Barriers to industrial hydrogen production - and how to overcome them

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Together, we shape a sustainable and liveable world

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It’s not just numbers. It’s a promise.

Sustainability is at the core of our values.

That is why we have set specific targets to define our sustainability promise.

2022

Deselecting all new projects exploring fossil fuels.

70%

Reduction of our carbon footprint by 2030 (compared to 2008).

100%

Of our revenue must come from projects that drive sustainability before 2027.

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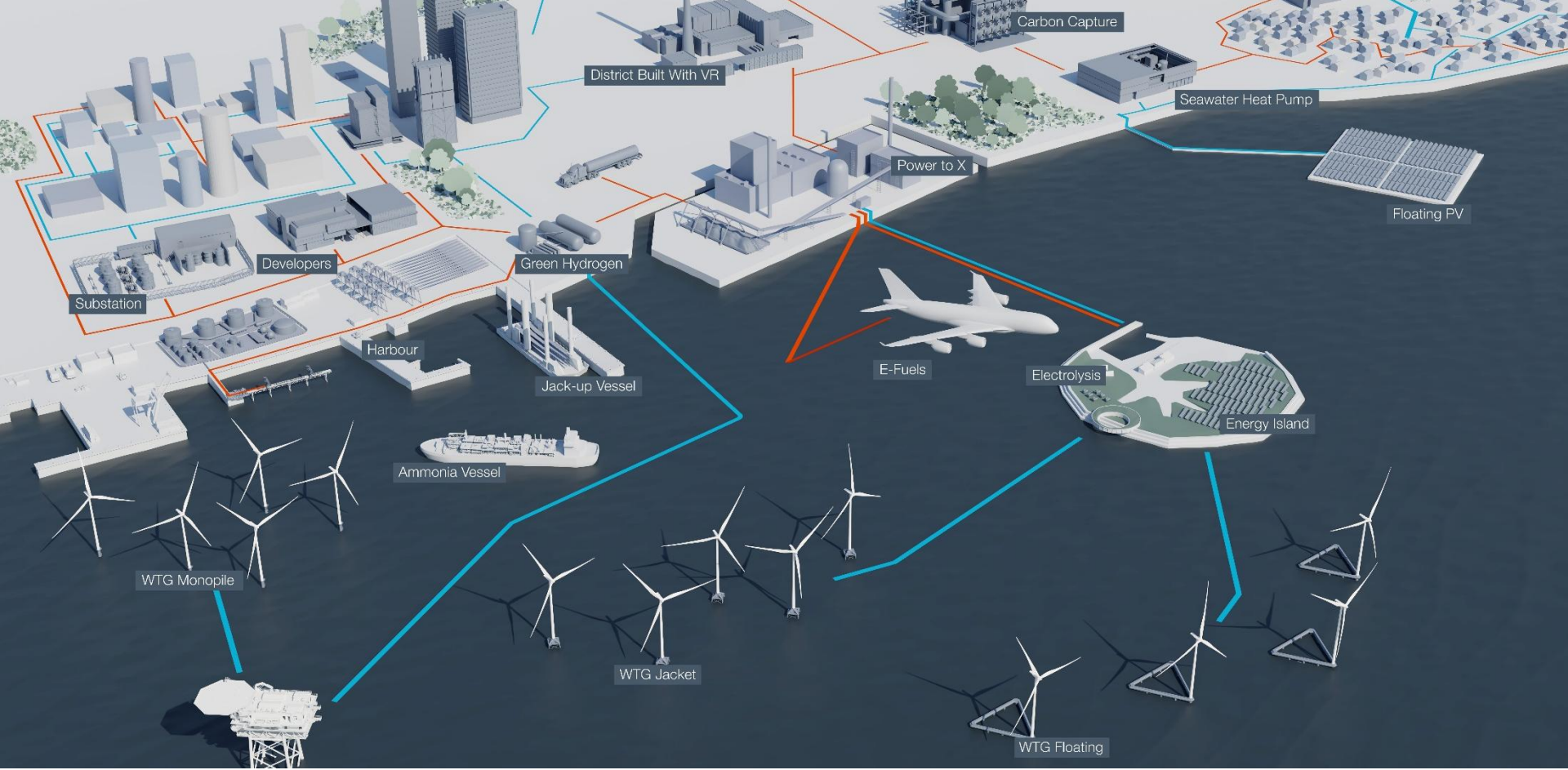
Carbon Capture
District Built With VR
Seawater Heat Pump
Power to X
Floating PV
Developers
Green Hydrogen
Substation
Harbour
Jack-up Vessel
E-Fuels
Electrolysis
Energy Island
Ammonia Vessel
WTG Monopile
WTG Jacket
WTG Floating

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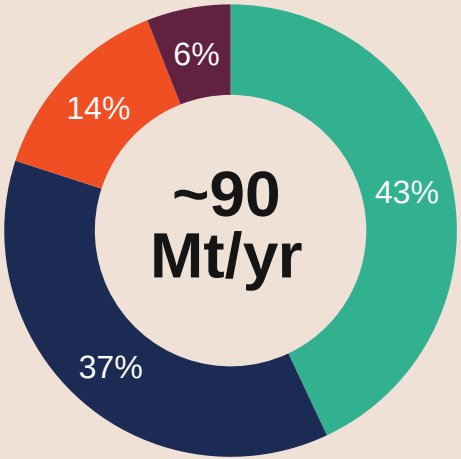
What does the future hold for us?

H_2 market 2022

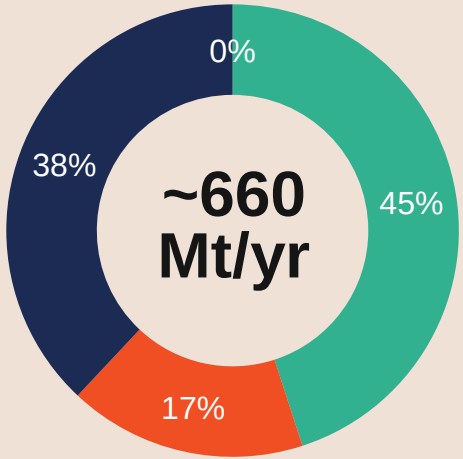
green H_2 is insignificant



Refinery Ammonia Methanol Steel production

H_2 market 2050

65% of which may be green H_2



Mobility (e-fuels) Existing industry use Heat, power generation and new feedstocks

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What will it take?

Electrolysis in 2022

- Large GW projects in pipeline (300 GW)
- Electrolyser production capacity is on the rise
- BUT largest plant in operation is only ~25 MW

Electrolysis in 2050

- Expected green hydrogen demand of ~430 Mt/yr
- Requires ~4,000 GW installed capacity
- Improved electrolysis efficiency a precondition

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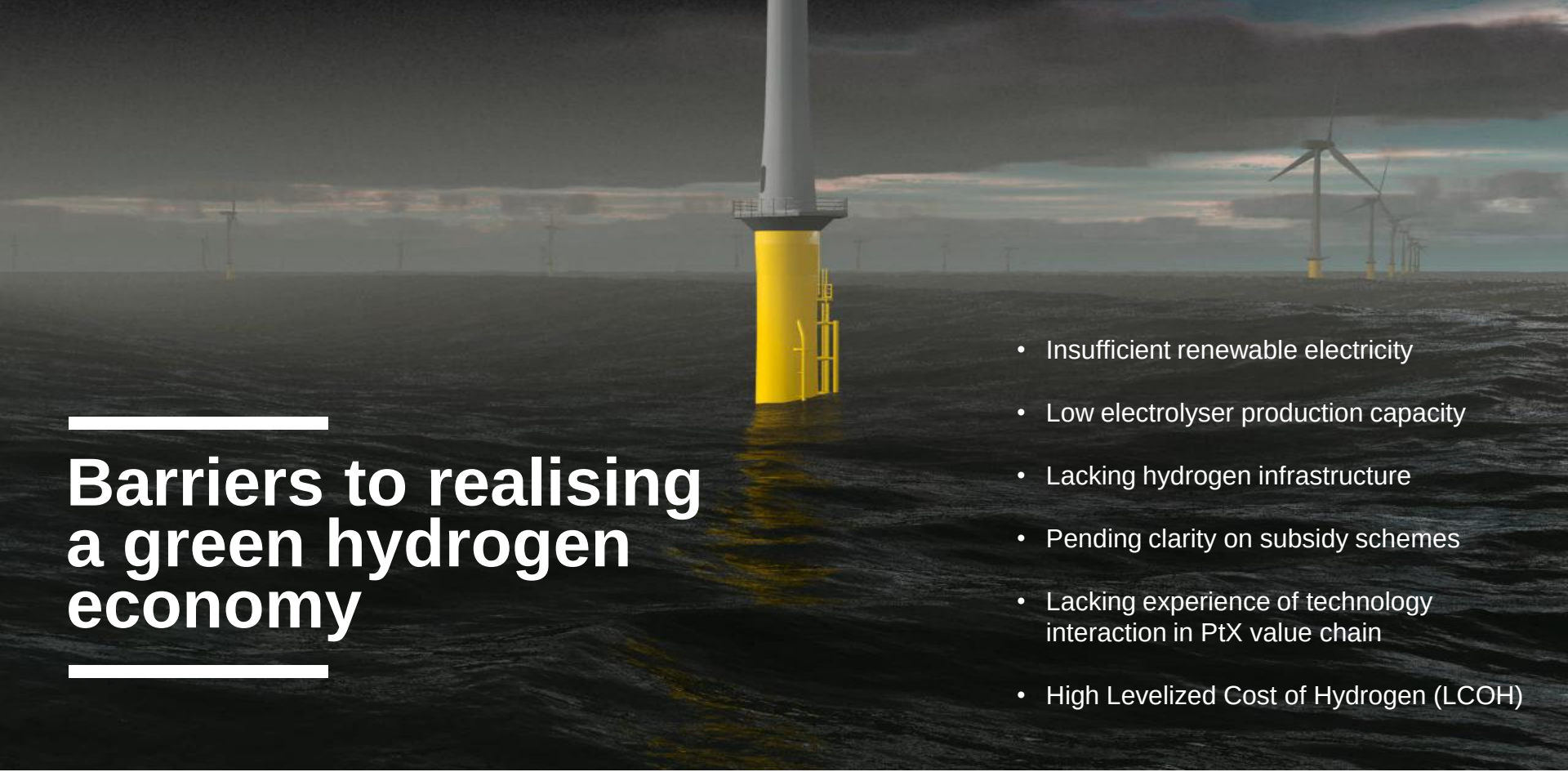

Barriers to realising a green hydrogen economy

- Insufficient renewable electricity
- Low electrolyser production capacity
- Lacking hydrogen infrastructure
- Pending clarity on subsidy schemes
- Lacking experience of technology interaction in PtX value chain
- High Levelized Cost of Hydrogen (LCOH)

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Enabling large scale hydrogen production

1

Clear route to market

- Political framework for renewable energy and hydrogen infrastructure
- Clarity on subsidy schemes, carbon tax and tarifs

2

Project optimization

- A strong sector coupling
- Digital modelling use as basis for optimal project design

3

Safety and operational experience

- Large scale operating experience to be achieved to optimize interaction
- High focus on safety in demonstration and scaling phase

4

Further lowering of LCOH

- Increase electrolyser efficiency
- Scaling to lower costs
- Digitalization for optimal operation

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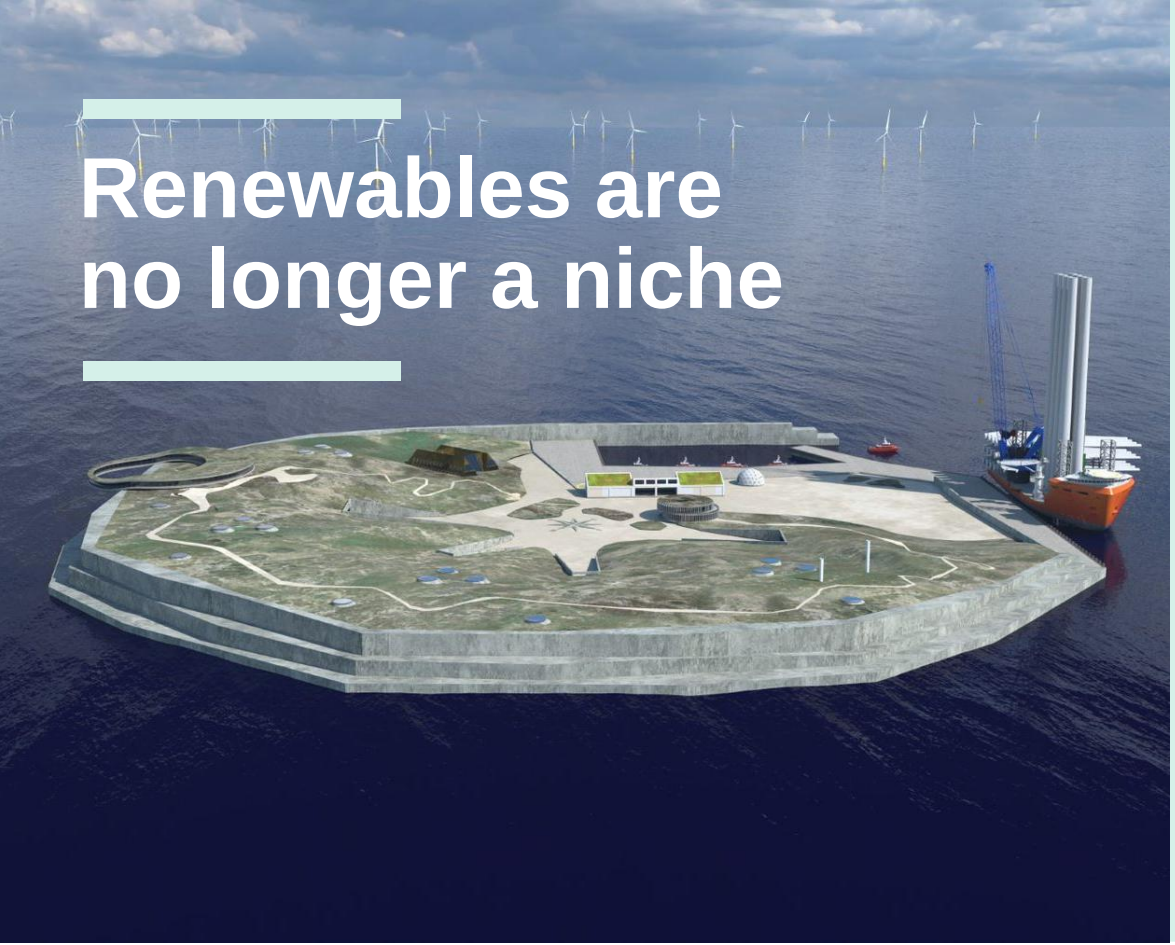

Renewables are no longer a niche

Energy Island

Challenge

Green energy and clean fuels are necessary means to decarbonise the world. However, today we do not have enough sustainable energy sources or the infrastructure to handle the clean energy demand.

Solution

We are helping Energinet, the Danish Energy Agency, Copenhagen Infrastructure Partners and the VindØ consortium build an artificial island (energy island) in the North Sea.

The island will connect offshore wind and host energy storage and green fuels.

Value

With a capacity of 10 GW, the island can generate enough energy to supply ten million European households or to produce green fuels for the entire Danish aviation industry.

Green Fuels for Denmark

Challenge

Lack of technology integration and sector coupling currently makes is difficult to substitute marine diesel and heavy fuel oil with sustainable alternatives.

Solution

Partners from the entire value chain have teamed up to combine their know-how and establish a 1.3 GW electrolyser powered by 2-3 GW offshore wind. Through electrolysis processes, the facility can produce green fuels for both heavy road and the marine- and aviation industries.

Value

The project will decarbonise the partners' business, while contributing to Denmark's CO2 reduction goals. The fully scaled facility will reduce annual CO_2 emissions by 850,000 tons and spearhead the maturation of the green fuel industry.

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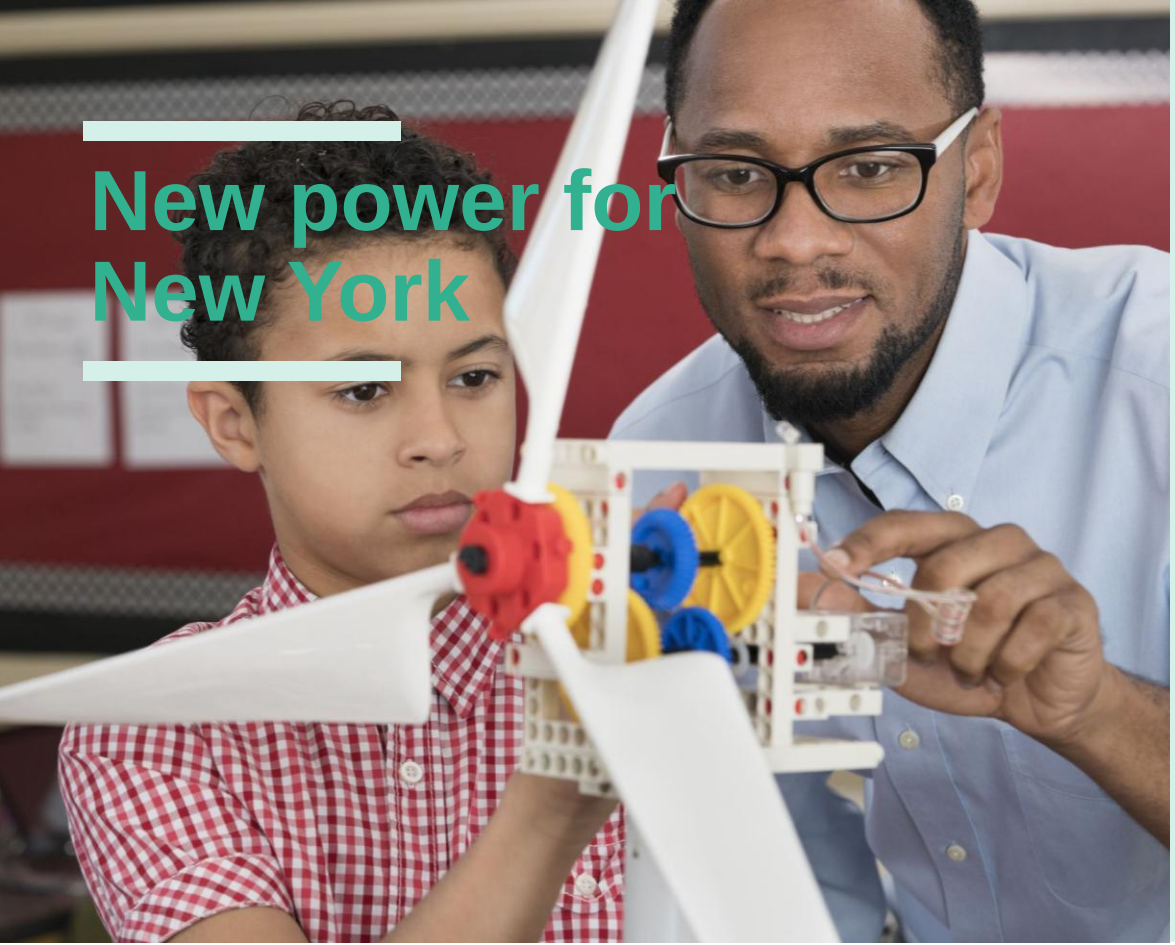

New power for New York

Empire Wind

Challenge

New York has set mandated targets for decarbonising the state's electricity calling for 70% renewable energy by 2030 and 100% zero-emission energy by 2040.

Today, renewables only account for 27% of energy generated statewide.

Solution

For a joint venture between Equinor and bp, COWI will deliver a turnkey design for the wind turbine foundations in two offshore wind projects (Empire Wind 1 and 2) off the coast of Long Island. the Empire Wind development has an anticipated generation capacity of 2.1 GW of renewable energy.

Value

Powering 1 million New York homes, the project will have great social benefits. It will further help New York achieve their renewable energy goals.

Let’s talk

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