AquaVentus

20.02.2025

EUREC
Energy Islands and P2X

AquaVentus – The bet on offshore hydrogen production

The AquaVentus Förderverein

Network

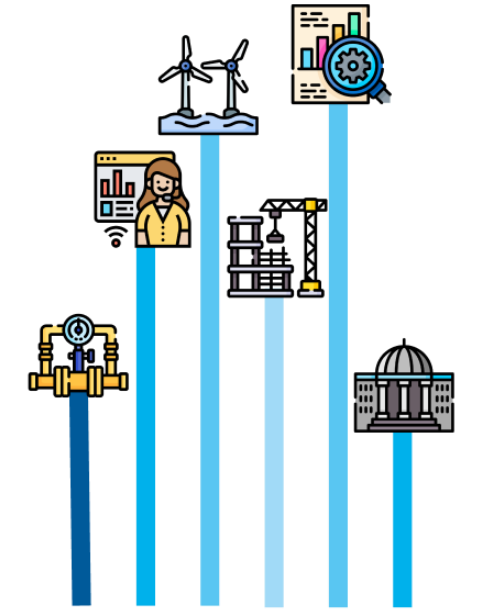
More than 100 members along the entire value chain form a high-quality and unique company and research network

Vision

AquaVentus includes several coordinated projects along the value chain, where dedicated and agile consortia are working to realise the vision

Realisation

Installation of large-scale hydrogen production at sea from offshore wind energy in the North Sea and build-out of the associated transport infrastructure



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Hydrogen production at sea as key enabler for the energy transition

Ambition

- Use of full domestic offshore energy potential
- Maximise socio-economic benefits (business cases)

Challenge

- Electric network congestion
- Price risks for power due to simultaneous onshore renewable supply

Solution

- Flexibility using two energy carriers: hydrogen and electricity
- Solves transport challenge and avoids electric grid congestion
- Increases revenue potential and decreases price risks through flexible revenue streams

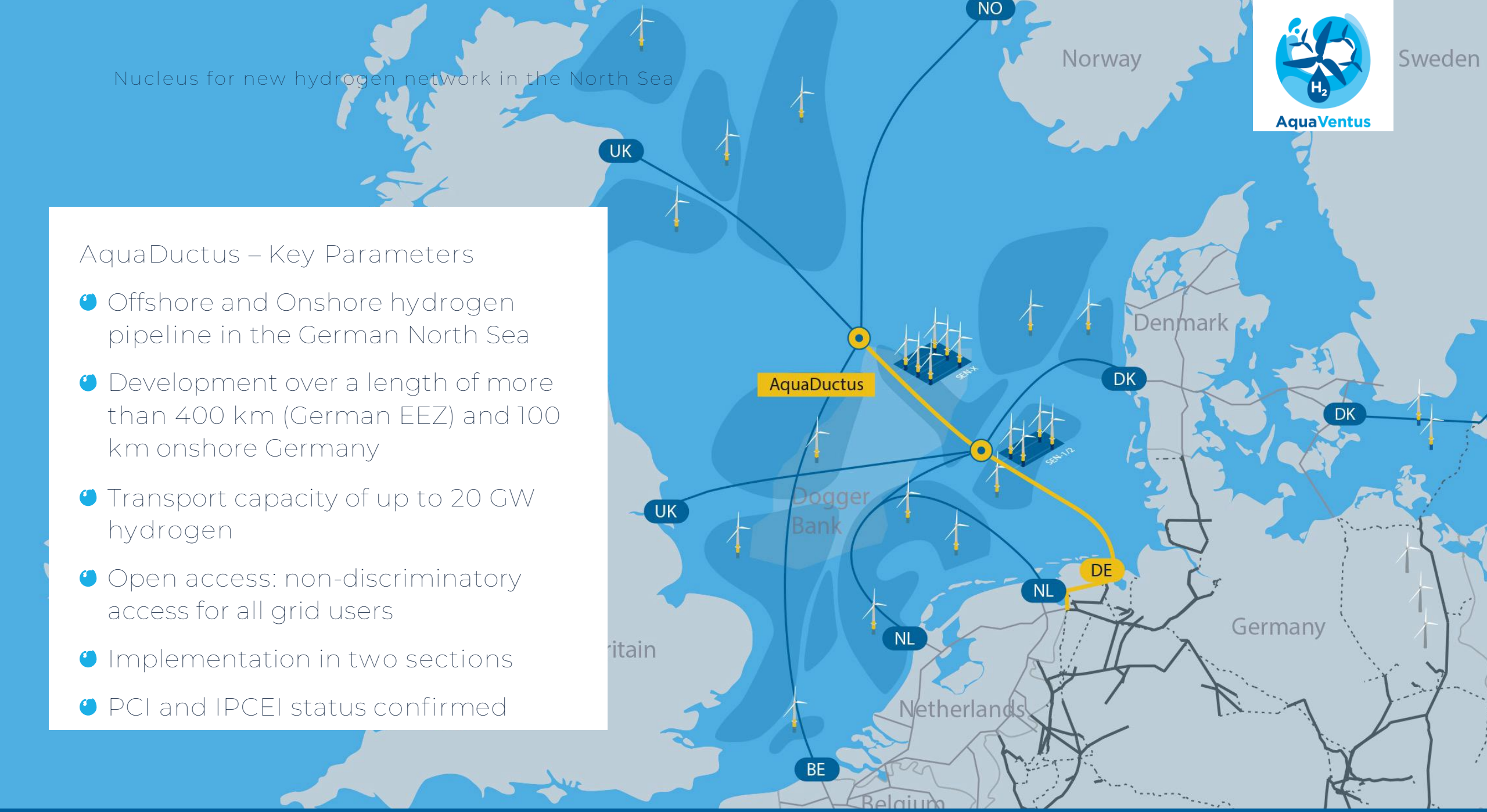
Precondition for the ramp-up: Enabling Combined Connection Concepts in Germany

- **Mixed connection concepts connect offshore wind farms simultaneously via electric cables and offshore electrolysers and a pipeline.** Such concepts offer many benefits in terms of energy system integration, total cost and implementation risks for far out offshore wind farms.

- **Mixed connections concepts increase the flexibility of energy supply: electricity can be supplied when needed.** When RES is abundant, hydrogen is produced. When offshore wind is limited, the power cable can also be used to supply the offshore electrolysis with onshore electricity.

- Despite their advantages and in contrast to the neighbouring countries in the North Sea, **there is a legal exclusion from combined connection concepts in Germany.**

Nucleus for new hydrogen network in the North Sea



AquaDuctus – Key Parameters

- Offshore and Onshore hydrogen pipeline in the German North Sea
- Development over a length of more than 400 km (German EEZ) and 100 km onshore Germany
- Transport capacity of up to 20 GW hydrogen
- Open access: non-discriminatory access for all grid users
- Implementation in two sections
- PCI and IPCEI status confirmed

Europe relies on offshore wind!

- North Sea Summit with Ostend Declaration by Belgium, Denmark, France, Ireland, Luxembourg, the Netherlands, Norway, UK and Germany on 24 April 2023

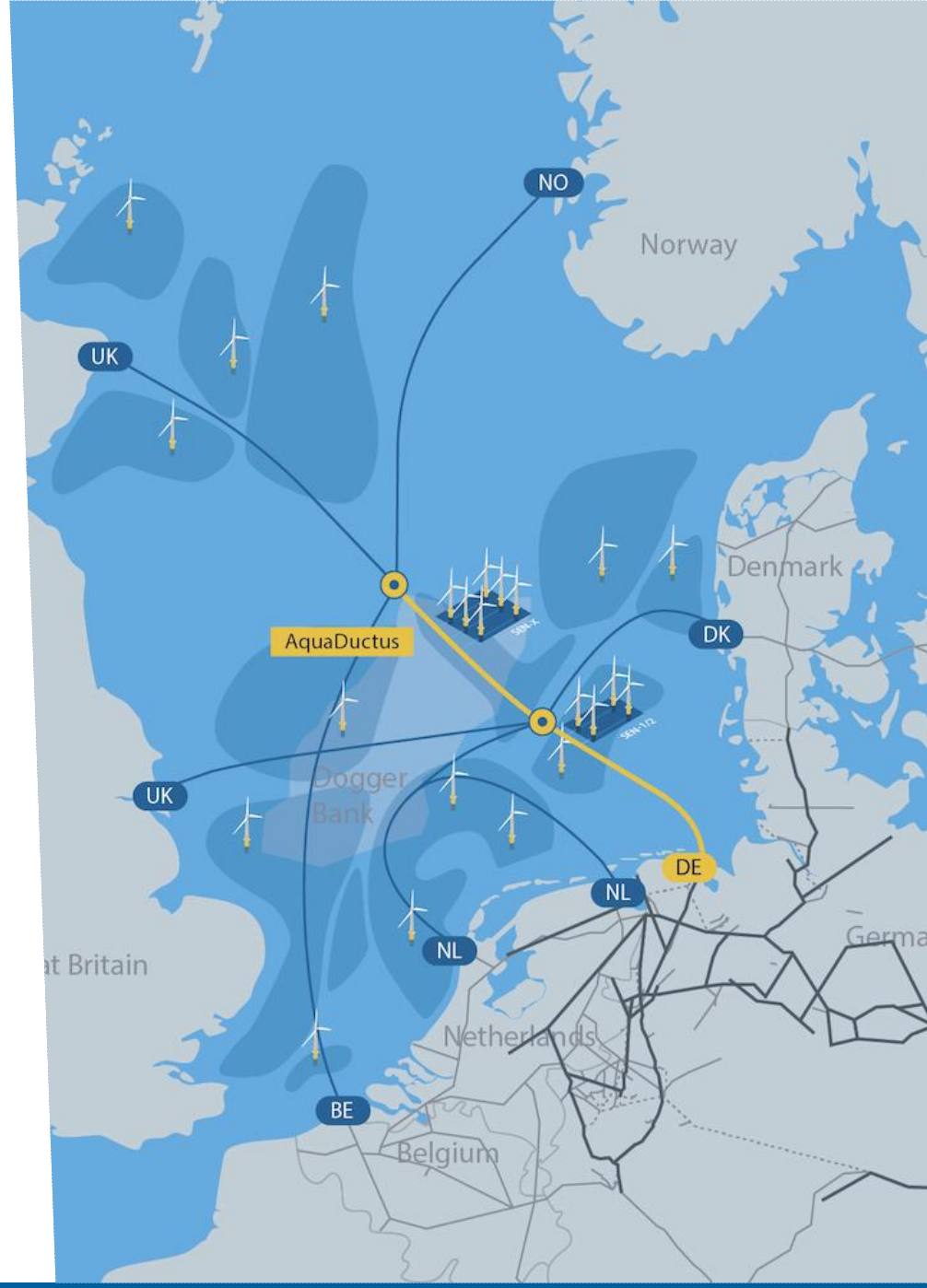
- Agreed on massive expansion of offshore wind energy production. The capacity targets were 300 GW by 2050
- This capacity target was updated end of last year to 356 - 366 GW
- In Germany the targets 40 GW by 2035 and 70 GW bis 2045

Europe requires cross boarder Hydrogen network

- Creation of tangible cooperation agreements between **North Sea states**
- **Offshore H2 Backbone with the Pipeline AquaDuctus** – Integration into the European hydrogen network (offshore and onshore) including connection of further areas for offshore hydrogen production
- **Integrated planning** of electricity and hydrogen infrastructure including cross border generation and transportation
- AquaVentus (with AquaDuctus) **delivers German contribution** to the “Green power plant North Sea”, however needs a coordinated European effort to unlock the full potential
- Providing access to an offshore **hydrogen potential of 300 TWh***

"Green power plant North Sea"

*Source: DNV - Specification of a European Offshore Hydrogen Backbone



Towards offshore hydrogen in three steps – Triple Jump

Step 1 – Demonstrate: Pilot of offshore electrolysis

2026+

Proof of technical concept as foundation for further scaling

- Start of operation in 1 - 2 years
- At least 3 to 8 years of operation

Step 2 – Improve: SEN-1 (pre-commercial scale < 1 GW)

2030s

Optimise technology and get ready for commercialisation

- Start of operation in 6 - 8 years
- At least 20 years of operation

Step 3 – Invest: Several Gigawatt offshore electrolysis (commercial use)

2040s

Make use of the full potential of offshore hydrogen

- At least 25 years of operation at commercial scale
- Legal inclusion of mixed connection concepts

AquaVentus

The green energy revolution starts in the North Sea