New installation vessels for new markets: lifting higher, larger, heavier turbines

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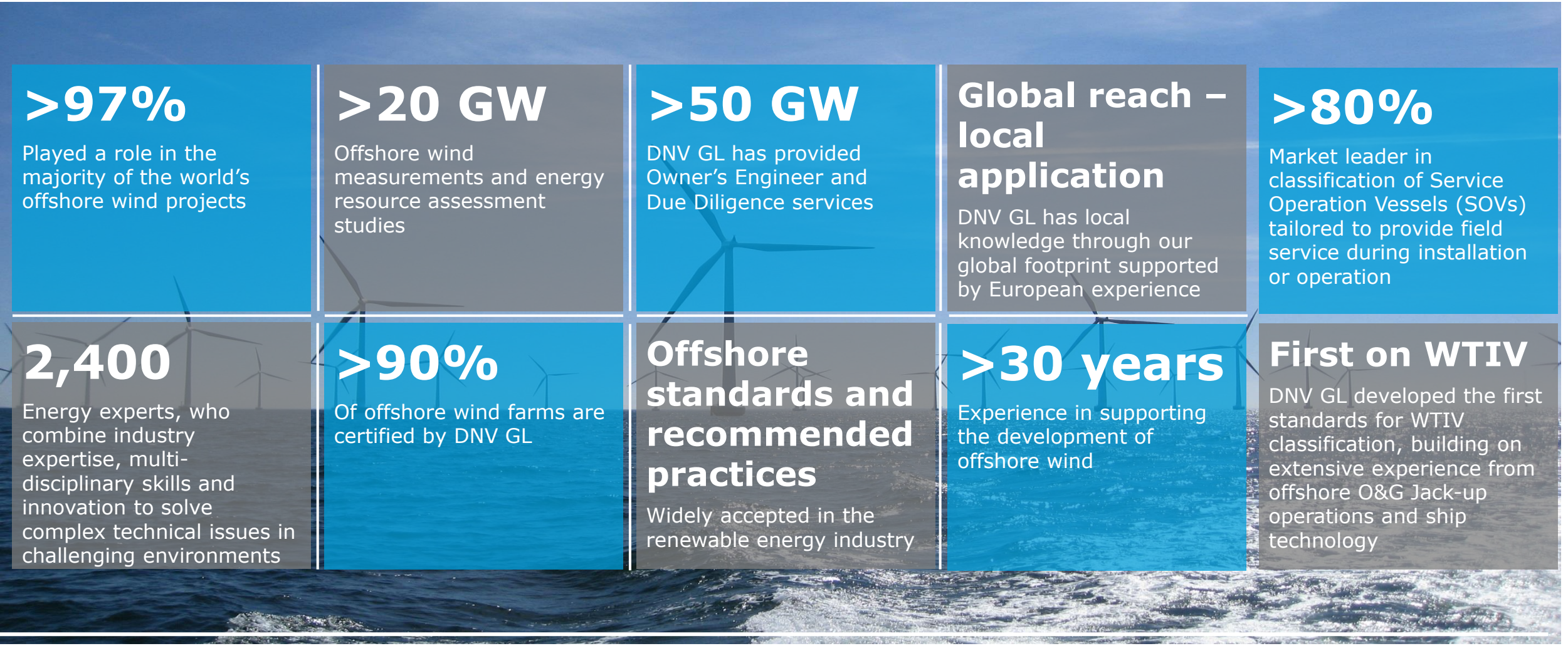
MARITIME

New Installation Vessels for new Markets

Riviera Offshore Webinar Week

Nick Prokopuk
04 November 2020

DNV GL has extensive global footprint in offshore wind



>97%

Played a role in the majority of the world's offshore wind projects

>20 GW

Offshore wind measurements and energy resource assessment studies

>50 GW

DNV GL has provided Owner's Engineer and Due Diligence services

Global reach – local application

DNV GL has local knowledge through our global footprint supported by European experience

>80%

Market leader in classification of Service Operation Vessels (SOVs) tailored to provide field service during installation or operation

2,400

Energy experts, who combine industry expertise, multi-disciplinary skills and innovation to solve complex technical issues in challenging environments

>90%

Of offshore wind farms are certified by DNV GL

Offshore standards and recommended practices

Widely accepted in the renewable energy industry

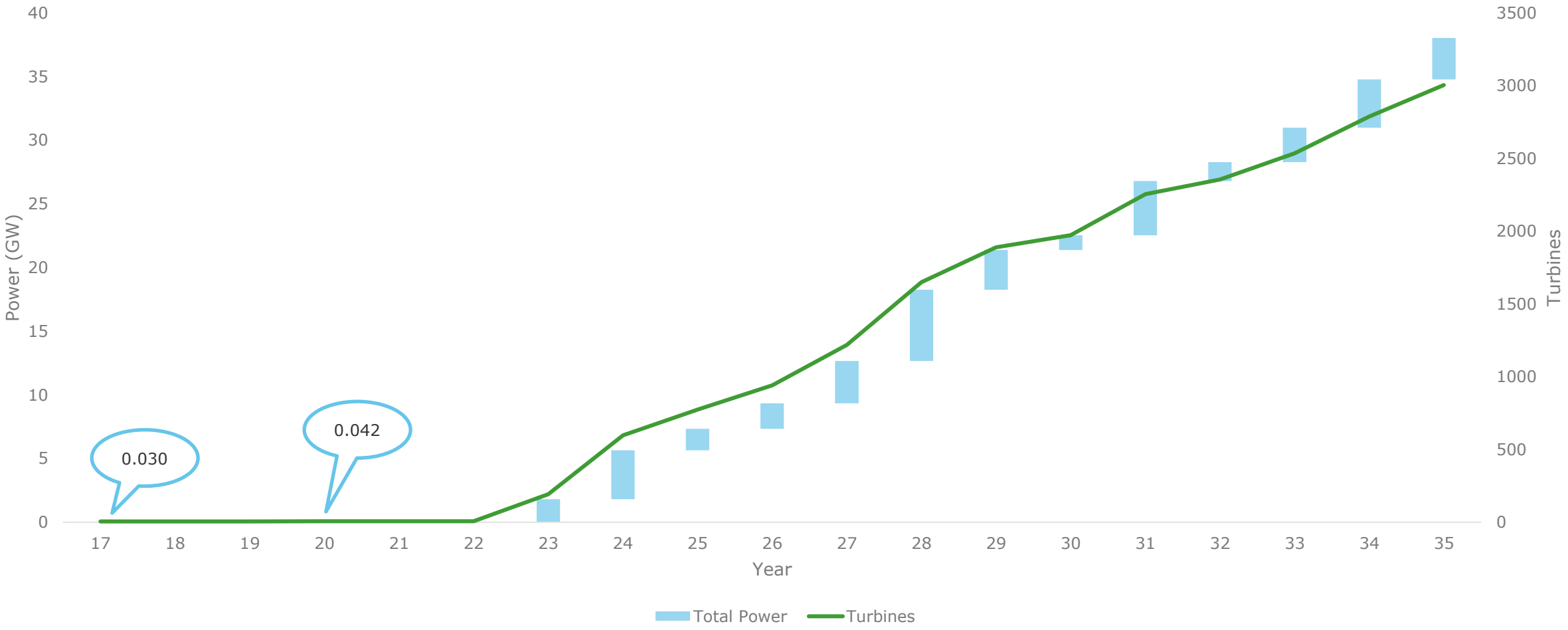
>30 years

Experience in supporting the development of offshore wind

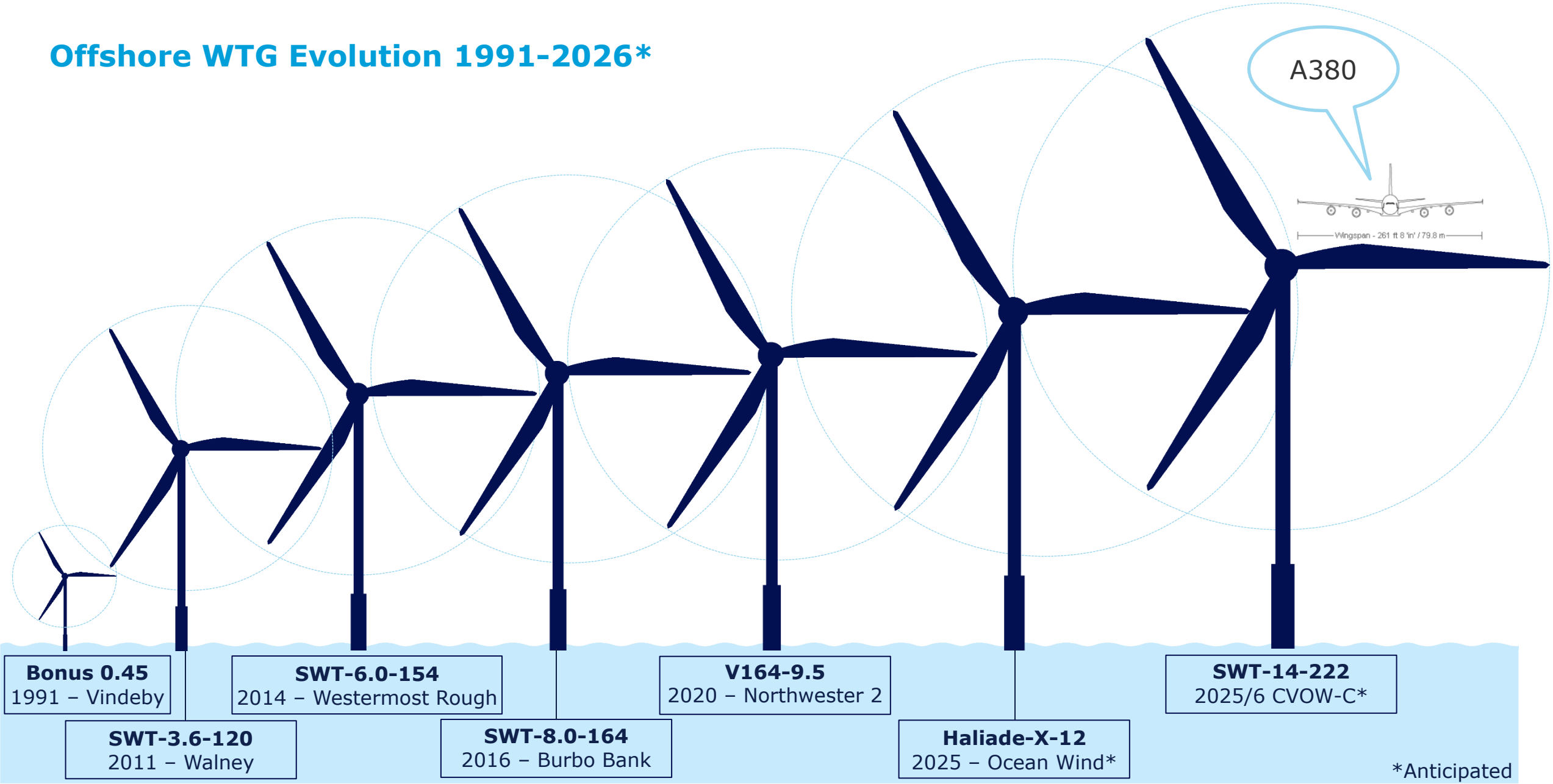
First on WTIV

DNV GL developed the first standards for WTIV classification, building on extensive experience from offshore O&G Jack-up operations and ship technology

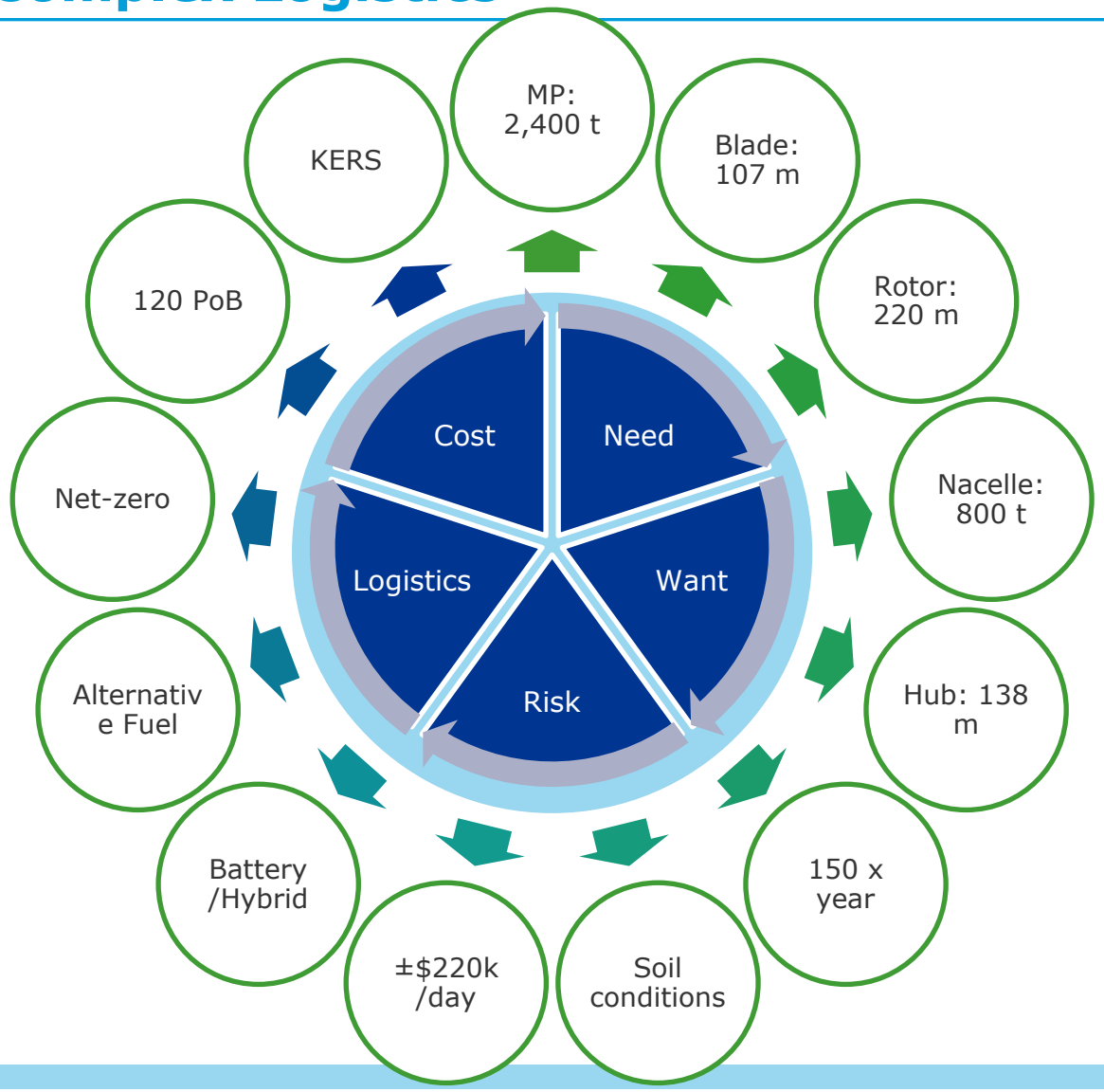
US Offshore Wind Pipeline



Offshore WTG Evolution 1991-2026*

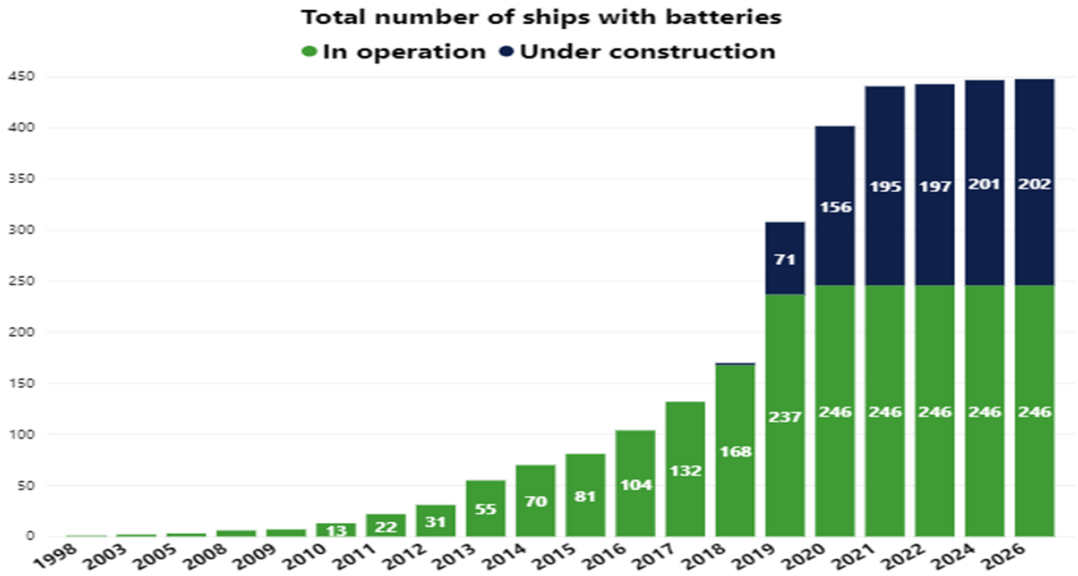


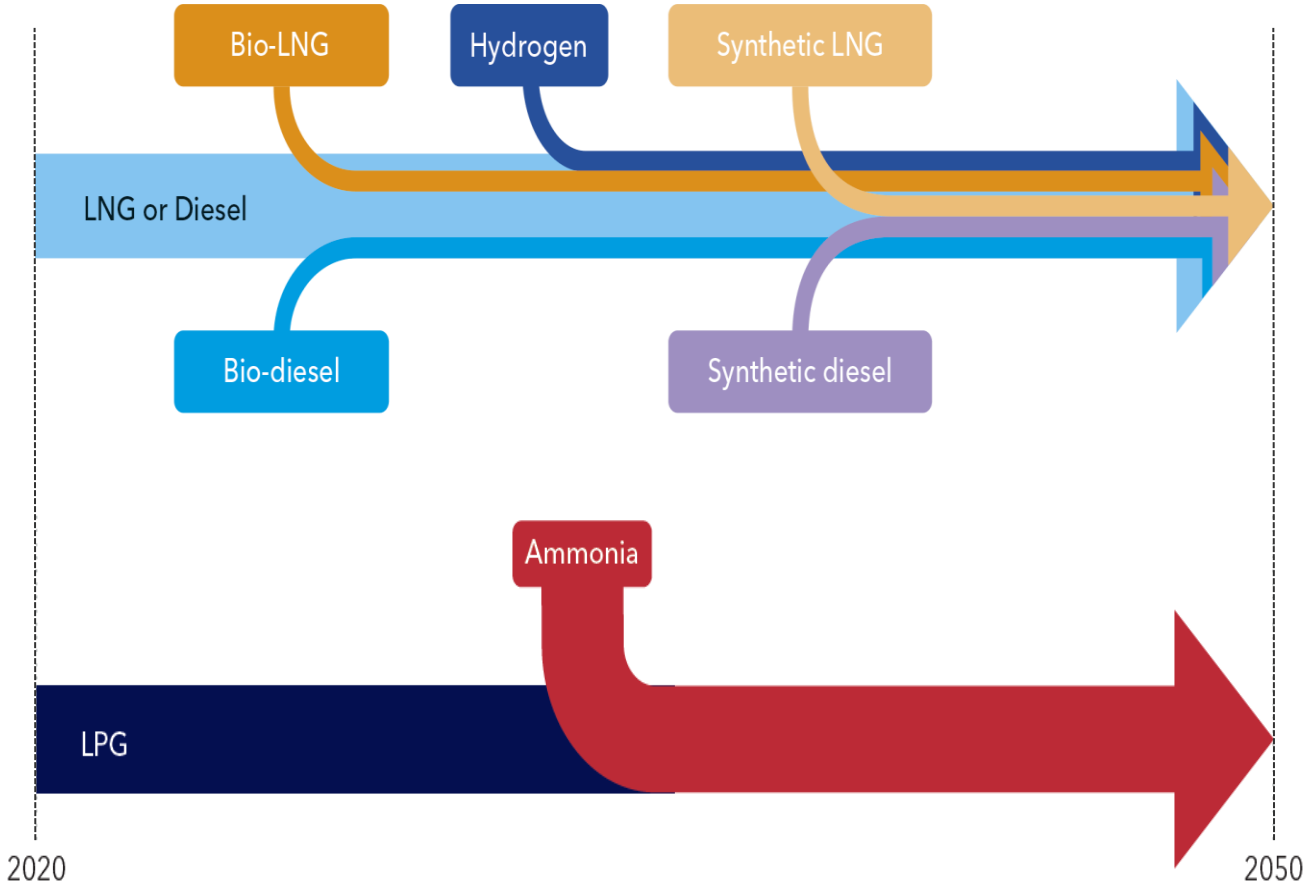
Complex Logistics



The world is going green: power & energy system onboard will change

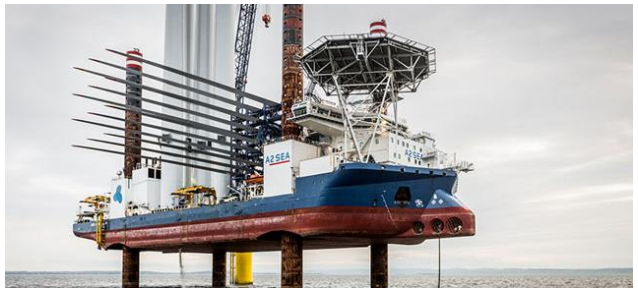
- Hybrid combinations will continue
- Alternative fuels will take centre stage
- Electrification accelerates
- Shore power in the future





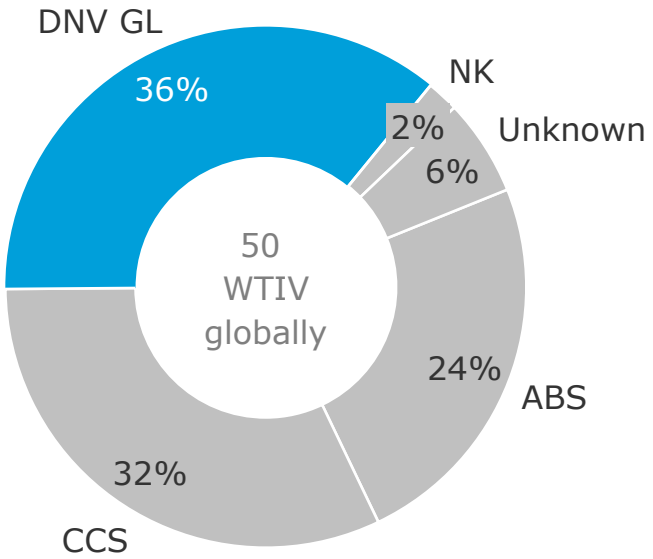
DNV GL Wind Turbine Installation Vessels

18 WTIV in DNV GL class



DNV GL's market share in WTIV

38% of all wind turbine installation vessels in service are classed by DNV GL (based on number of units)



- Typical class notation:
  Self-elevating Wind Turbine Installation Unit SPS Crane Unit OPP-F E0 DYNPOS-AUTR DPS2 NAUT-OSV(A) CLEAN DESIGN Battery Power

Source: DNV GL internal, Clarksons Research, internet (photos), 2019-12-01

Thank you

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Clarksons Platou Securities AS

Riviera Offshore Wind Webinar

New installation vessels for new markets: Lifter higher, larger and heavier

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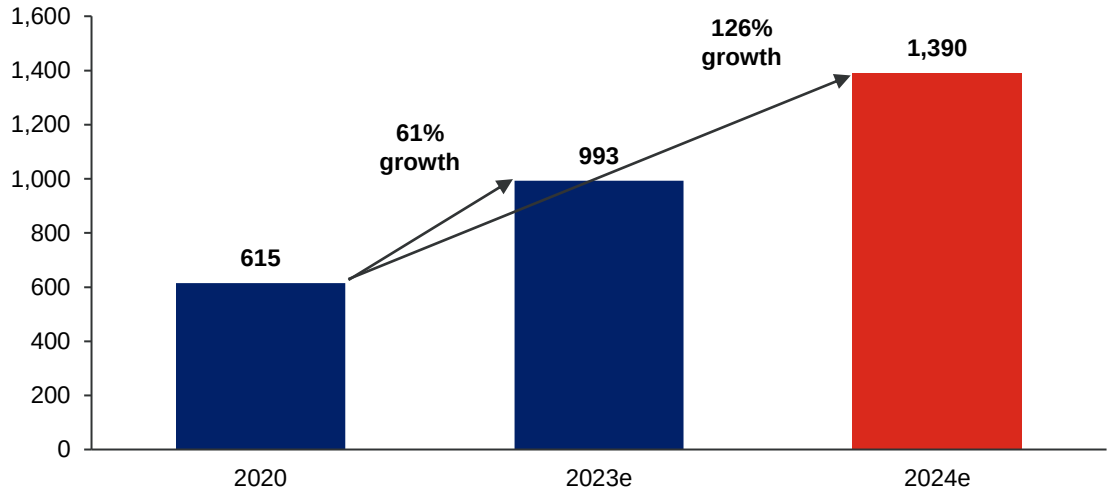
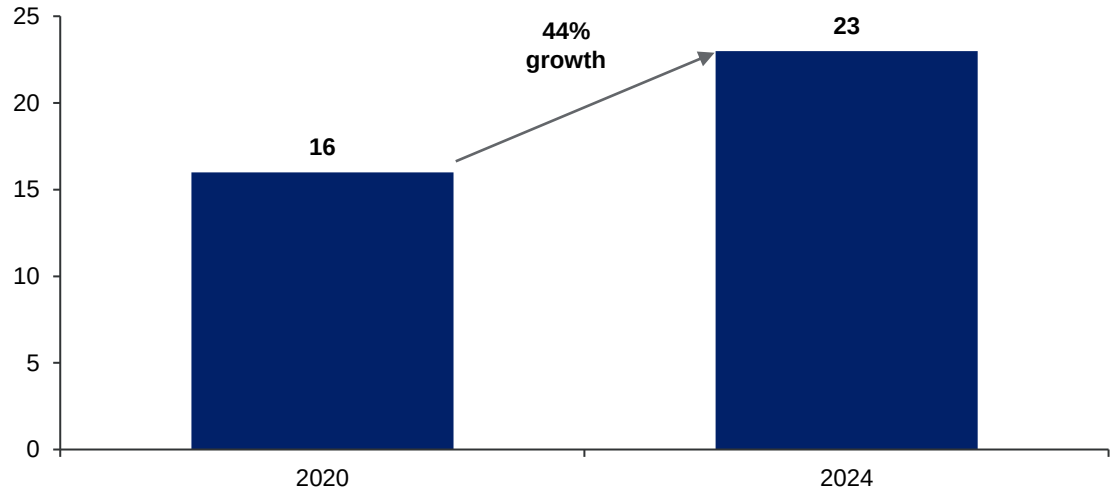
The WTIV market looks undersupplied going forward

WTIV demand is expected to outpace fleet growth by a wide margin

Offshore turbine installations by year



WTIV fleet size



Demand for WTIVs is expected to grow significantly in the coming years as a result of high investment levels by wind farm developers. In 2019 for example, FIDs rose 70% in value terms. Other factors could add to upward demand pressure like increasing geographic spread, meaning the vessels spend more time in transit. Demand for high-spec WTIVs will likely grow faster as new turbines start installation from 2022 onward and preference for these assets strengthens.

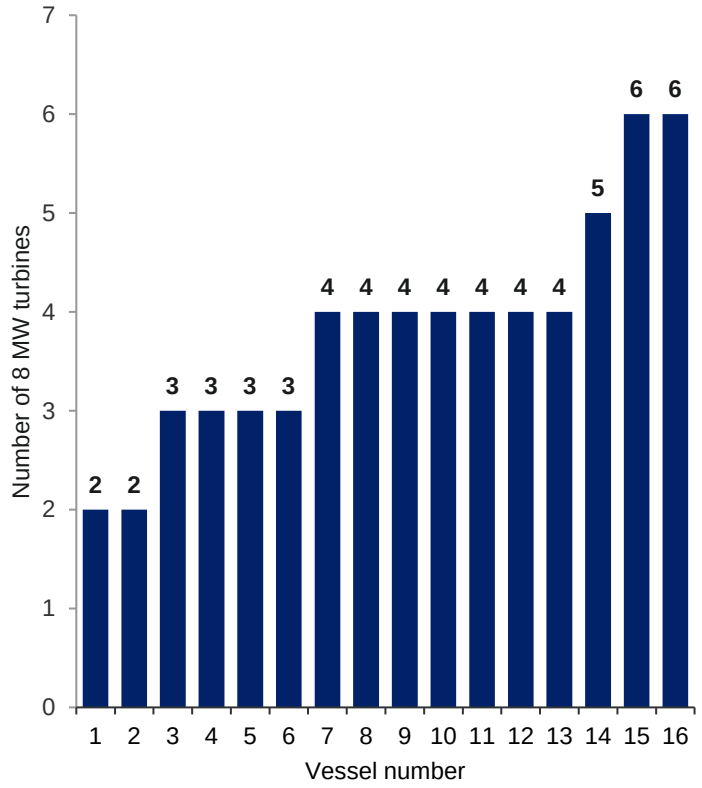
The fleet of WTIVs is expected to rise by about 44% by 2024 as newbuilds in Japan (2), the US (1) and Europe (4) hit the market. Significant uncertainty remains for some of these assets. Of the existing fleet, many units will require significant crane upgrades in order to remain a relevant part of the installation fleet. Otherwise, the smaller units may be pushed down to the typically low-margin maintenance market.

Source: Company filings, Clarksons Platou AS, Clarksons Platou Securities AS

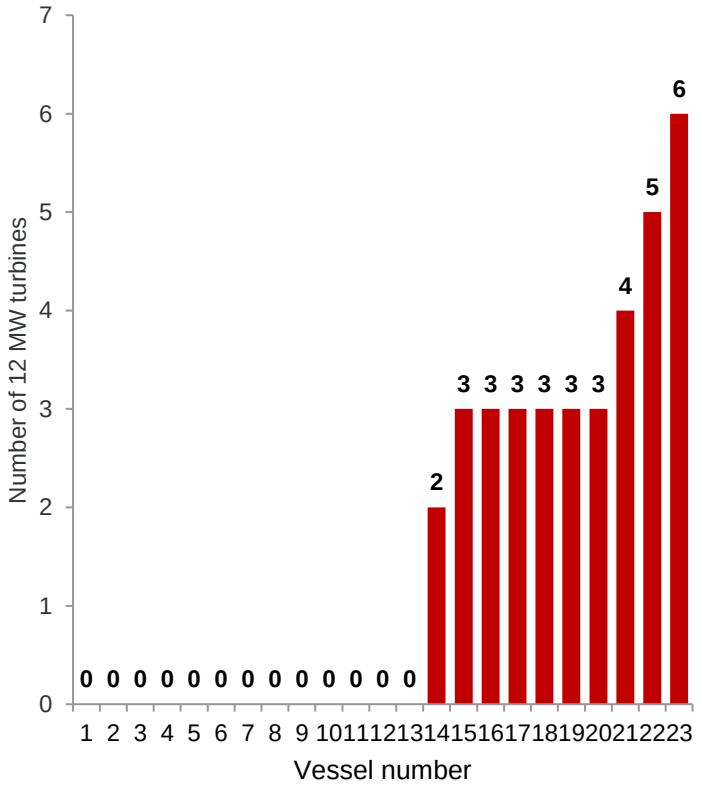
Installation efficiency to decline as larger turbines gain market share

Majority of current fleet are not able to install the new generation of turbines

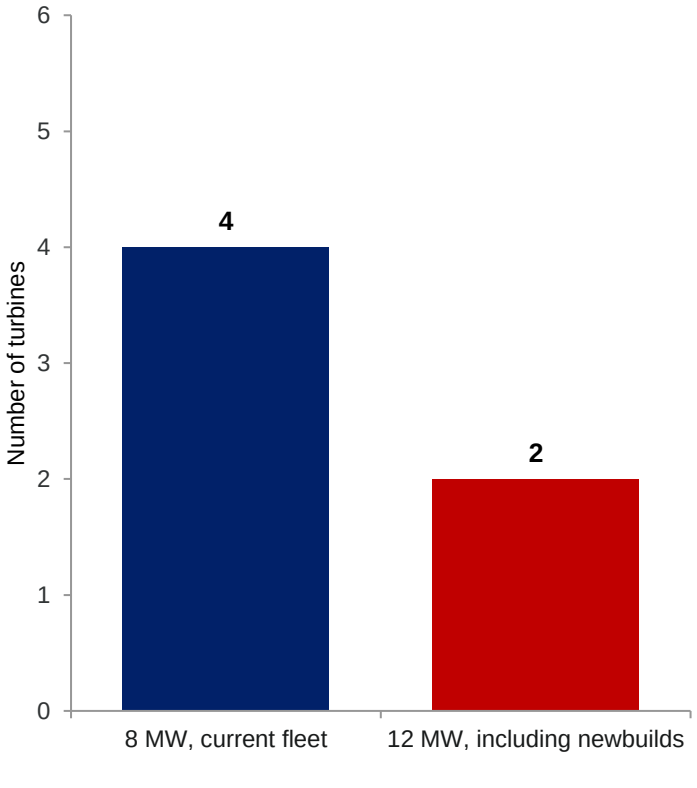
Number of 8 MW installed per trip



Number of 12 MW installed per trip*



Average transportation capacity per trip

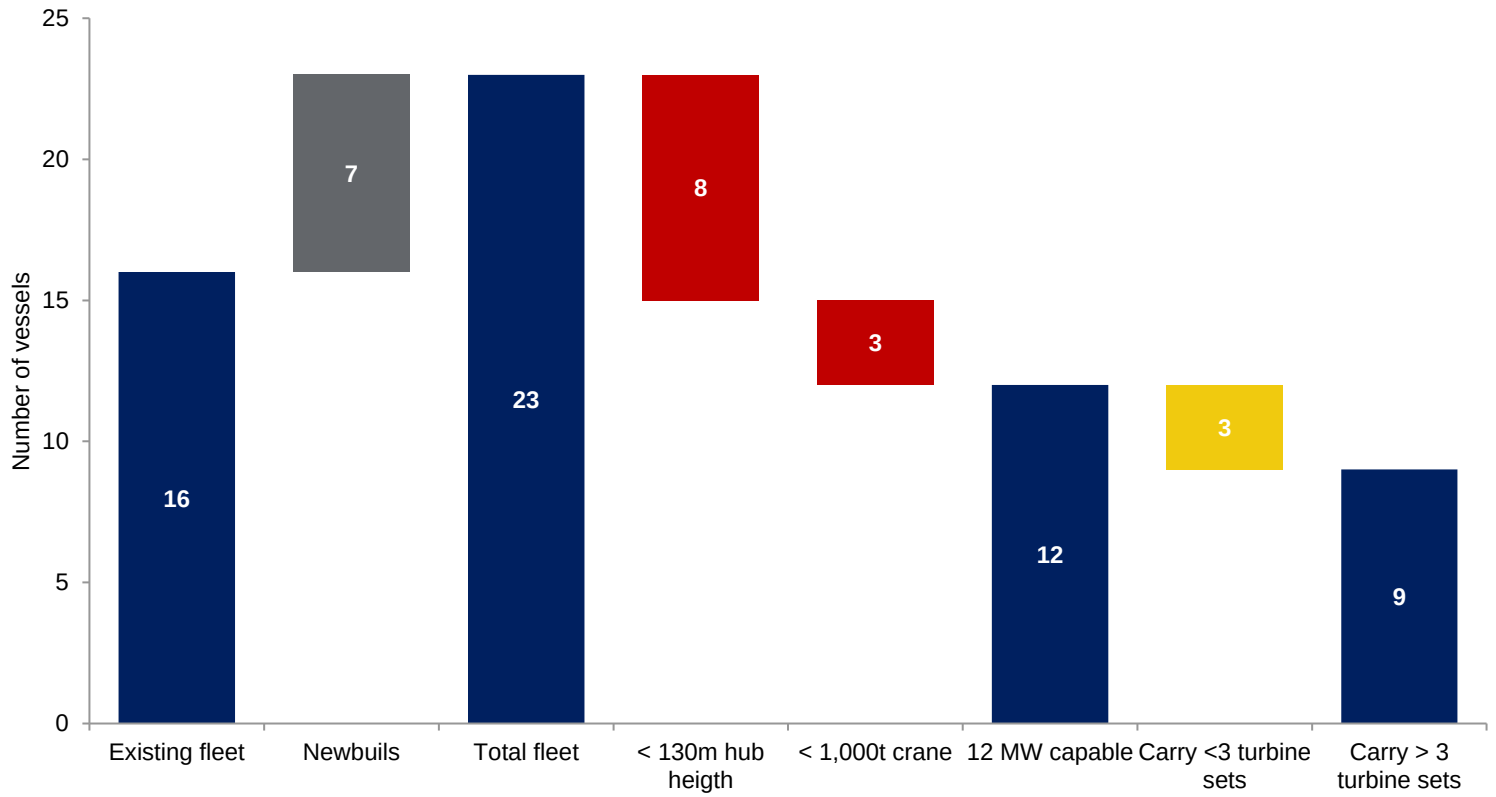


Source: Company filings, Clarksons Platou Securities AS. *Including all announced newbuild orders we find to be credible.

Newbuilds are needed to install the new turbines

Crane capability and deck load capacity constrains transportation and installation

Breakdown of fleet based on the ability to install and transport the 12 MW+ turbines



Background to WTIV fleet breakdown

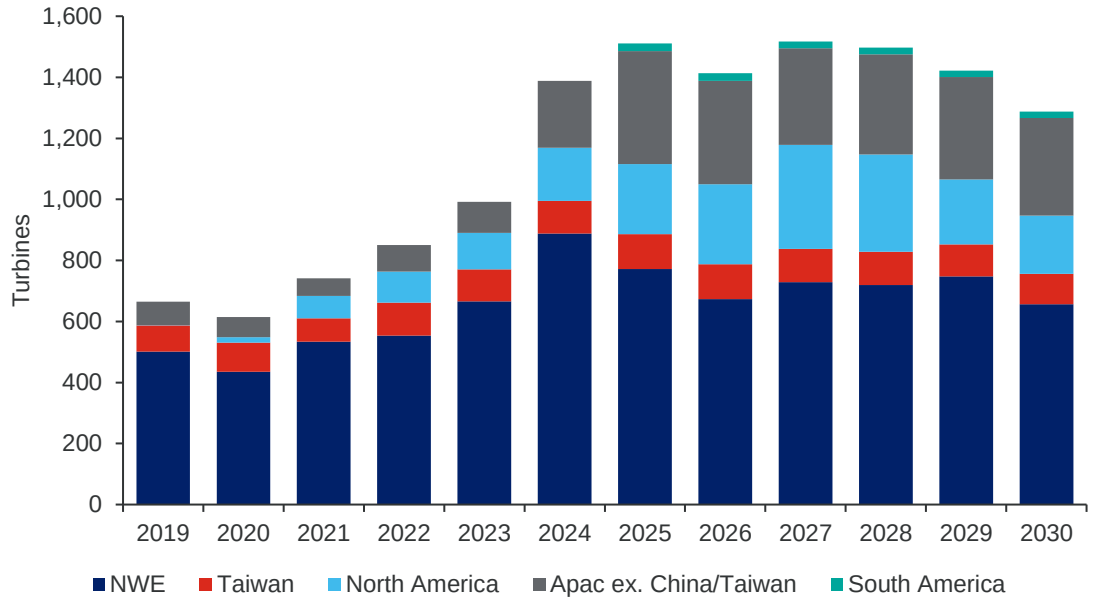
- Out of the 23 vessels, 11 are not able to install the new generation of turbines.
- Out of the 12 capable vessels, 3 have insufficient variable deck load capacity, leaving them able to only transport 1 or 2 turbines per trip, making them inefficient.
- This leaves 9 vessels able to transport 3 or more sets, of which 6 have not yet been delivered.
- Of the 7 newbuilds counted here, several remain uncertain with regards to the “realness” or timing of eventual delivery. Few details are concrete around the 2 units built by Japanese players. One or more of these orders may never materialize or come at a much later than expected date.

Source: Clarksons Platou Securities AS

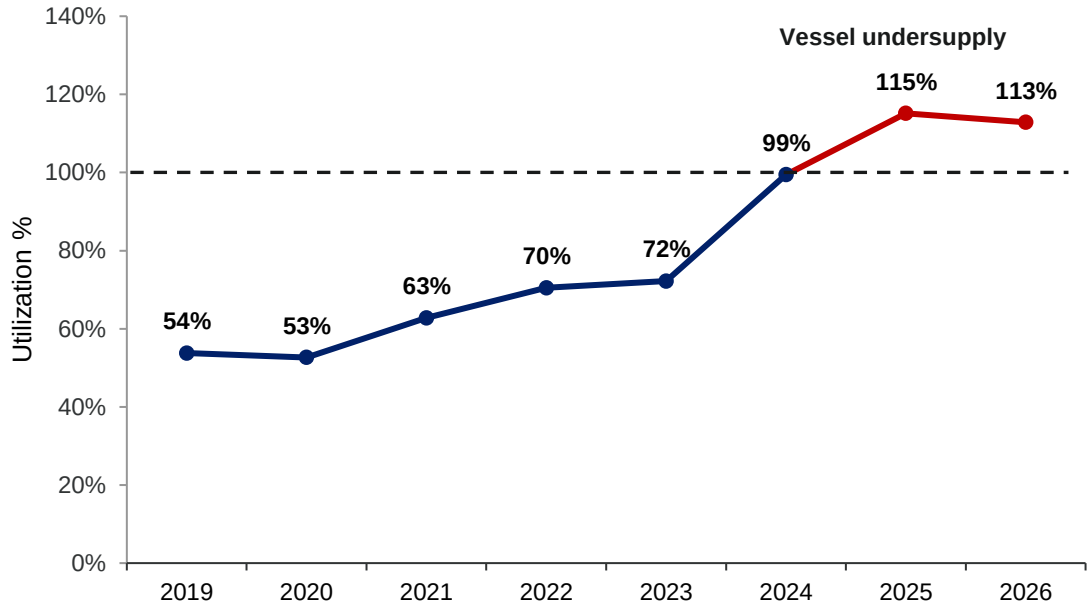
More investment needed to avoid critical undersupply by 2024/25

Newbuilds are needed to avoid a scenario where vessel capacity cannot serve market demand

Offshore wind turbines installed per year



WTIV fleet utilization scenario*



We expect the utilization for offshore wind installations vessels should increase on the back of rising turbine and foundation installations, supported by an aging installed asset base requiring more maintenance. Based on our calculations, the current fleet plus announced, credible newbuilds may not be able to satisfy market demand from 2024/25. This development should lead to higher day-rates for the WTIV fleet, we argue, especially for the high-spec'd vessels.

Source: Clarksons Platou Securities AS *Including all announced newbuild orders we find to be credible.

The WTIV Market

Key takeaways

Demand is growing faster than vessel supply

- 61% more turbines expected to be installed in 2023 compared to 2020
- 126% more turbines expected to be installed in 2024 compared to 2020
- WTIV fleet growing by 44% from 2020 to 2024, based on current credible orders

Larger turbines reduce efficiency and increase costs

- Average transportation capacity to fall from 4 turbines to 2 turbines, as installation market moves from ~8 MW turbines to +12 MW turbines

Few vessels are spec'd for the future

- Though upgrades are possible, majority of current fleet are not able to install the next generation of turbines, even including credible newbuilds
- Only 9 of 23 WTIVs (incl. newbuilds) can carry at least 3 turbine sets at a time

More investment needed to avoid undersupply

- Rapid growth in turbine installation demand together with comparatively modest fleet growth are setting up a scenario where there may not be enough available assets by 2024/25
- New investment can mean the market avoids this scenario, but significant cash is needed. Approximately $100m in equity may be needed for each new high-spec WTIV

Source: Clarksons Platou Securities AS

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Thank you

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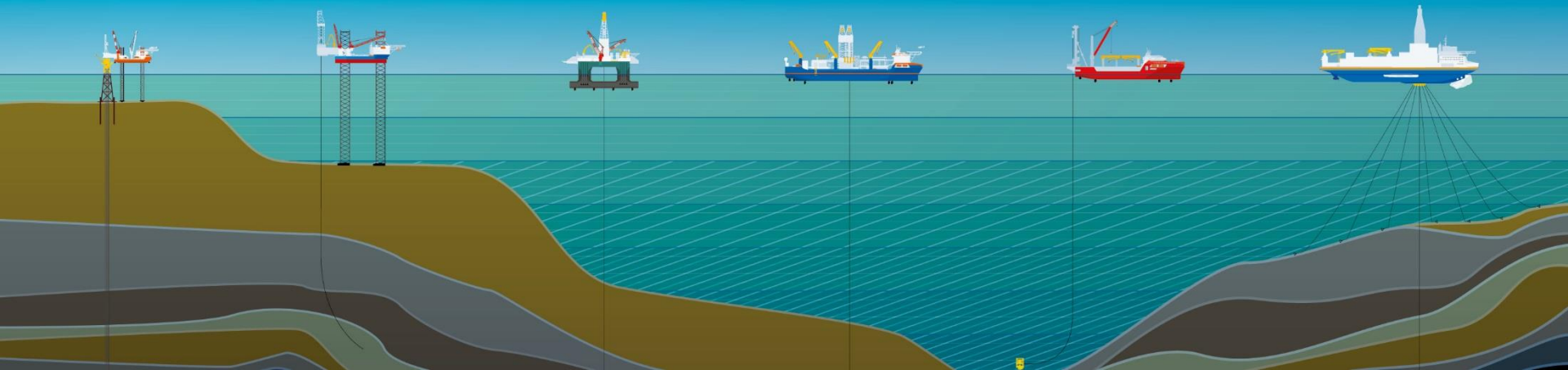
PURPOSEFUL INNOVATION

04 NOVEMBER 2020, WEBINAR

Andries Hofman



CAN WE DESIGN FOR THE FUTURE -PROOF-?

2002-2009

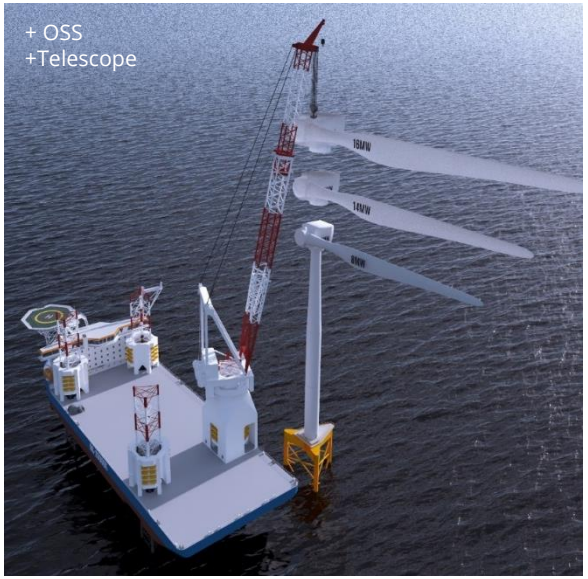
- 2 Jack-ups, one turbine

2010-2018

- Process improvement
- 9 x 3.6 MW
- **Upgrades: Post-upgrade…?**

Now

- Turbine step size up
- Crane SWL & height
- Reduced emissions
- Global markets



CHALLENGES

Larger & Heavier:
- Jacking Technology
- Equipment

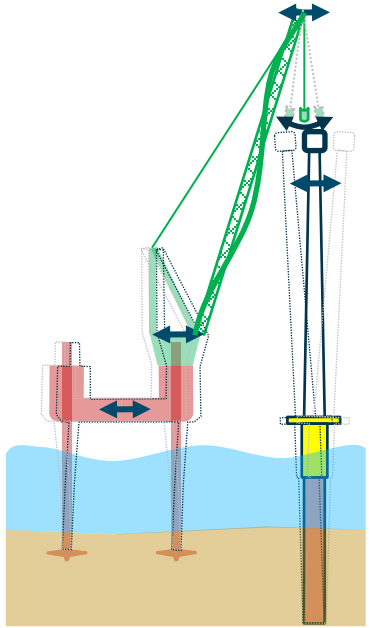
Higher + dynamics:
- Telescope
- New technology, tools

Greener:
- Optimization
- Energy storage

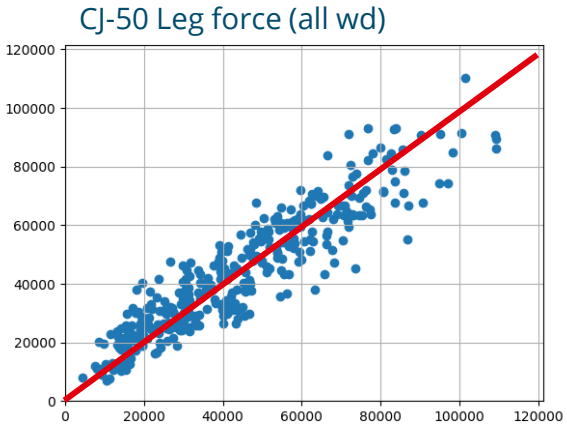
Smarter:
- OSS – Operator support
- Reduce risk, performance up

Globalization:
- Earthquakes: Japan, Taiwan
- US Jones Act

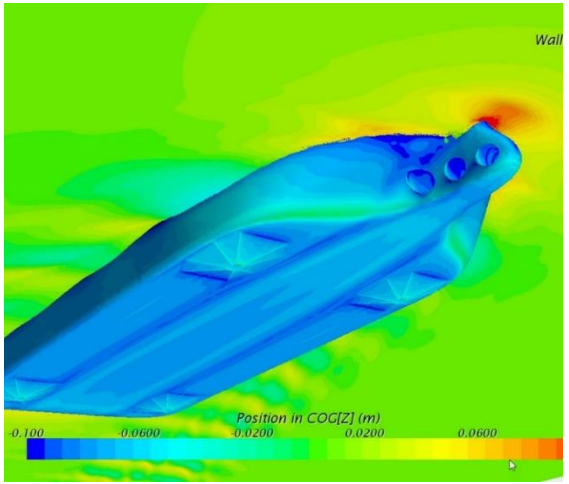
TECHNOLOGY DEVELOPMENT



Dynamics



Operator support



Optimization

NEW UNITS NEEDED & ORDERED

Major investment, control risks

Proven design
- Significant stretch

Proven jacking systems
- New innovations

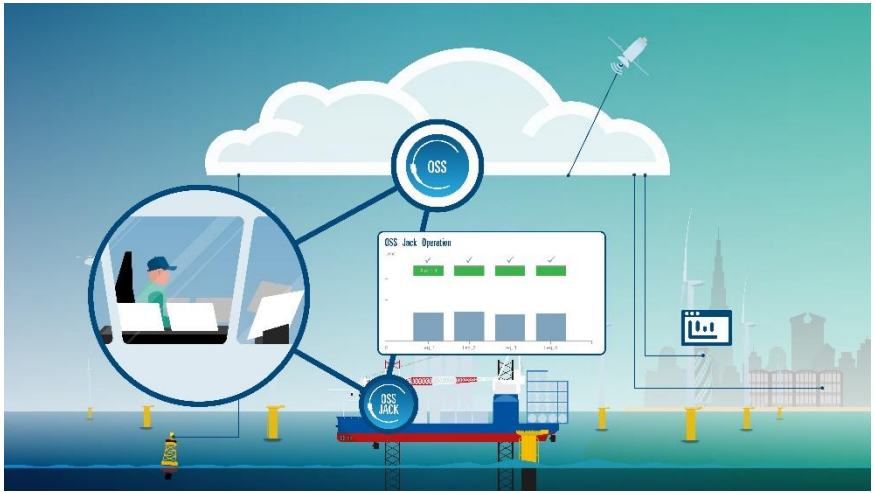
Proven crane
- With **new telescope**

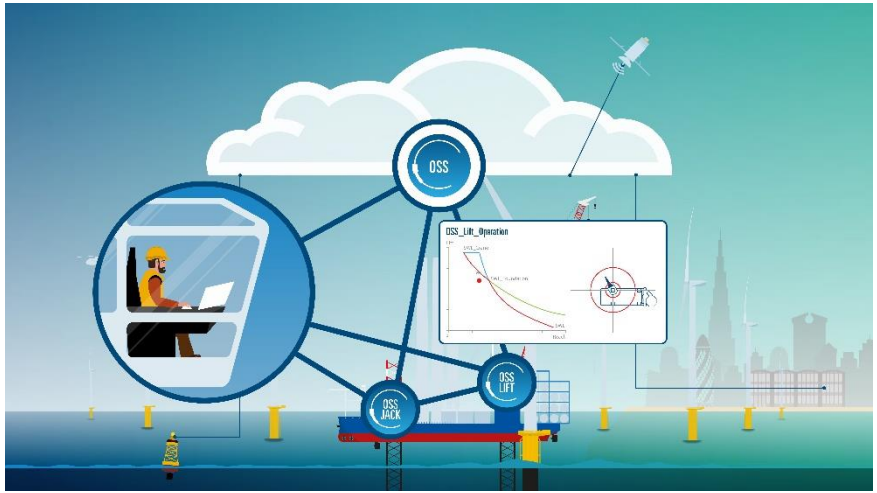
Better integration Crane <> JS
- **Operator Support System**

Several new builds announced:
- NG-14000XL (under constr.)
- NG-16000X's, NG-20000X

OSS

- Improved Safety – Foundation
- Better performance – Squeeze JU





THANK YOU KINDLY FOR YOUR ATTENTION

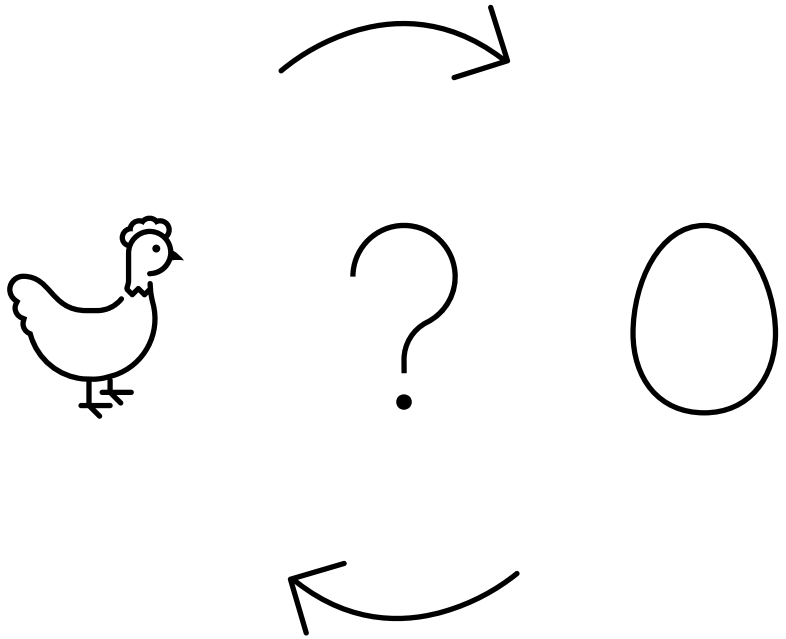
ZERO EMISSION
TURBINE INSTALLATION

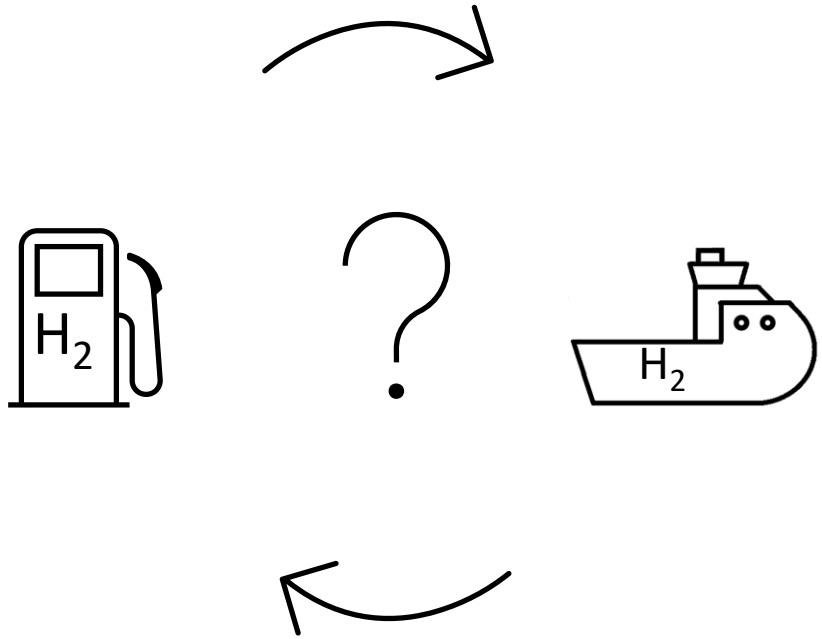
ULSTEIN®

OFFSHORE WIND WEBINAR WEEK
NEW INSTALLATION VESSELS FOR NEW MARKETS:
LIFTING HIGHER, LARGER, HEAVIER TURBINES

EDWIN VAN LEEUWEN | ULSTEIN DESIGN & SOLUTIONS BV
04 NOVEMBER 2020

WHICH CAME FIRST ?



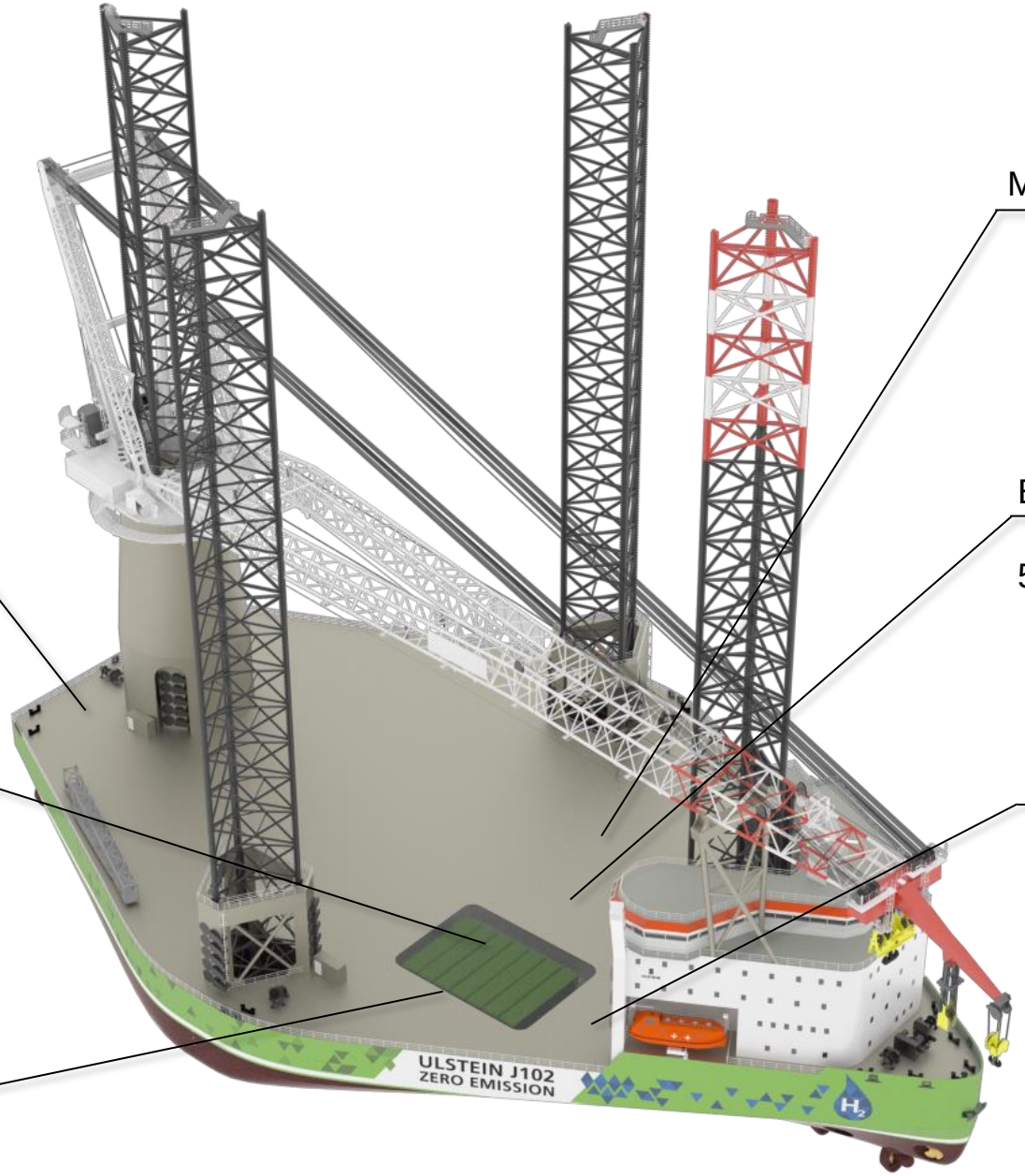


ZERO EMISSION OFFSHORE VESSELS

- ULSTEIN’s ambition is to accelerate zero emission offshore operations
- Using currently available, off-the-shelf hydrogen technology
- Hydrogen technology and design philosophy allows for installing 15MW turbines without emissions

ULSTEIN J102

HYDROGEN HYBRID



Electric power
& DP system

7 x 40’ container

500 bar H_2

open-top storage area for safety and container exchange

MDO engines

Battery energy storage

500kWh

H_2 fuel cell system

1500kW

ULSTEIN J102 HYDROGEN HYBRID

IN NUMBERS

- 200 ton reduction in effective payload, < 2% of total payload
- Relatively small additional cost of < 5% of total vessel cost

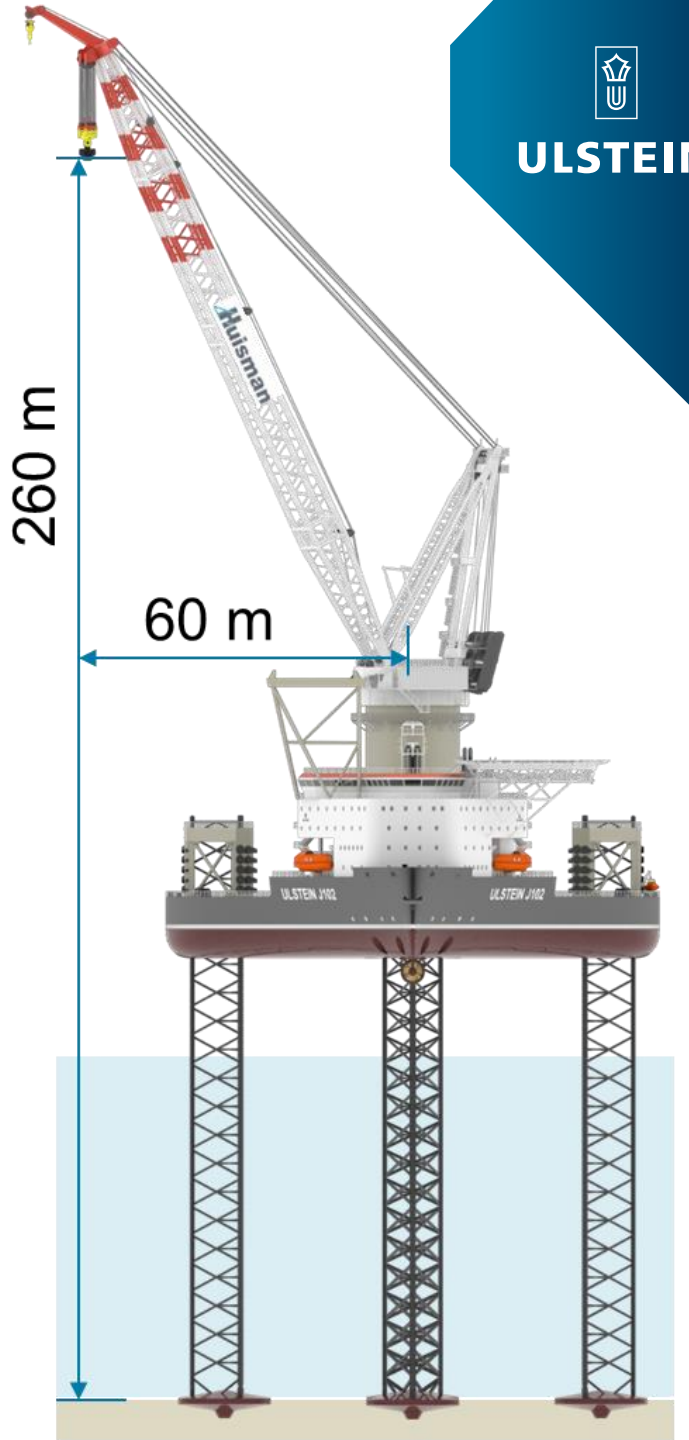
- 7 ton of hydrogen fuel consumed per round trip
- 25% emission reduction per round trip

- 75% of time will be a zero-emission operation

TURBINE INSTALLATION

REQUIREMENTS

- Next and future generation turbines will be taller and heavier
- Future jack–up for installation needs to provide:
  - The most stable crane hook at very high elevations
  - Sufficient carrying capacity and deck area
  - Provide competitive business model
- Just scaling up is not always the best solution



ULSTEIN X-JACK

DESIGN FEATURES

- X-Jack has a different shape to improve:
  - Lifting height
    - Better balanced platform to support high heavy lift cranes
    - Reduced bottom pressure because reduced weight and large spud cans
  - Loading capacity
    - Reduced weight by effective primary structure
    - 15% less CAPEX because of reduced weight
  - Environmental footprint
    - Power optimisation
    - Proven technology for all systems