

# Hywind Tampen experiences

Herbjørn Haslum, Equinor

FER Forum, Trondheim, 5. June 2024

# AGENDA

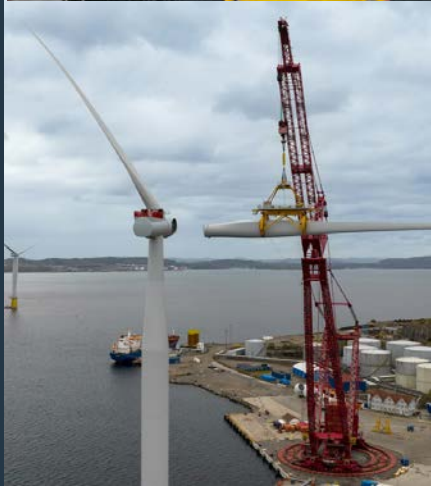
- Technology development in Hywind Tampen
- Hywind Tampen execution, learnings
- Integration of renewable energy with oil & gas platforms



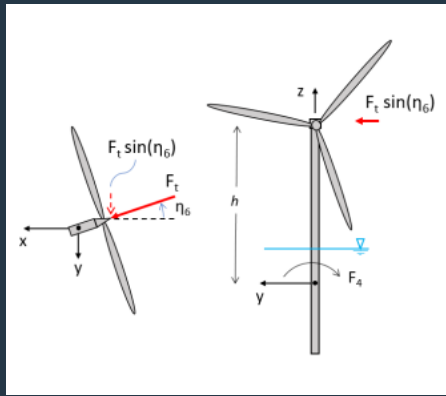
# Technology development – Hywind Tampen



Larger turbines



Assembly and installation/mooring



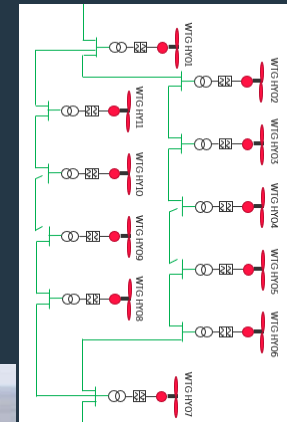
Dynamic, structural and anchoring system design



Concrete spar



Integrated gas and wind power generation system



# Hywind project execution

# Hywind Tampen windfarm





Hywind Tampen  
Dry-dock Stord  
Feb 2021





## Hywind Tampen

Fabrication bottom slabs in (dry-dock)  
February 2021





## Hywind Tampen

Tow from Stord (dry-dock) to  
Dommersnes (deep water site)  
April 2021





## Hywind Tampen

Deep water site – Dommersnes  
October 2021





## Hywind Tampen

Deep water site – Dommersnes

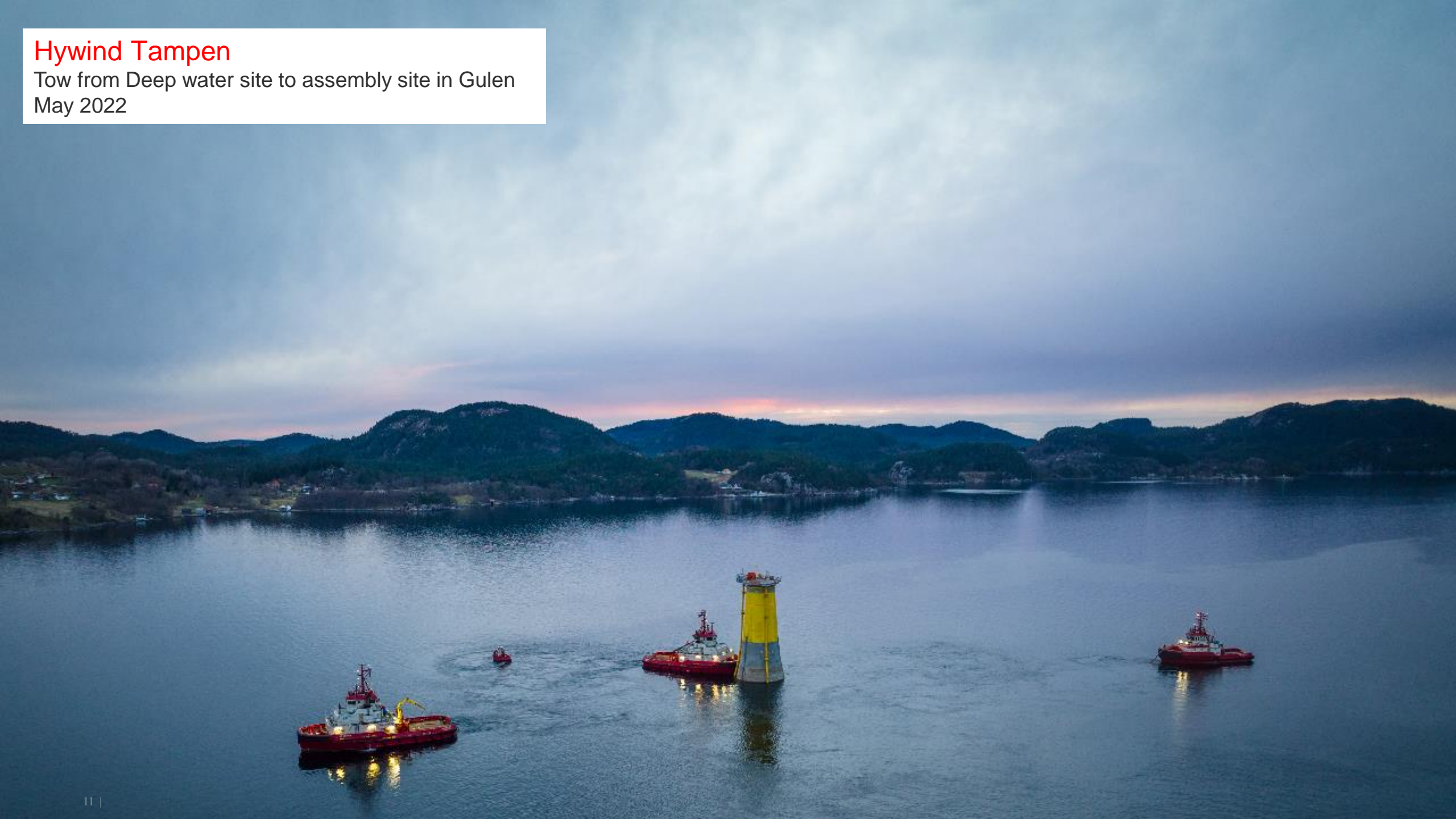
April 2022





## Hywind Tampen

Tow from Deep water site to assembly site in Gulen  
May 2022





Hywind Tampen  
Assembly site – Gulen  
May 2022





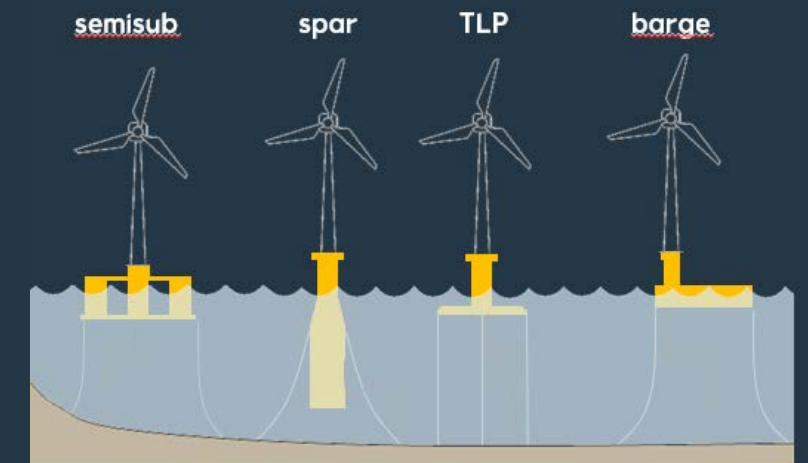
# Turbine integration (options)

From floating crane (Hywind Scotland)



# Turbine integration (options)

Safe and efficient turbine assembly @ quayside





## Hywind Tampen

1st Hywind installed @ Tampen field  
June 2022



## Hywind Tampen

Cable installation, commissioning





# Learnings from Hywind Tampen

Going from demo → commercial scale, requires more efficient logistics

Fabrication



+

Turbine integration



+

Commissioning



Floating wind factory, a one-stop shop

Electrification, power management

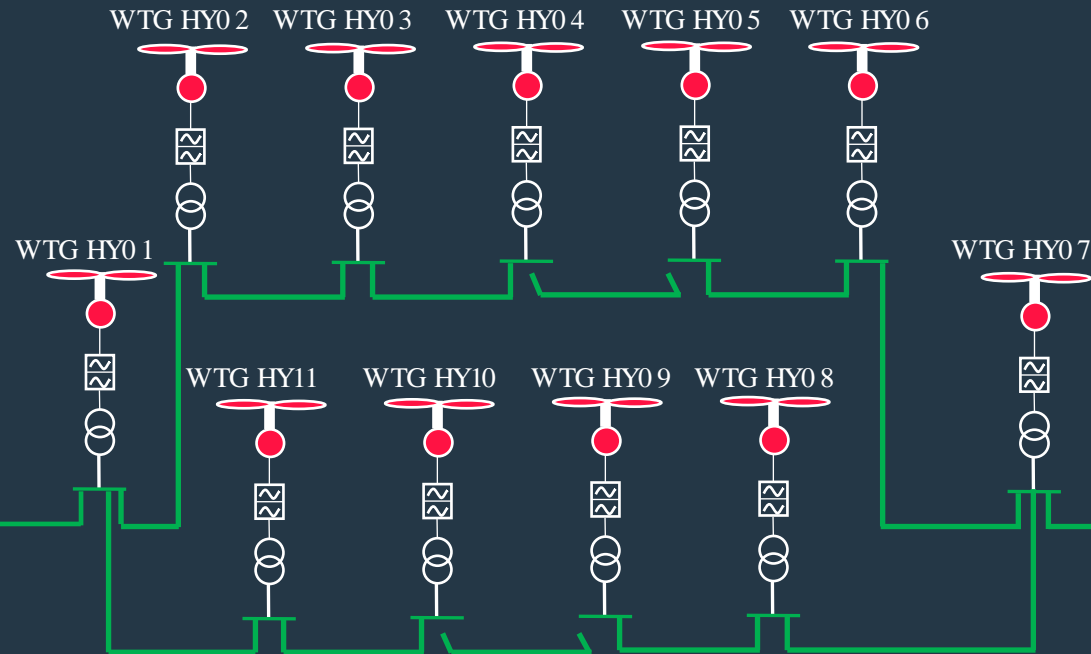


# Power management system -controlling windfarm (WTG) and gas turbine generators (GTG)

Snorre A

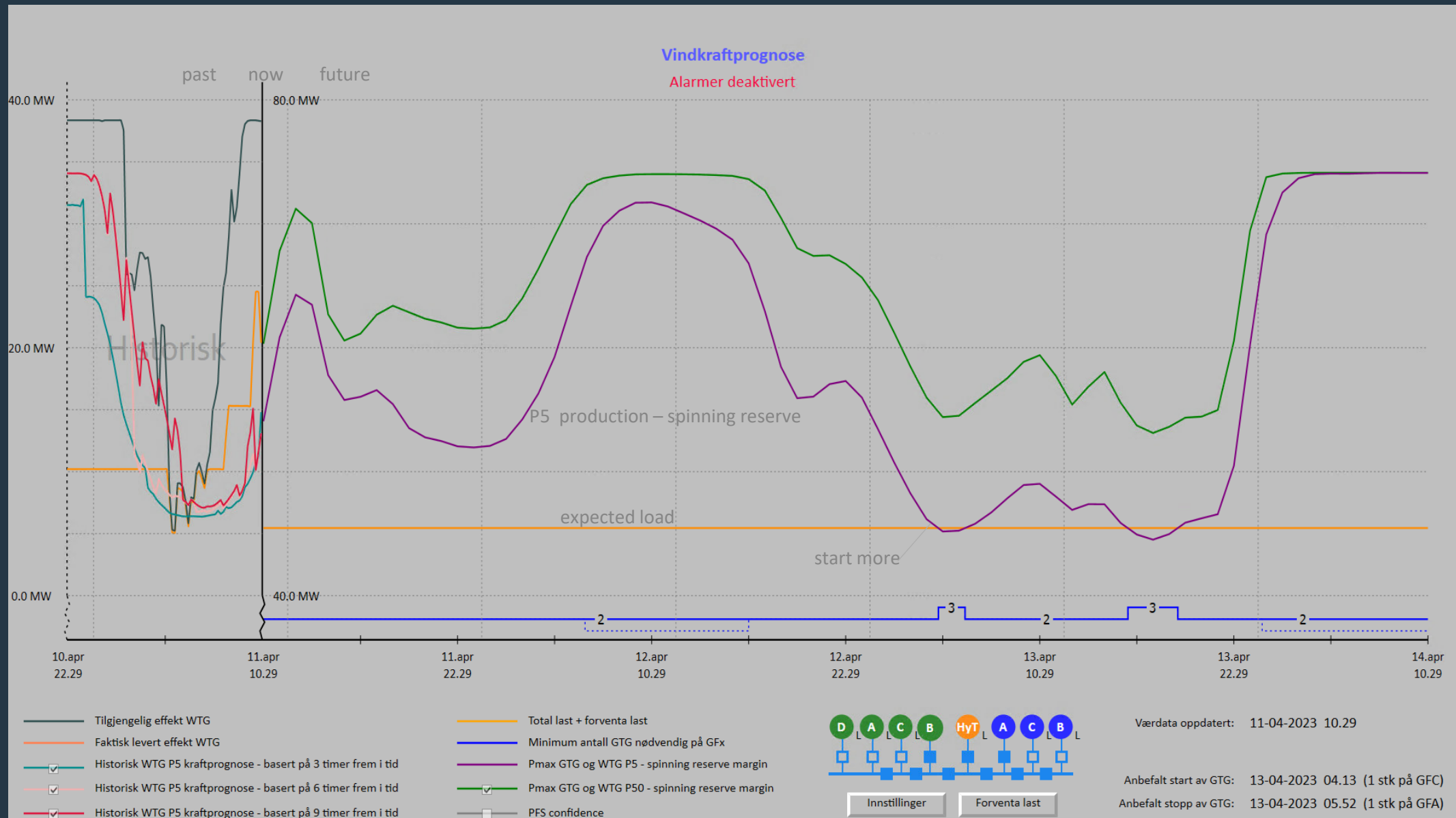


Gullfaks A



WTG – Wind Turbine Generator

# Start and stop of GTG based on expected consumption

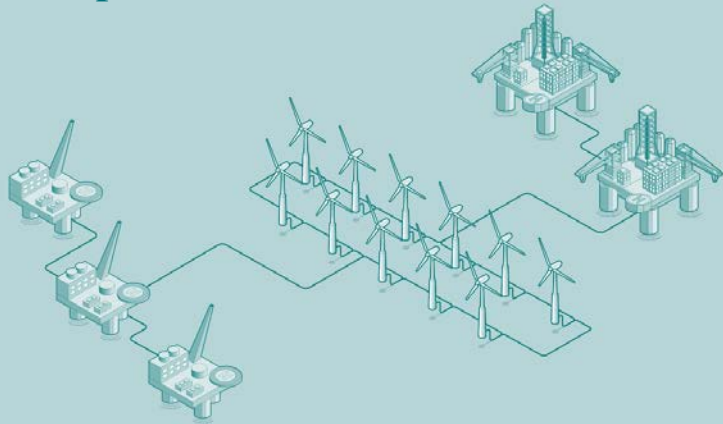




# Electrification of oil and gas, options

## wind turbines + gas turbines

### Tampen

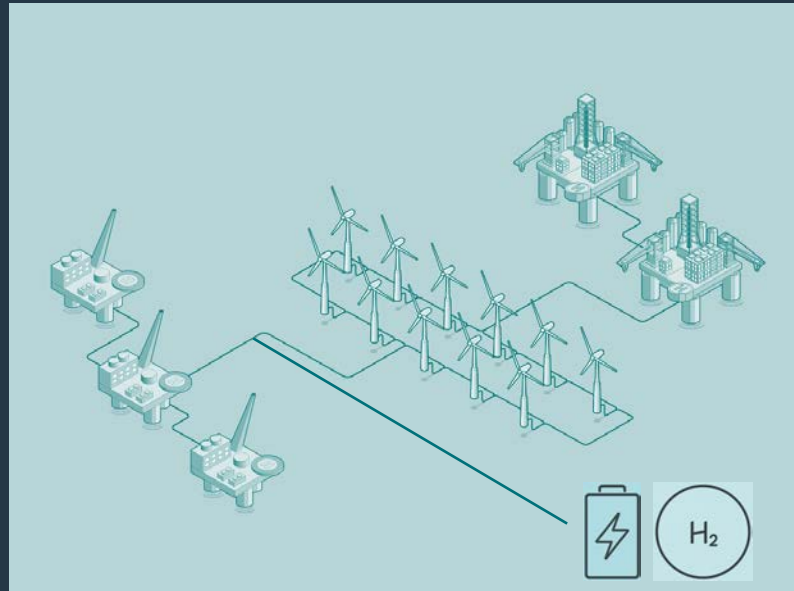


- Variable load & production
- Need spinning reserve

Fuel saving ~ 40 % \*

\* Ref. Northwind research, Tande 2022

## wind turbines + battery + gas turbines

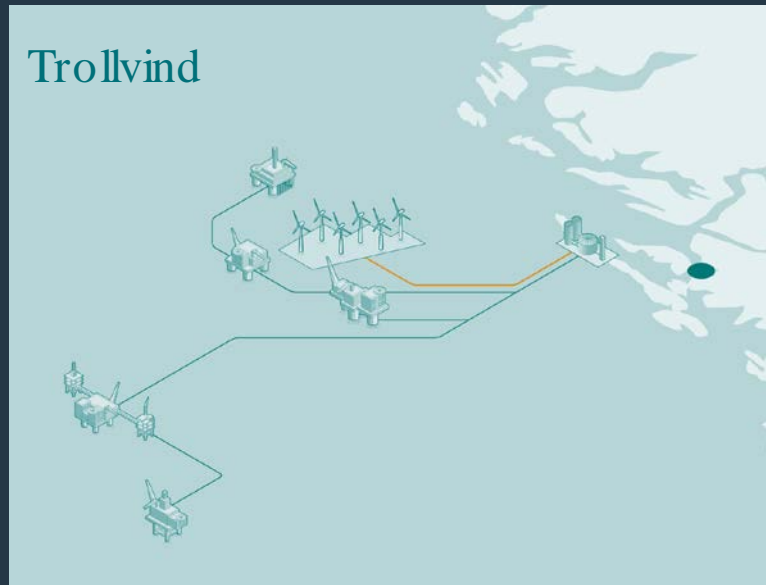


- Need spinning reserve
- 100 % electric requires HUGE storage

Fuel saving max 80 % \*

## wind turbines + grid connection

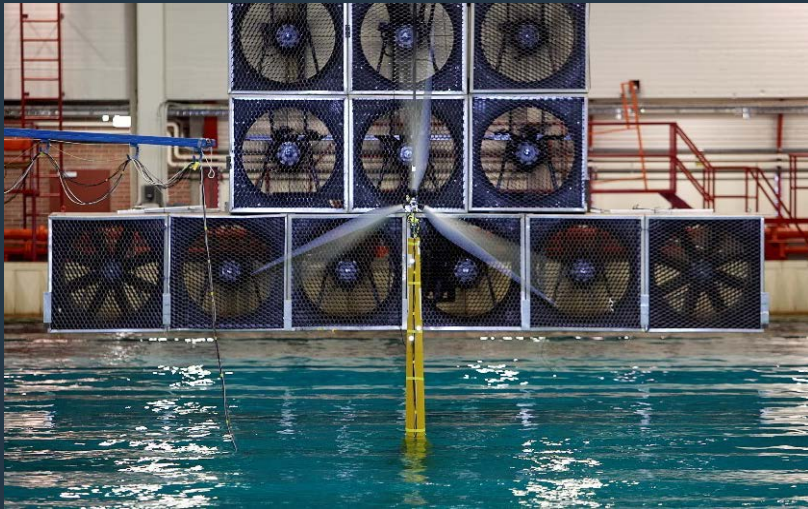
### Trollvind



- Typ power neutral over time
- Can export/import through grid
- Grid stabilizes turbines (inertia)

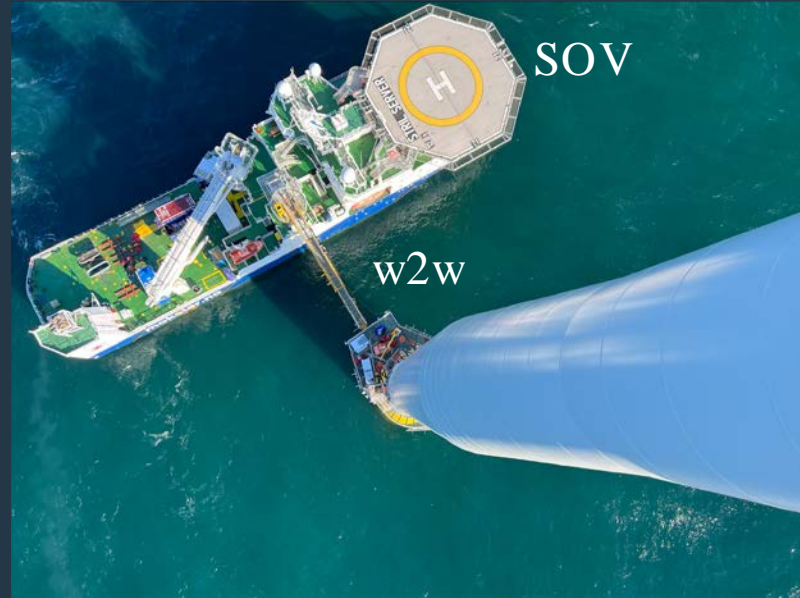
Fuel saving 100 %

# Learnings from the 'Hywind journey'



Analysis tools, Floater controller,

- Developed aero-hydro analysis tools & controller, now state of the art
- Validations (model tests & full scale), discovered new dynamic phenomena



Project execution

- Windfarms require factory logistics
- Minimize commissioning offshore
- Large number of contractors involved



Operations

- Electrification o&g, PMS
- Capabilities of SOV (DP, w2w)
- Helicopter access for routine visits
- Heavy maintenance of Hywind



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