



equinor



# Hywind Tampen

An industrial part of the solution





## 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

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
- 200.000 tons/year CO<sub>2</sub> emission reduction

- Snorre
- Hywind Tampen
- Gullfaks

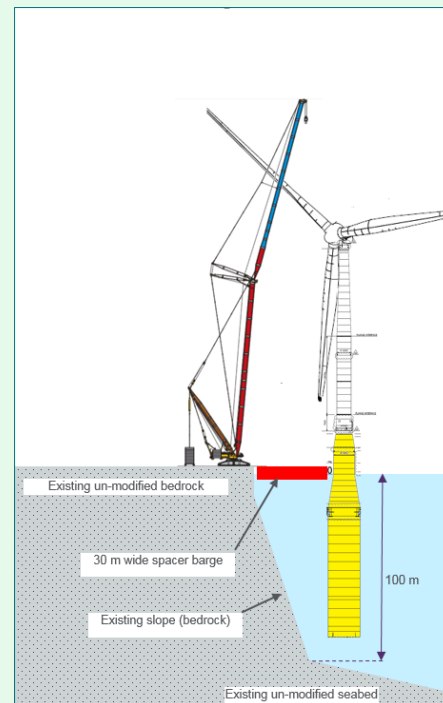


# Technology development at Hywind Tampen

Larger turbines



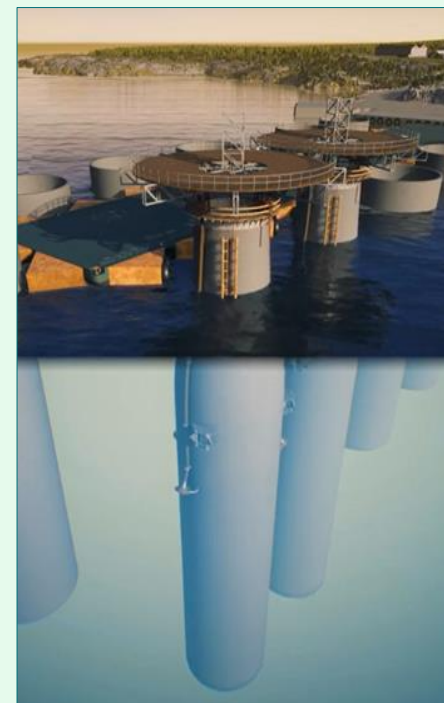
Installation method



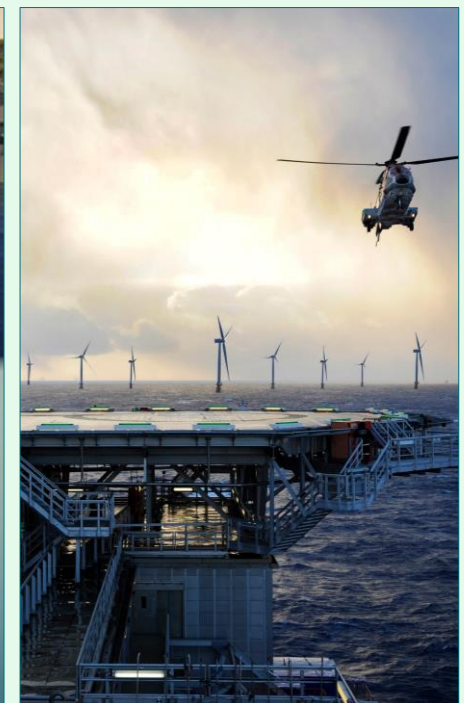
Simplified mooring



Concrete substructure



Gas and wind power generation system integration





# Hywind Tampen Execution

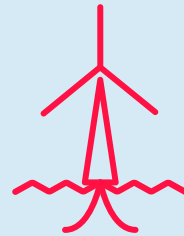
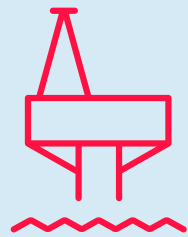
## Main contractors

|                                     |                                 |
|-------------------------------------|---------------------------------|
| 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                  |

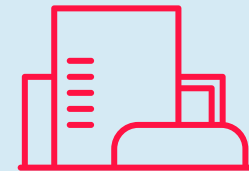


# Hywind Tampen Operations

Platforms



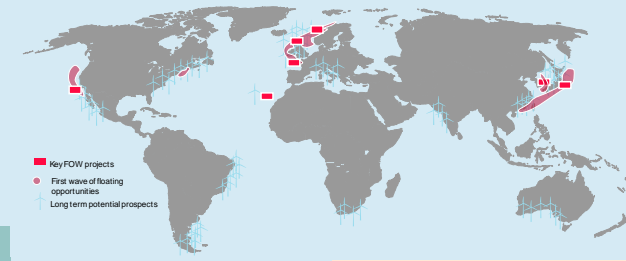
Wind farm



- Equinor is the operator on behalf of the licenses
- The Wind Farm will be operated and maintained by using synergies with oil and gas operations in the area
- Wind turbines are integrated into the existing power management systems

- Siemens Gamesa Renewables has a five year service agreement
- Ring solution design allows for flexibility
- SOV used for corrective and planned (annual) service

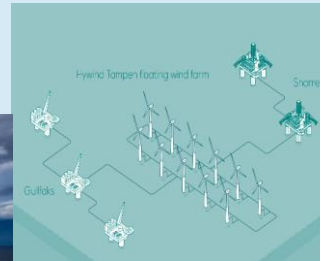
# Floating to become fully competitive – Equinor to remain a world leader



Fully commercial technology  
40-60 EUR/MWh

Utility scale projects  
500-1000 MW

Next floating project  
200-400 MW



2022 - Hywind Tampen  
88 MW



2017 - Hywind Scotland  
30 MW



2009 - Hywind demo  
2.3 MW



2001 – Idea and technology development

Technology development

Cost reduction

Industrialisation

Key markets:  
South Korea, Japan, US, Scotland, France, Spain (Canary Islands), Greece, Ireland, Norway

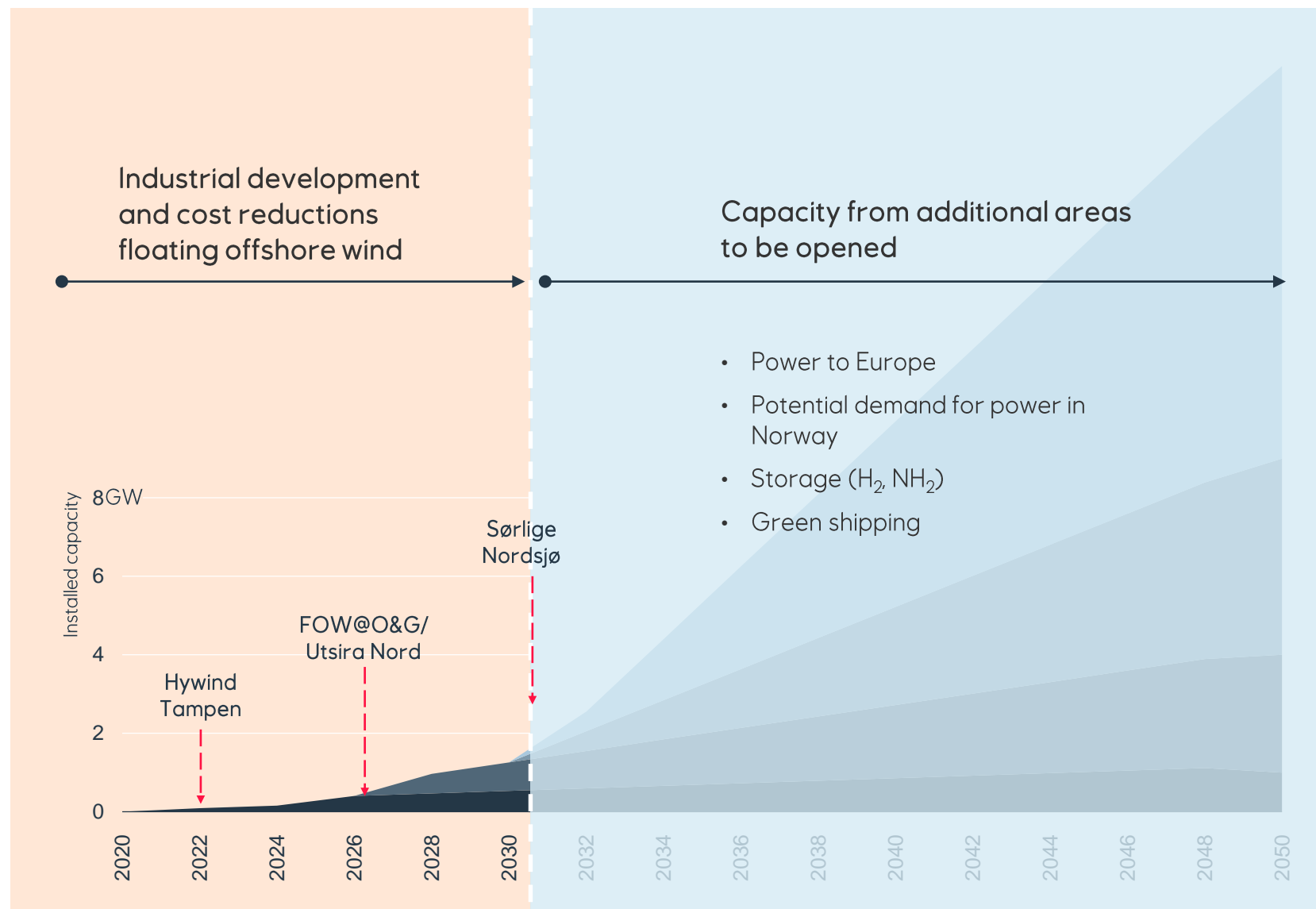
# A vision for offshore wind in Norway

Industrial development and floating offshore wind short/mid term

Power export to Europe on a longer term

Power to x/Hydrogen might be significant

- Profitable power export to Europe
- Power to X
- Power to land Norway
- O&G / Ocean power



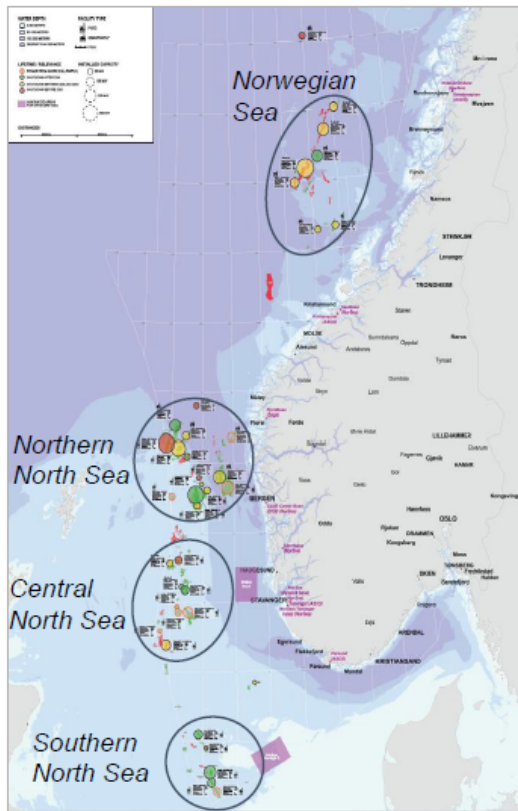
Sources: BVG Associates, Thema Consulting, project team assessments



# Offshore wind to Oil&Gas

## Report from Rystad Energy 10 March 2020

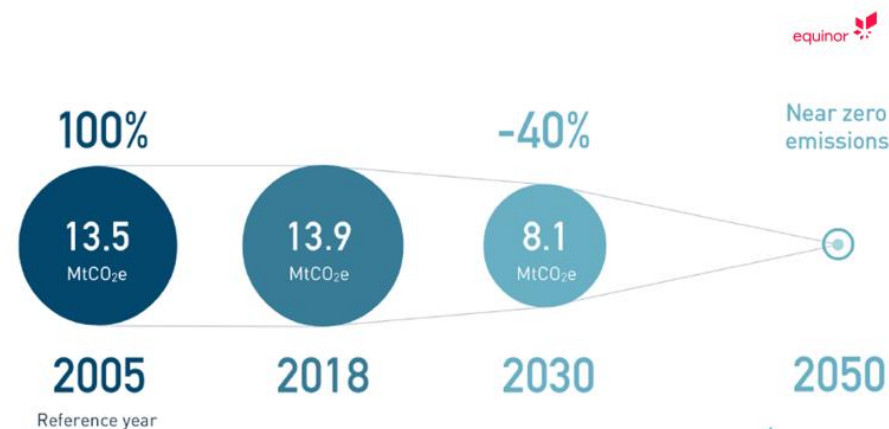
Offshore platforms are attractive off-takers for first large scale floating wind farm(s) in Norway



- Offshore oil and gas producers more attractive off-takers of electricity from first large scale floating wind farm(s), than power to grid
- Northern North Sea most suitable for combining offshore facilities with large scale floating wind (~500MW). Low cost capital combined with investment friendly fiscal regime can turn the case commercial
- Further costs reductions could trigger 1-3 additional large scale floating wind farms (~500 MW) towards oil and gas facilities within 2030, as part of the ambition to realize floating wind in Norway
- Realize floating wind in Norway sooner rather than later:
  - Likely industrialized within 2030
  - Expand toolbox to meet climate targets
  - Oil & gas fields with limited remaining life

# Havvind til O&G – et mulig kostnadseffektivt bidrag til klimaveikartet

- Equinor og oljebransjen la i januar frem klimaveikartet som vil kunne gi 40% kutt i klimagassutslipp fra installasjonene innen 2030
- For mange felt vil den naturlige løsningen være elektrifisering gjennom kabel fra land, som i mange tilfeller er mest kostnadseffektivt og kan kutte all CO<sub>2</sub>
- Havvind kan være en attraktiv løsning i tilfeller hvor
  - flere felt/lisenser kan koples sammen i en områdeløsning for å gi tilstrekkelig **størrelse** til vindparken
  - det finnes **CO<sub>2</sub>-frie kilder** som kan levere strøm når det ikke blåser
  - vindkraften er **konkurransedyktig** versus kraft fra land, f.eks ved at det kan oppnås synergieffekter eller kostnadsbesparelser



FURTHER DEVELOP NORWAY'S STRONG POSITION IN OFFSHORE WIND





# More offshore wind in Norway - what would it take?



Collaboration between authorities, developers, suppliers, other industries , NGOs, Universities/R&D

Scale

Competitive supplier industry

Well designed framework conditions