

# Hywind Tampen

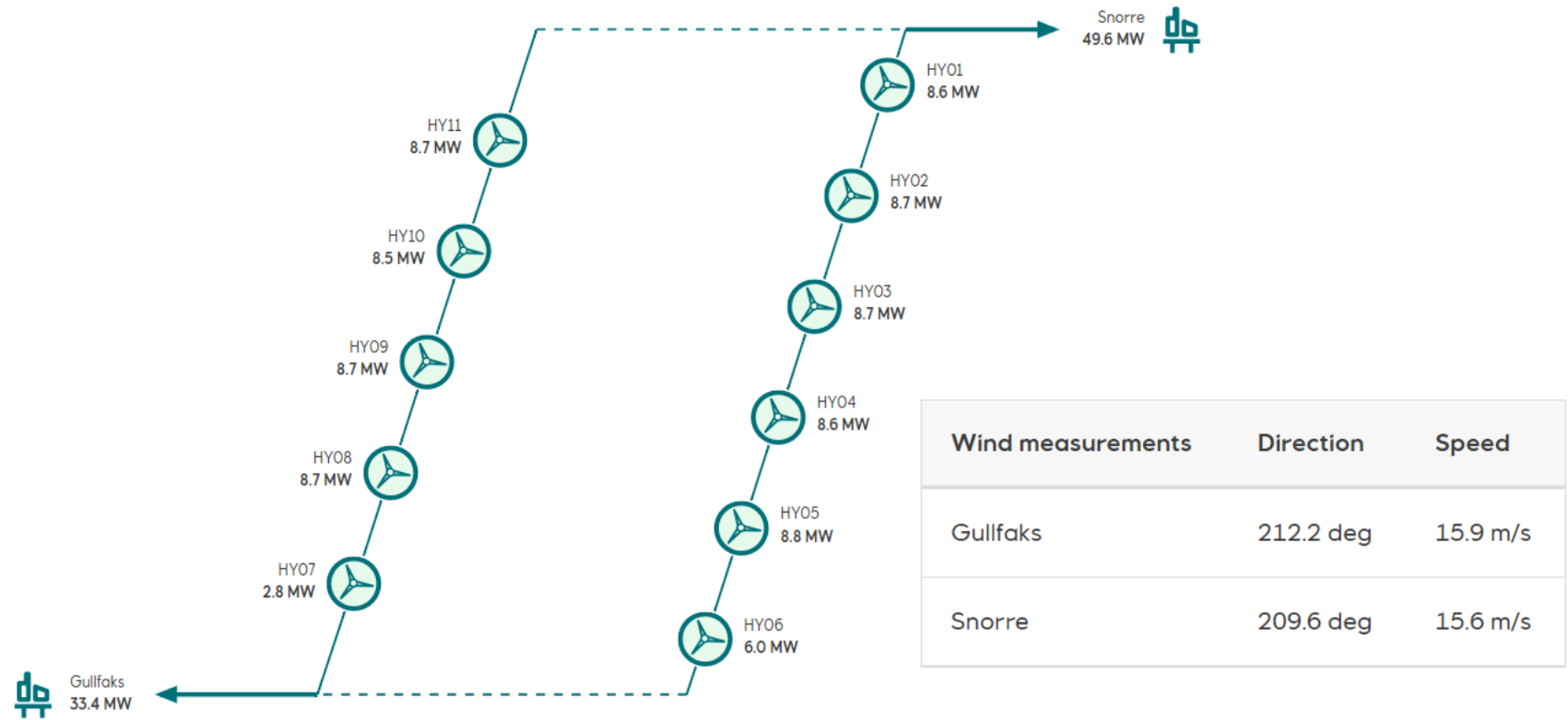
Experiences from installation of Hywind Tampen

Arthur Skartveit – Marine Operations manager



# It works!!!!

- When you're pushing borders, you must expect challenges. Floating wind turbines are not a standard product
- From 6MW to 8,6MW to 15MW+ and from 5 to 11 to 50+ turbines
  - Next project will also be a technology development project
- Onshore/Inshore logistics, construction, assembly, testing and commissioning can be improved



# Hywind Tampen ~60% Norwegian content

## Aker Solutions



Betongkrog & forankringssystem



Plassledelse sammenstilling



Forankringssystem installasjon



Uttauing & forankring

## Seaway7/ Ocean Installer



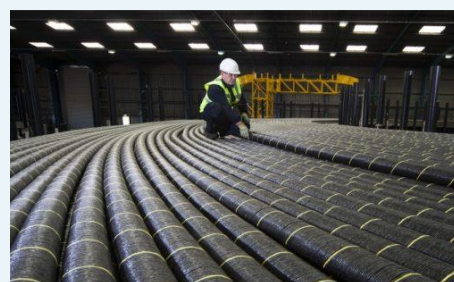
Kraftkabel installasjon

## SiemensGamesa



Turbin & tårn

## JDR



Kabel fabrikasjon

## Wood Group



Plattform modifikasjoner

## Wergeland base



Sammenstillings anlegg

## Mammoet



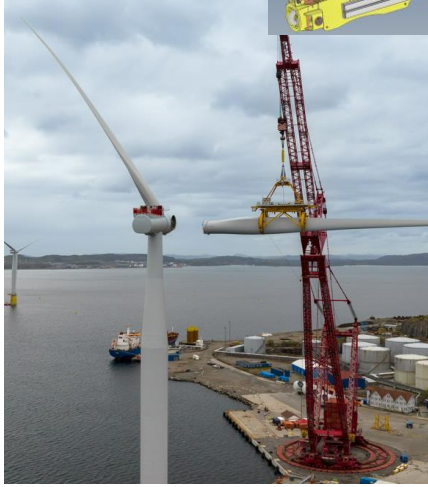
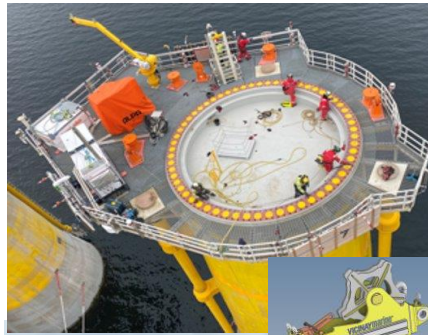
Sammenstillings kran



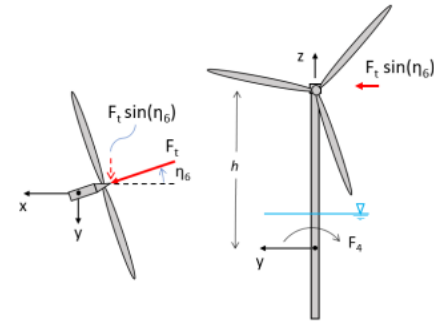
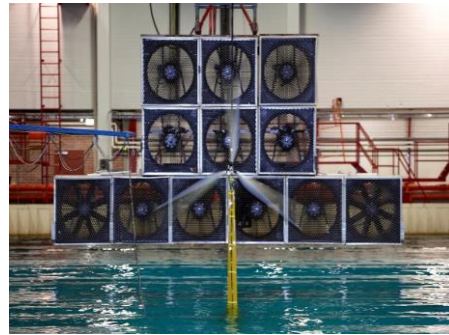
# Technology development at Hywind Tampen



Larger turbines



Installation method



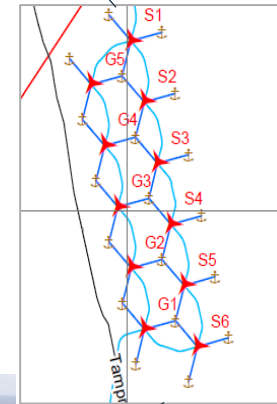
Simplified mooring



Concrete substructure



Gas and wind power generation system integration



# Floating offshore wind is a logistical puzzle

- Assembly crane delivered in 240 containers
- 4 additional cranes need to handle shipments and support assembly site
- 8 Shipments of tower sections, blades & turbines
- 22 towing operations of substructures inshore
- 11 towing operations of FWTs to field
- 19 suction anchors and 33 mooring chains
- 13 cables with 26 pull-in and terminations
- 1 – 3 SOVs in the field from May 22 to August 23





# Assembly and offshore installation scope a success



## Assembly marine operations

- Installation of tower sections
- Installation of turbines and blades
- Installation and removal of temporary equipment



## Inshore marine operations

- Cranes in over 240 containers to be erected
- Lift assisted out of dock operations for substructure bottom sections
- Site moves of tower sections, turbines and blades
- Substructure fabrication site lifts



## Sea transports

- Load-on and load-off of equipment, tower sections and turbines on vessels
- Suction anchors load-in and load-off



## Offshore installation

- Installation of suction anchors
- Mooring system installation and hook-up
- Cable installation and pull-in of power cables
- Lift removal of temporary equipment on turbines

# Safety will be improved by minimising offshore scope!

- Different risk picture from Oil and Gas (normally not manned / no hydrocarbons)

Major accident potential vs. individual human exposure?



- Immature safety culture at temporary construction sites and with offshore wind contractors may be a challenge
- Offshore wind regulations will be important
  - Hygiene at turbines (food, water & toilets)
  - Nighttime work essential for safer operations
    1. Complete all work in summer season when weather conditions are optimal
    2. 24/7: Installation and support vessel can be utilized 100%
- High voltage regulations harmonised across Europe





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