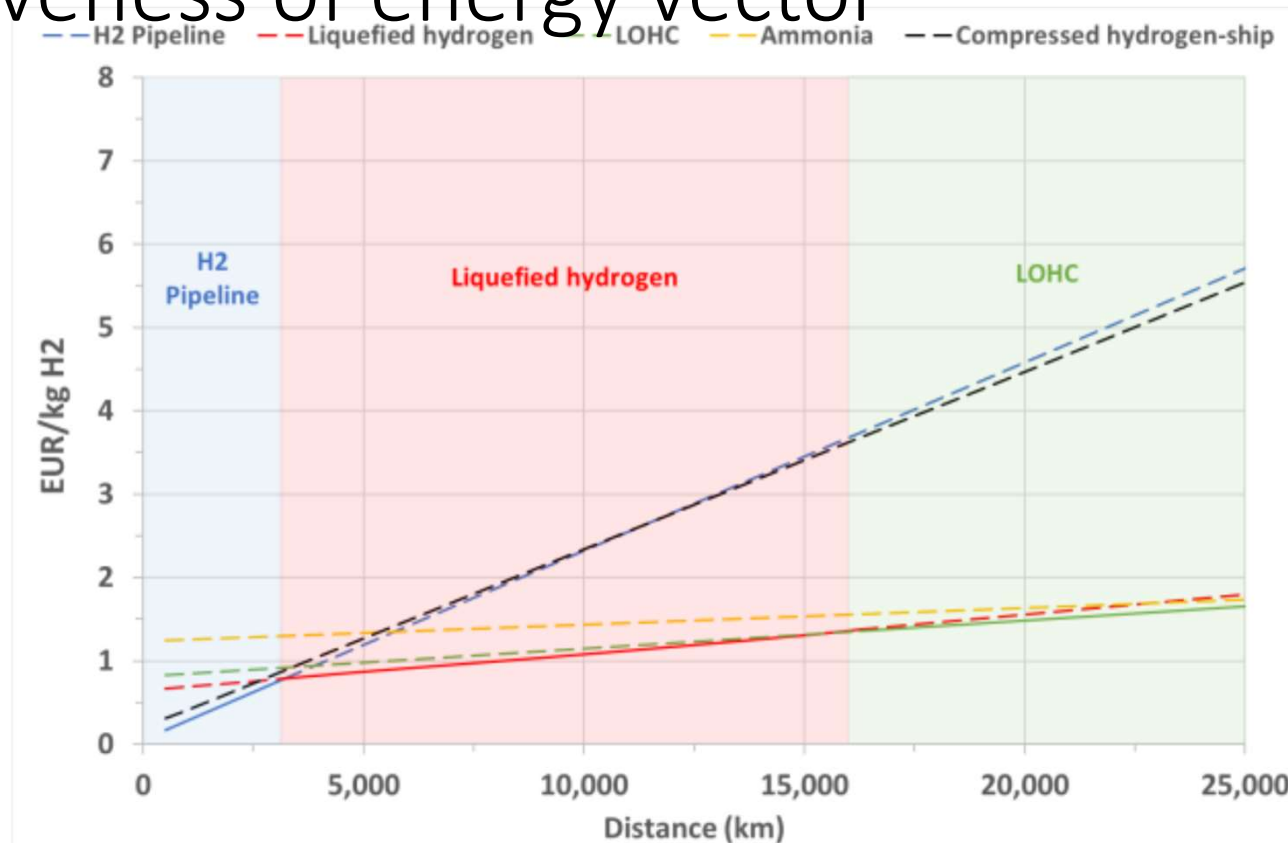
Decarbonizing Europe means to decarbonize 2050 Energy Imports

# Different Transport options for importing Hydrogen



...and of course there are synthetic fuels that can be shipped.

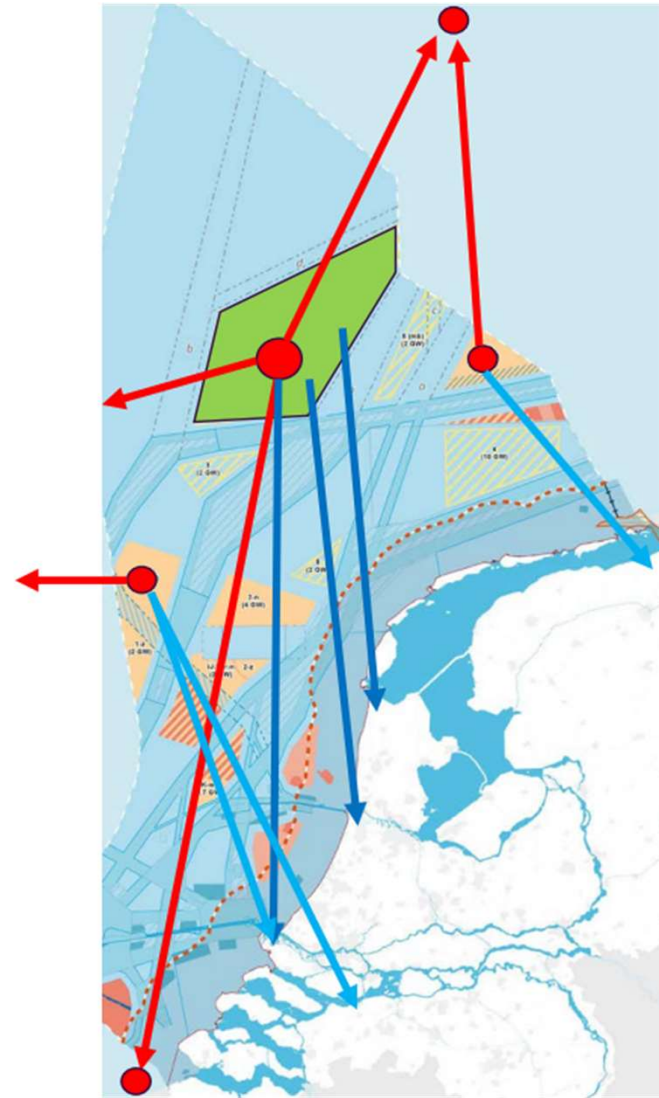
# Distance to source important factor in cost competitiveness of energy vector



Source: European Commission 2021; Hydrogen delivery costs for a simple (point to point) transport route, for 1 Mt H2 and low electricity cost scenario.

# • Hub design and functionality

- Our future energy system is to satisfy demand across multiple energy vectors.
- Hubs are to land Northsea produced energy but are also pivotal in facilitating energy import.



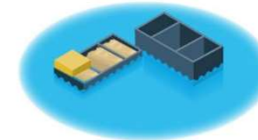
# Modularity of future energy hubs

- **Multiple hub structures possible:**

- Sand-based
- Piling-based
- Caissons
- Platforms
- Floating?



Platform



Caisson Island

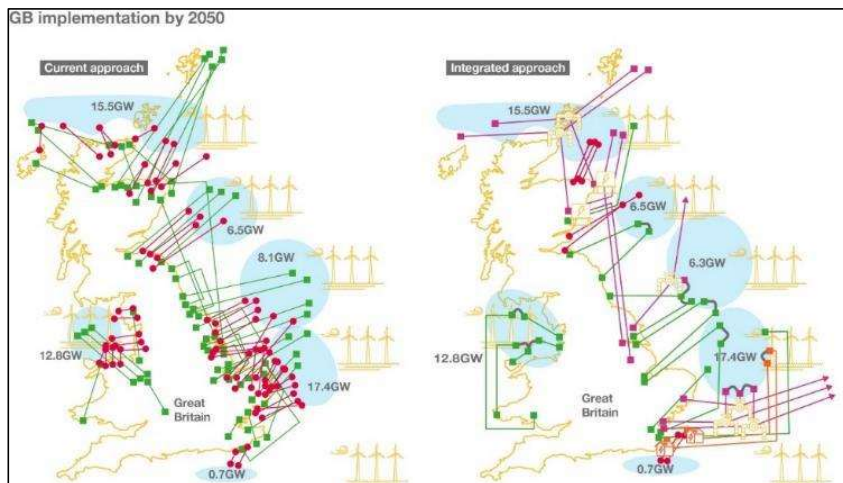
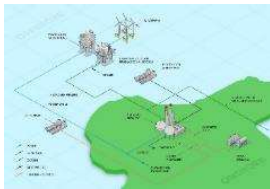


Sand Island



# Numerous initiatives different philosophies

“Northern Horizons’  
green hydrogen project  
for Shetland (Aker, DNV)



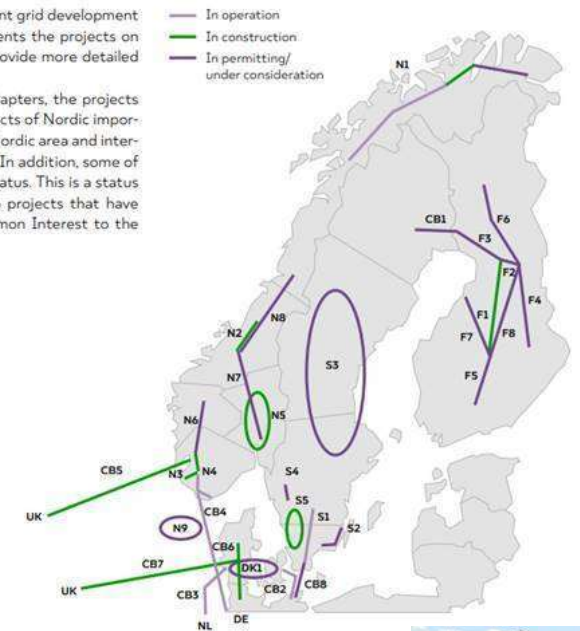
© Arcadis 2023

## 7.2 Status of grid development projects in the Nordics

This chapter presents the most significant grid development projects in the Nordics. Figure 18 presents the projects on a map and Subchapters 7.2.1 to 7.2.3 provide more detailed descriptions of the projects.

In the reporting of the following chapters, the projects have been categorised as: national projects of Nordic importance, cross border projects within the Nordic area and inter-connectors to other synchronous areas. In addition, some of the projects have a reference to PCI-status. This is a status given by the European Commission to projects that have been deemed to be a Project of Common Interest to the European Union.

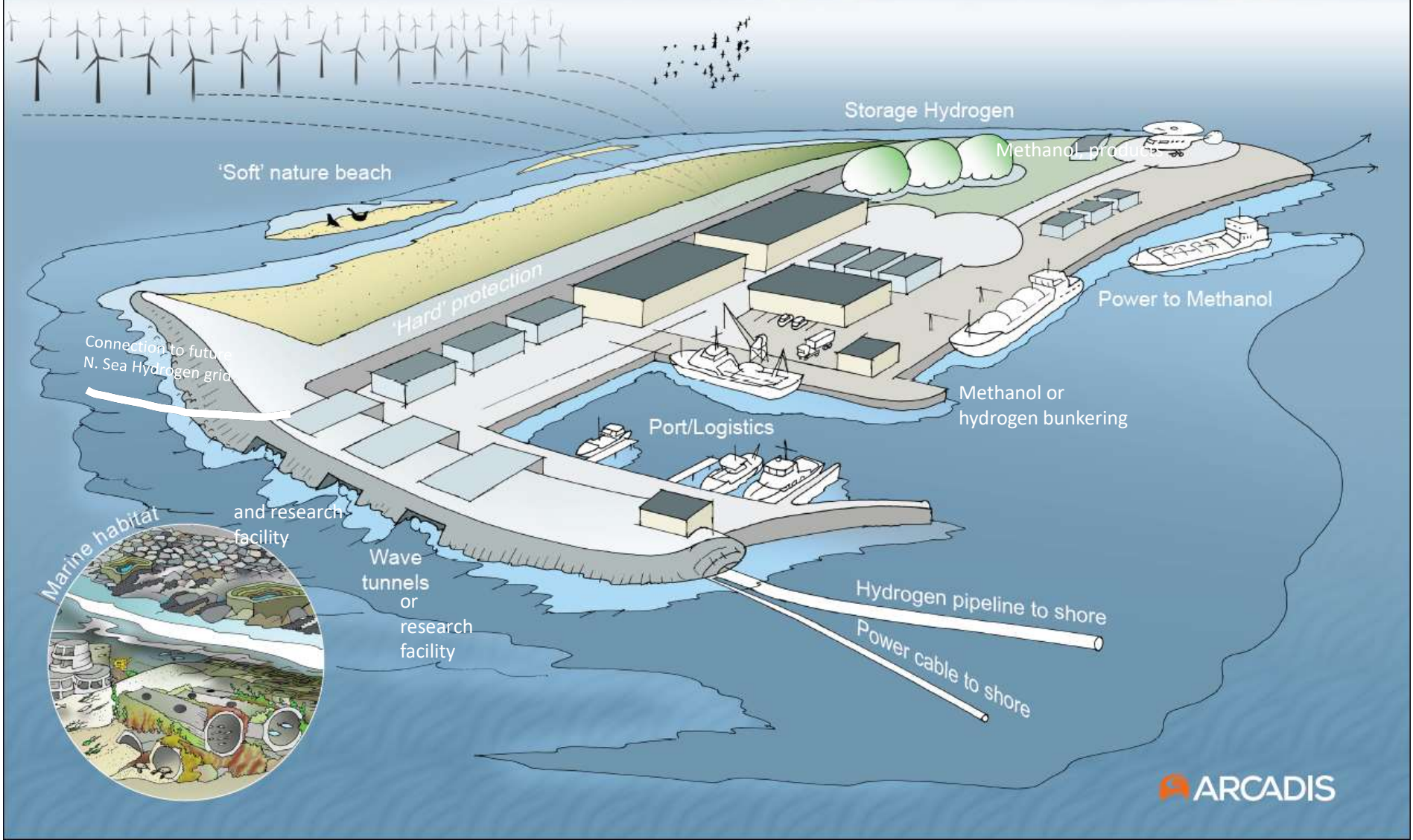
Figure 18 – Map of projects of Nordic significance.





Hub of a north sea hydrogen pipeline grid

Offshore wind development in North Sea



# Different Hub designs possible

- **Sand-based island**

- Once an island is constructed, sufficient space for future extensions of facilities
- Energy infrastructure is “onshore” situation, flexible in use
- Space for harbor and energy import, process plant

- **Caisson island**

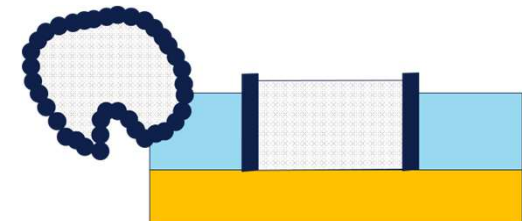
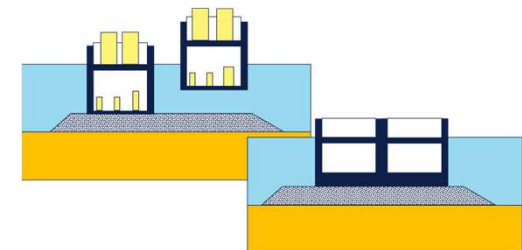
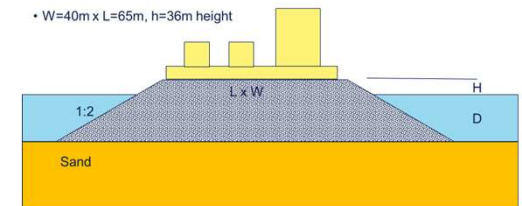
- Relatively easy to build building with international expertise (preferred solution Belgium, Denmark)
- Building at yard with good conditions
- Comparable with sand-based island, flexible in use
- Ecology: low noise solution

- **Platforms**

- Continuation of current practice and benefiting from standardization
- Quick to realize and standard permitting

- **Piling-based island**

- Maybe cost effective for smaller islands in shallow waters, not common



## What about future extensions: modularity

- **Material and costs**
  - Island gives room for expansion in future if "oversized" laid out
  - Extensions of Piling-based islands results in double material costs, the large the more expensive compared to other options
  - Multi-platforms adds technical difficulties
- **Risks to existing structure**
  - Adding Caissons to existing structure may be difficult if not considered upfront
  - ...
- **Ecology**
  - Piling requires additional pile driving/drilling
  - ...

- 1. Welk ontwerp is volgens jullie het meest modulair, en waarom?**
- 2. Welk ontwerp is volgens jullie het meest toekomstvast?**
  1. Uitbreidingsmogelijkheden over tijd
  2. Flexibiliteit in toekomstige functie

# Discussion





**Martijn Duvoort**

Director Energy Transition

[Martijn.Duvoort@arcadis.com](mailto:Martijn.Duvoort@arcadis.com)