



equinor

# Hywind Tampen

The World's First Floating Offshore Wind Farm to Supply Renewable Energy to Offshore Oil and Gas Installations

Society of Petroleum Engineers (SPE)

14.04.2021



# Offshore wind - Hywind Tampen

Introduction to offshore wind

Floating offshore wind

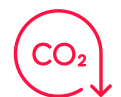
Hywind Tampen

Reflections & Questions

# The future of energy

The world is changing

Increased renewable and climate ambitions



Net zero emissions



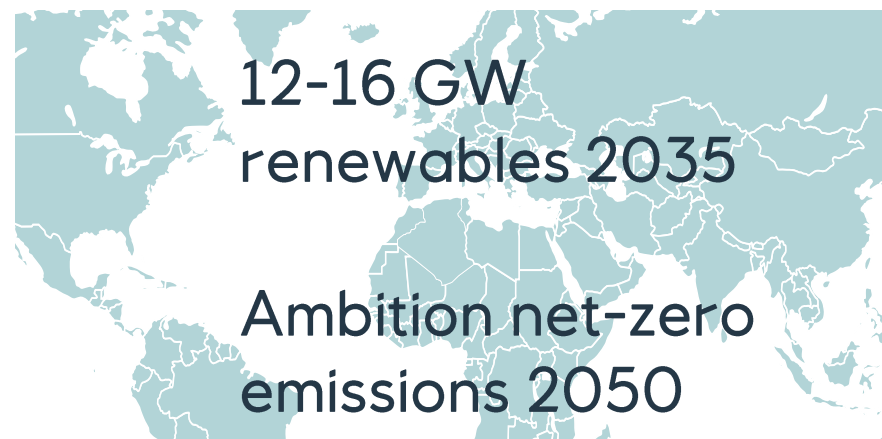
Higher energy demand



Population growth



GDP growth



Optimise oil and gas

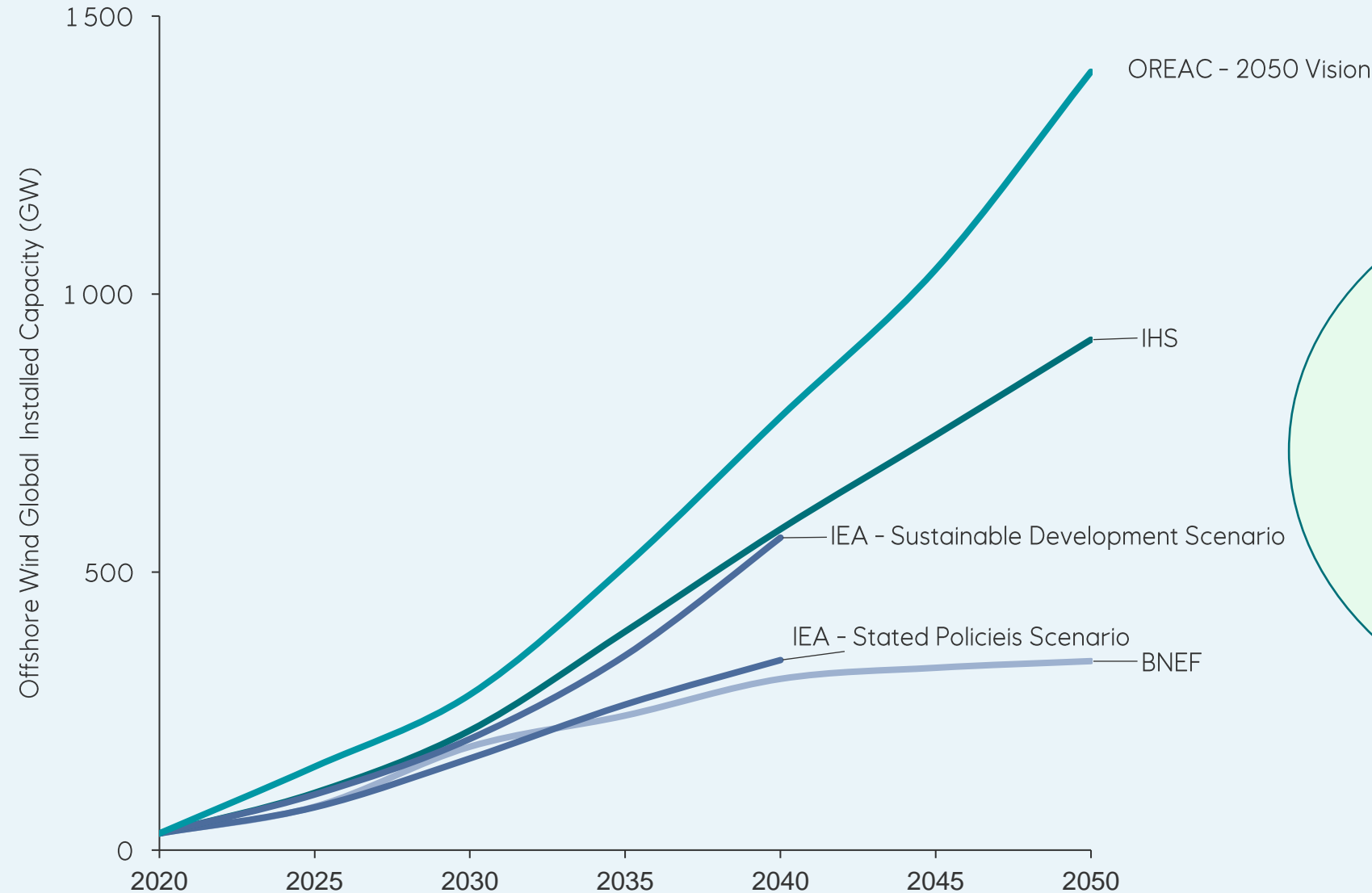


Accelerate  
profitable  
renewables



Develop low-carbon  
solutions

# Global offshore wind markets will grow significantly



## Want to learn more?

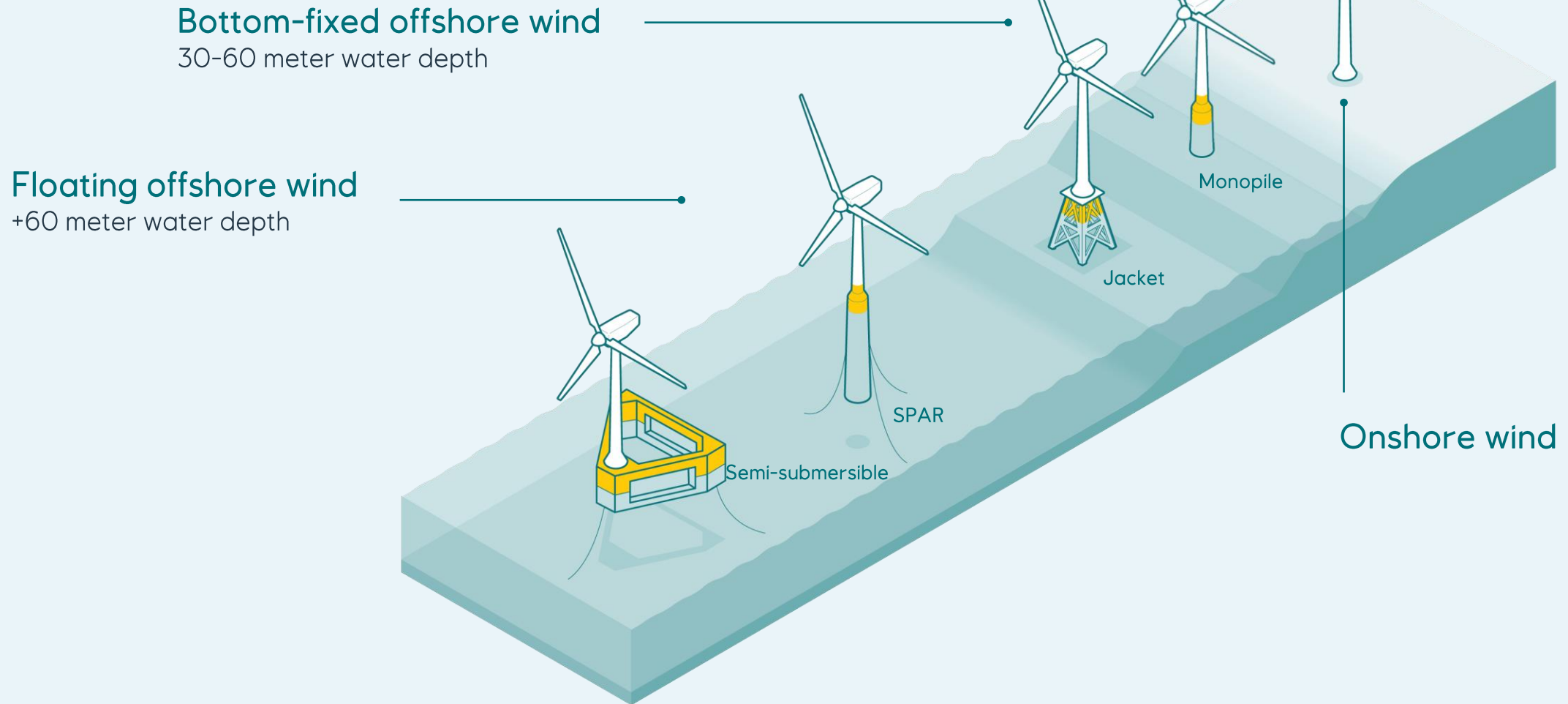
[OREAC's 2050 Offshore Wind Vision](#)

[IHS](#) Global power and renewables – Supply and Demand dashboard

[IEA's](#) "Stated Policies" and "Sustainable Development" scenarios for Offshore Wind

[BNEF](#) New Energy Outlook 2020

# Main wind power concepts



# Equinor's offshore wind portfolio

| In production                               |  |   |   |   |
|---|--|---|---|---|
| Bottom fixed                                |  |   | Floating                                |   |
| Sheringham Shoal. UK<br>317 MW              | Dudgeon. UK<br>402 MW                            | Arkona. Germany<br>385 MW                                   | Hywind Scotland. UK<br>30 MW            |   |
| Equinor (40%)<br>Production start: 2012     | Equinor (35%)<br>Production start: 2017          | RWE operator<br>Equinor (25%)<br>Production start: 2019     | Equinor (75%)<br>Production start: 2017 |   |
| Project pipeline                            |  |   |   |   |
| Bottom fixed                                |  |   | Floating                                |   |
| Dogger Bank. UK<br>3.6 GW                   | UK extensions<br>0.7 GW                          | East coast. US<br>> 4 GW                                    | Baltyk I, II, & III. Poland<br>~3 GW    | Hywind Tampen. Norway<br>88 MW          |
| Equinor/SSE (50%)<br>Production start: 2023 | Extensions to<br>Sheringham Shoal<br>and Dudgeon | Equinor (100%)<br>(Empire wind -<br>production start: 2024) | Equinor/Polenergia<br>(50%)             | Equinor (41%)<br>Production start: 2022 |



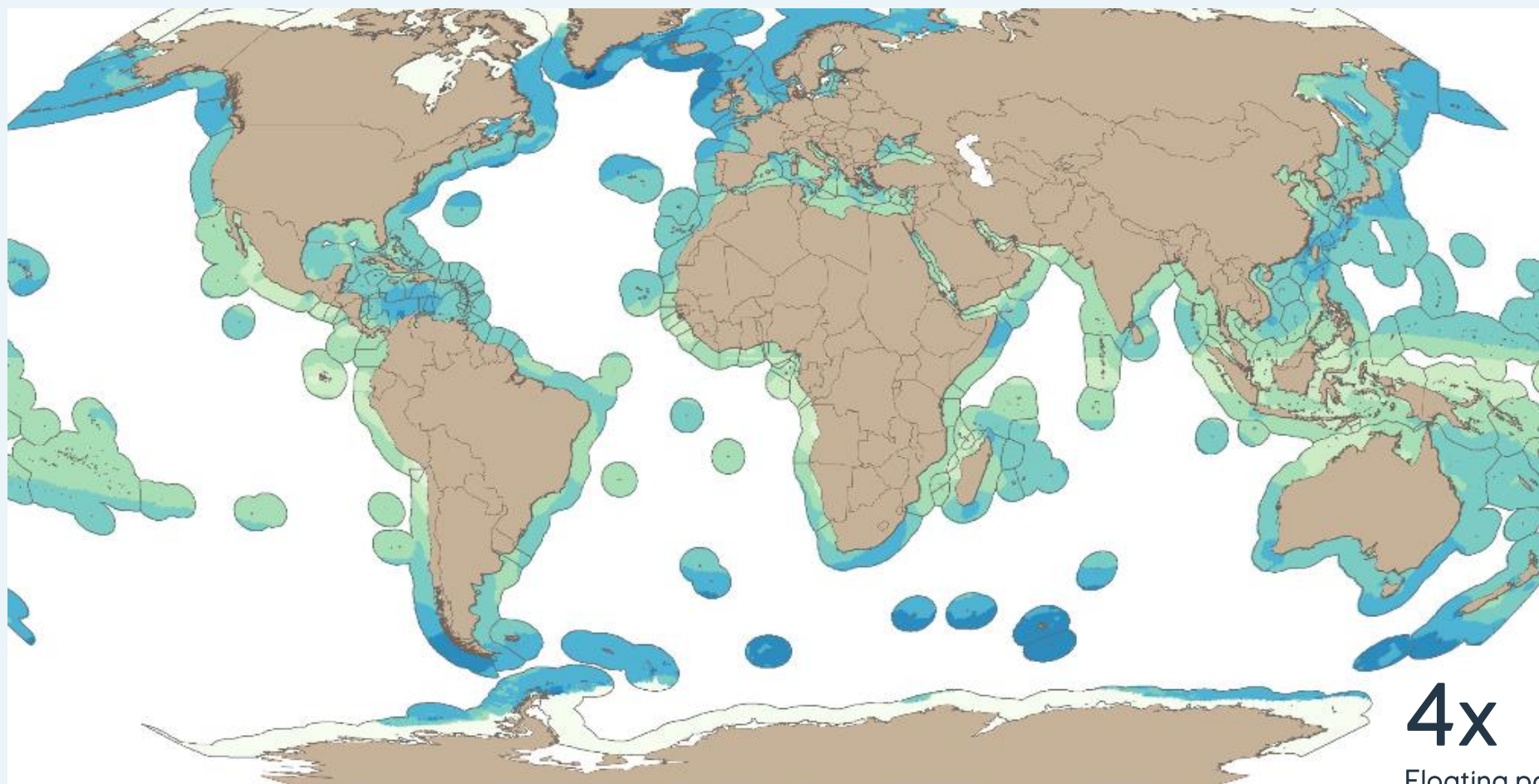
## The future of offshore wind is afloat

Freeing wind power from bottom-fixed designs opens a world of new markets and opportunities. With tried and tested floating wind turbines already in production, we are the world's leading floating offshore wind developer – a position we intend to keep.

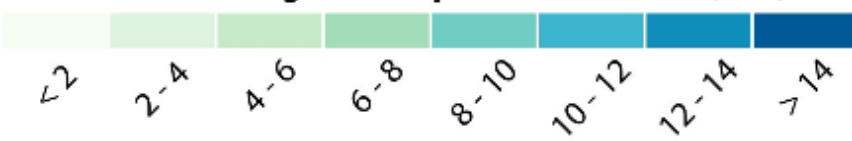
Read more: [Equinor.com](https://equinor.com)



# Why offshore wind? And why floating offshore wind?



Annual Average Wind Speed at 90meters (m/s)



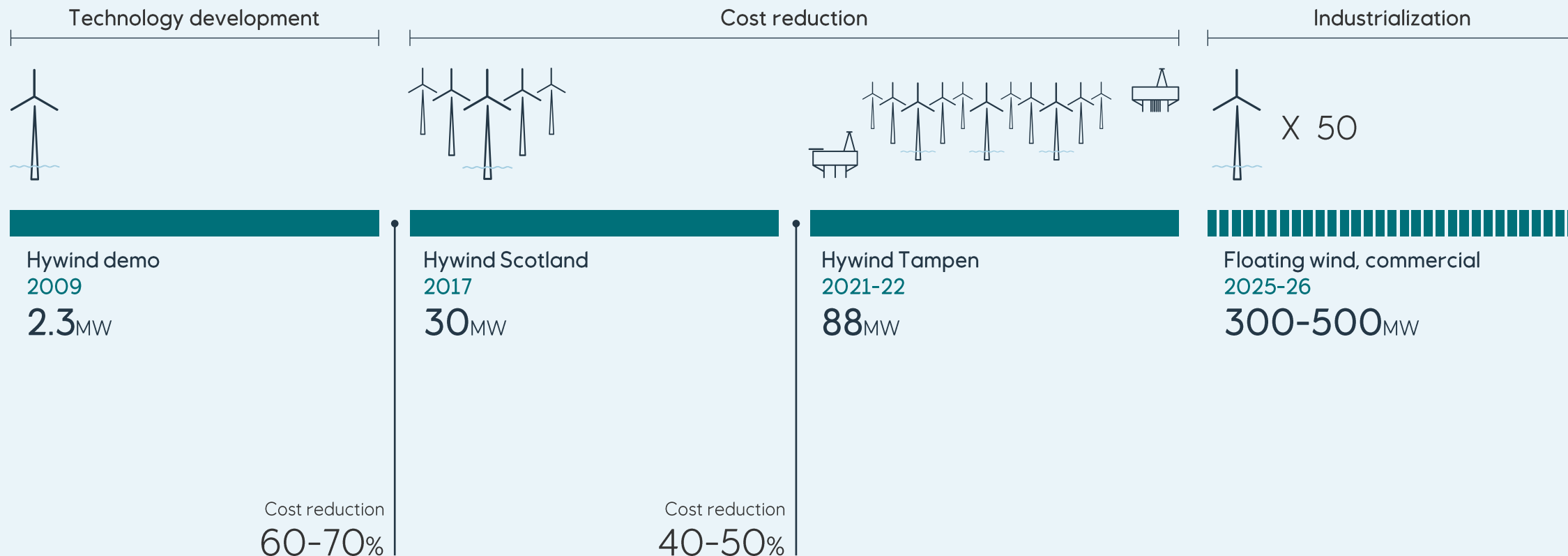
4x

Floating potential  
compared to bottom-fixed

~80% of offshore wind resources accessible  
only by floating



# Way forward for floating wind

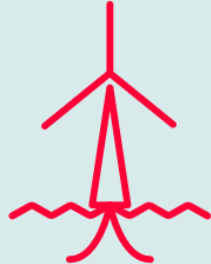


# Firefly offshore wind farm



800 MW

*Power, base case*



200–250 m

*Water depth (metres)*



8.5 m/s

*Average wind speed*

## Key facts

- Floater steel semi-sub with 3 mooring lines
- O&M base onshore (~70 km)

### Business case

- Two Lidars deployed June 2020
- 100% Equinor (partner expected)

### Targeted timeline

- Lidar measurements 2020
- Consent and grid agreements 2022/23
- FID 2023
- Fabrication 2023/24/25
- Installation 2025/26

## Project location



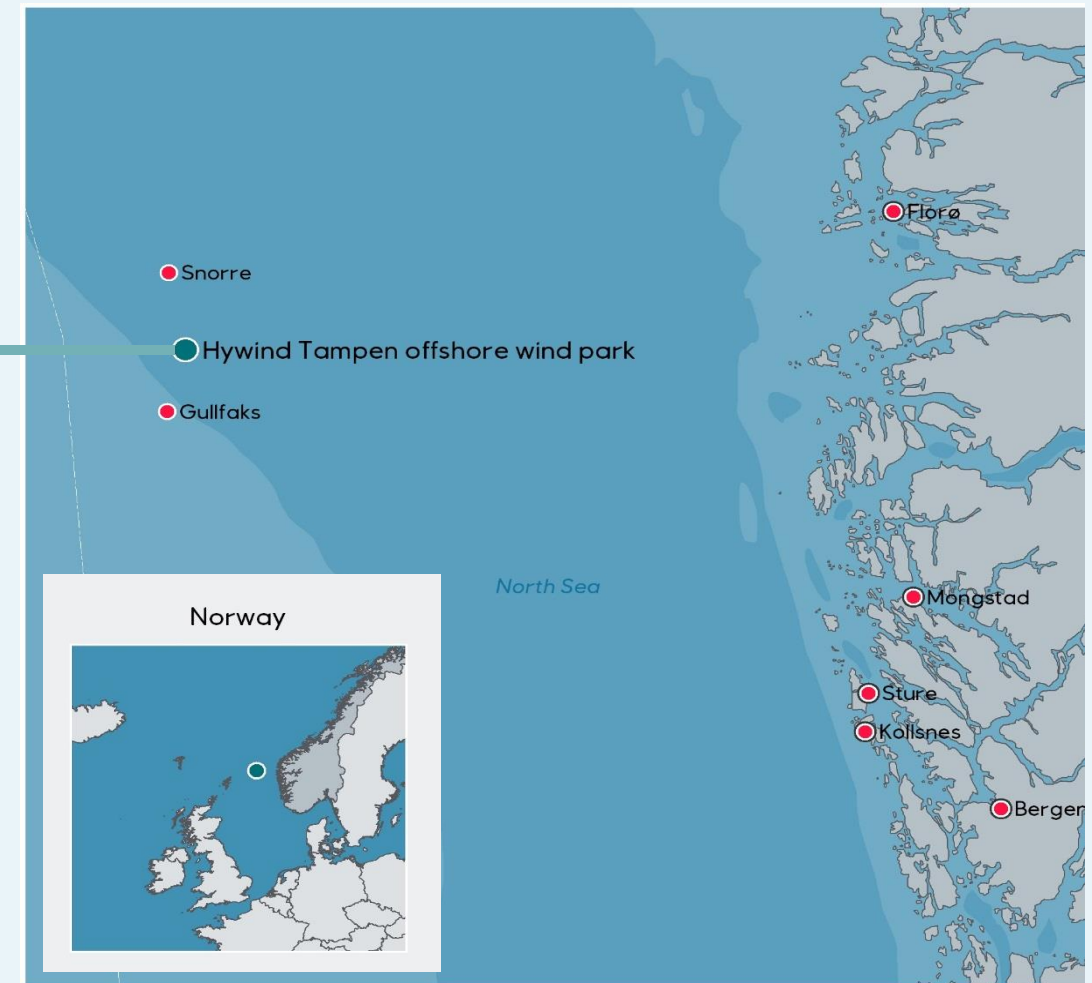
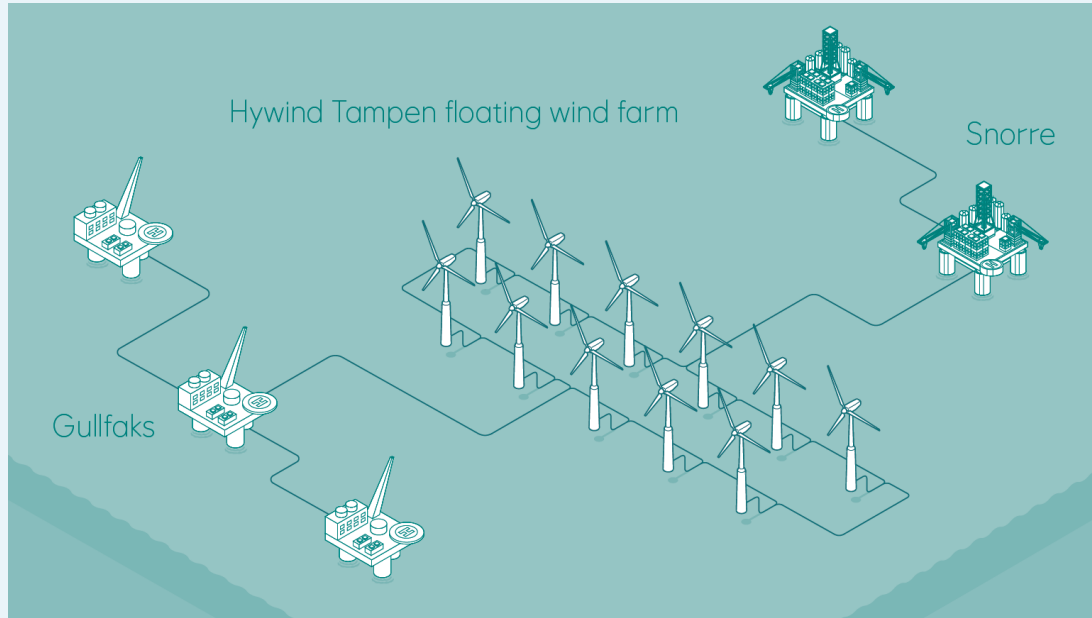
### Legend

- ◆ Planned wind farm
- Capital

0 100 km

Read more: [Equinor.com](https://equinor.com)

# Hywind Tampen – The world's first floating offshore wind farm to supply renewable power to offshore oil and gas installations



11 wind turbines

Combined capacity of  
88MW

Concrete substructures and  
shared anchors

200.000 tonne/year CO2  
emission reduction



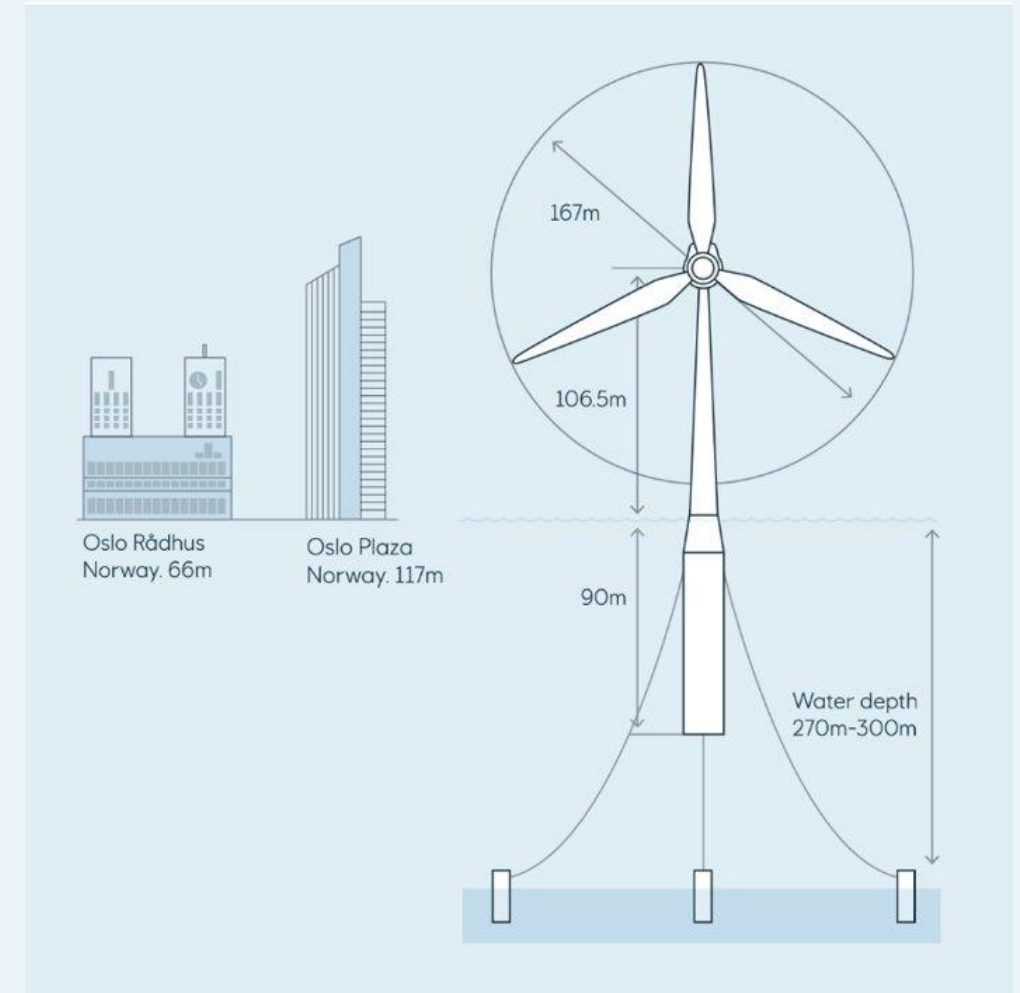
# Hywind Tampen – An industrial part of the solution

- Reduce CO<sub>2</sub> and NO<sub>x</sub> emissions on Gullfaks and Snorre
- Further develop floating wind and the Hywind concept, technology and execution methods
- Demonstrate a fully integrated gas and renewable power generation system with large global deployment potential

# Hywind Tampen Execution

## Main contractors

|                                     |                                 |
|-------------------------------------|---------------------------------|
| Wind Turbine generators:            | Siemens Gamesa Renewable Energy |
| Substructure and marine operations: | Kværner                         |
| Inter-array and export cables:      | JDR Cable Systems               |
| Cable installation:                 | Subsea 7 / Seaway 7             |
| Topside modifications:              | Wood Group Norway               |
| Assembly site Sløvåg:               | Wergeland Base                  |
| Onshore crane:                      | Mammoet Norway                  |



## Hywind Tampen: The world's first renewable power for offshore oil and gas



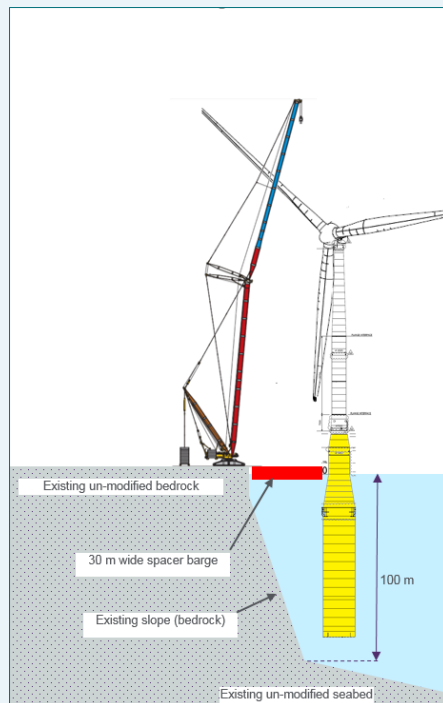


# Technology development at Hywind Tampen

Larger  
turbines



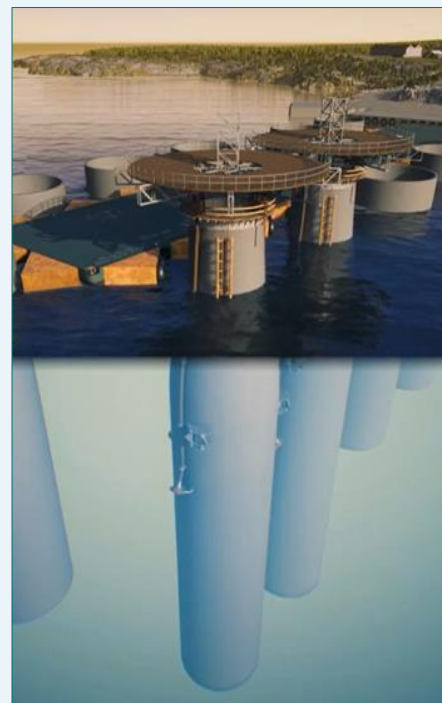
Installation  
method



Simplified  
mooring



Concrete  
substructure

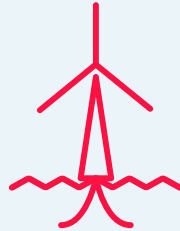
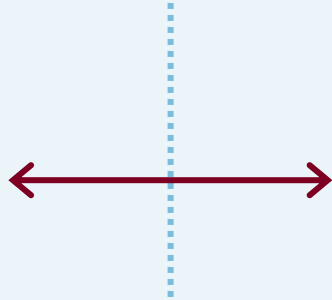
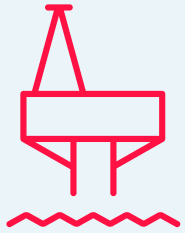


Gas and wind power  
generation system  
integration

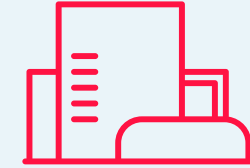


# Hywind Tampen Operations

Platforms



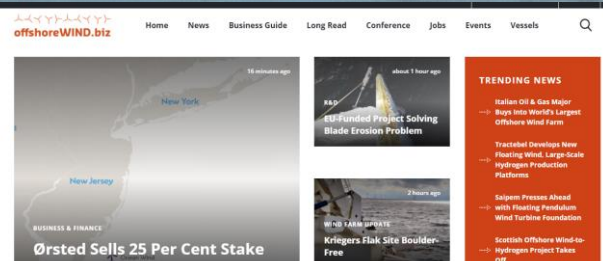
Wind farm



- Equinor is the operator on behalf of the licenses
- Wind turbines are integrated into the existing power management systems
- Siemens Gamesa Renewables has a five-year service agreement
- Service Operation Vessel (SOV) used for corrective and planned (annual) service



# The future is exciting



## BP takes \$1.1bn stake in offshore wind farms as it agrees Equinor deal

Strategic partnership will seek to develop more wind farms off the coast of the US



important early step' in the delivery of BP's new

re wind industry with the offshore wind projects being minor.

more windfarms off the coast to help corner the fast-

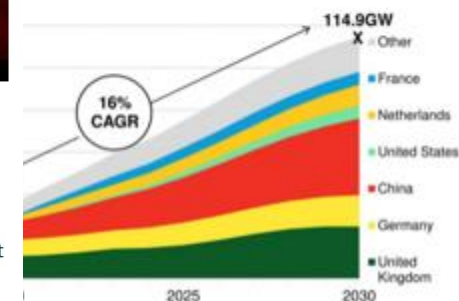
## Market Set to Grow Sixfold by 2030

appeared on the BNEF mobile app and the app.

J.K. and lead installations by 2022

forecast by 85% on new state targets

and cumulative installation forecast



RENEWABLES/ENERGY TRANSITION

## Eni to buy 20% of Dogger Bank, world's largest windfarm, for £405million

UK offshore wind market with a deal to buy 20% of the huge Dogger Bank £405million.



growing market for offshore wind.



Thank you!

