

Panel 1 - Let's Talk Vessels (Construction and O&M)

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LAVLE

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HISTORY MOMENT



Vikings – app. 1000 AD

- Sail
- Manpower
- Slow
- Zero emission
- First Mover
- 35 men, 60 days to cross the Atlantic



Steam Power – SS Savannah (1819)

- Sail and Steam
- Reliable
- Fast
- First Mover
- 28 days across the Atlantic – primarily on sail (Steam Engine up to 80 hours)



MS Selandia (1912)

- 2 x Diesel Engines (1,250 hp)
- Built at Burmeister & Wain in Denmark
- Speed: 12 knots
- Sank 30 years after seatrial, outside Yokohama



Sally Mærsk, 8,000 TEU (1998)

- M/E: MAN 12K90MC 107,000 hp (80,000 kW)
- 346 m long (1,135 feet)
- Speed 25 knots (Atlantic in 7-10 days)
- 300 T HFO / day
- +10 T HFO 7 day per Aux. Genset



Ellen (2019)

- 100% Electric
- 1,500 kW
- 15,5 knots
- 31 cars
- 200 passengers
- None of the builders or technology suppliers were profitable, but have obtained knowledge for the next project

SHIPBUILDING INDUSTRY

- **>80%** of the world's vessels are built in **South Korea, China and Japan**.
- When **state subsidies** have been removed and policies hasn't been changed to support the shipbuilding industry – the **industry has gone into decline**. European shipyards are a testament to that.
- **Jones Act** has helped shipbuilding industry to continue in the US. However, the protection has **failed to penalize shipbuilding inefficiencies** – meaning build costs are 2-3 times more in the US compared to Europe.
- European shipbuilding has developed into “**niche vessel**” construction, with implementation of **cutting-edge technology** to keep the vessels attractive to operators (**high efficiency and low O&M costs**).

What do we do in the US?

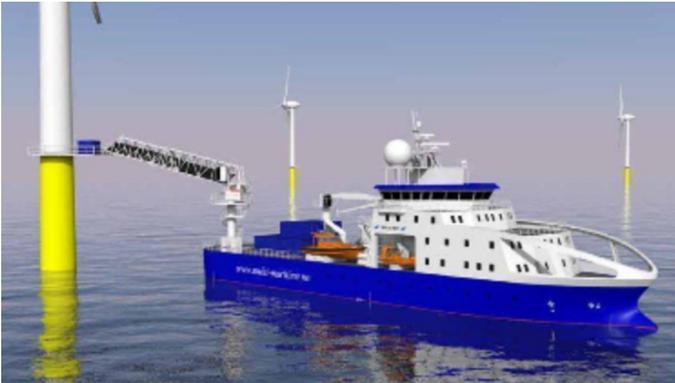


September 19-20, 2019
Norfolk, Virginia

LAVLE

HOW DO WE PROVIDE??

- Enough vessels to cover all tasks, all sizes for now and the future?





ABC Offshore Wind ... made for US

– 2019

Ketil Arvesen

Vice President, Fred. Olsen Ocean

Short Introduction

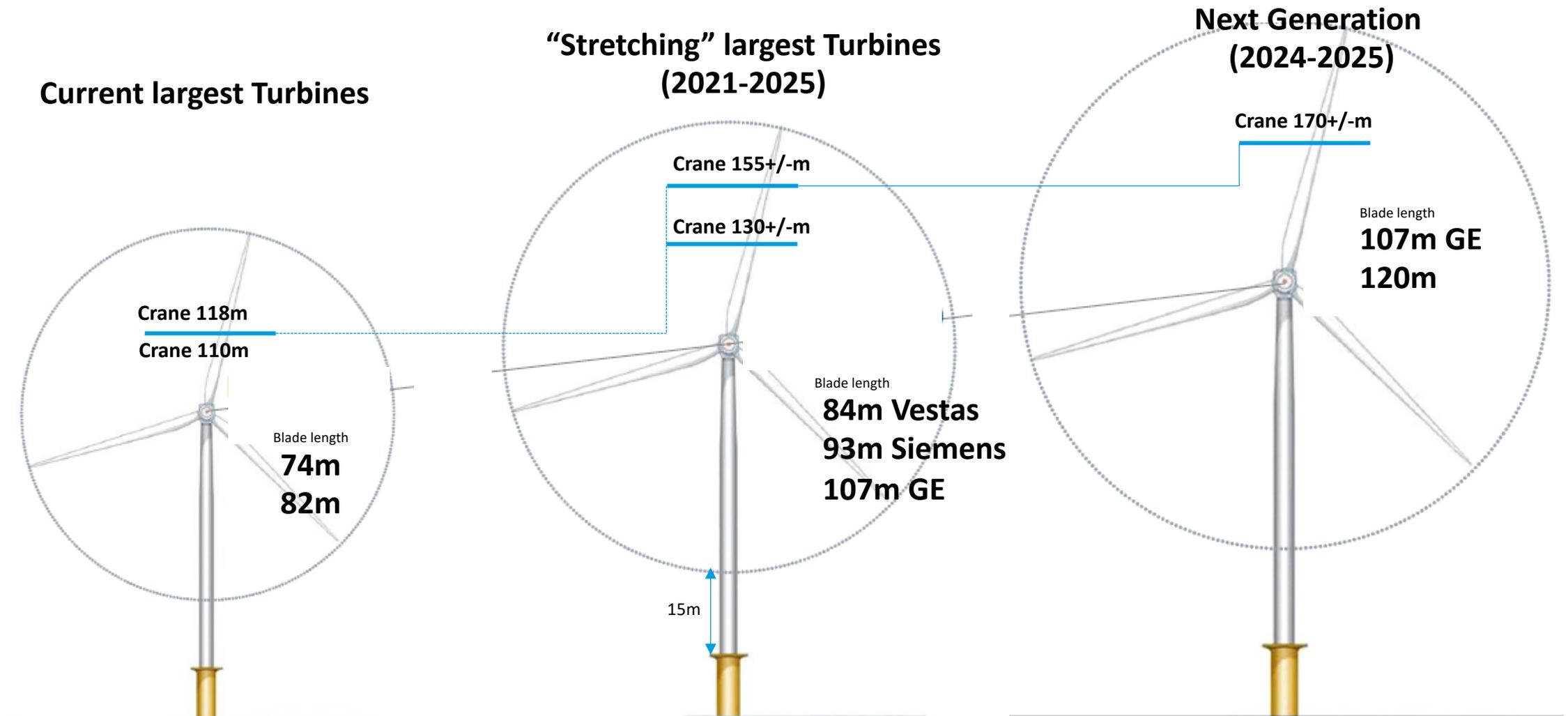
Offshore Wind Turbine installation contractor. Own and operate 3 specialized jack-ups *

Track record

- ✓ **30%** market share in 2018
- ✓ **500+** turbines installed
- ✓ Equals **2800+** MW capacity
- ✓ **14** windfarms
- ✓ Close to 200 turbines 2019
- ✓ **45%** market share *) Blue T



Economics ABC – how to get more revenue (i.e. power) out of each turbine? Everybody needs to understand this picture !



You can cheat a bit by jacking high, but not much ...

Working together



Fred. Olsen Windcarrier

Offshore installation

Block Island Wind Farm, RI, USA

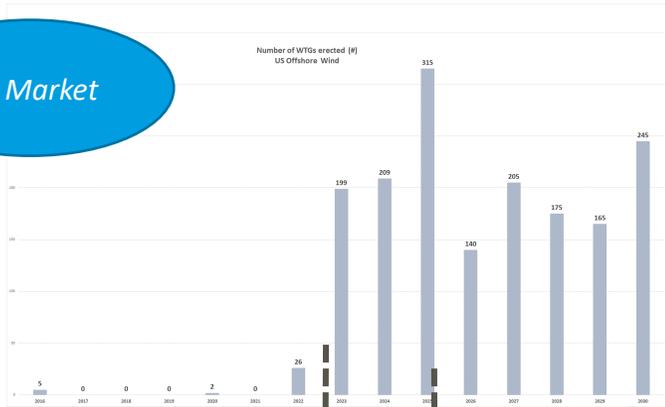
«Block Island» (2016) – 30MW, 5 turbines



A global market emerging, creating "bottlenecks" within short ...

So the US will have a challenge

US Market



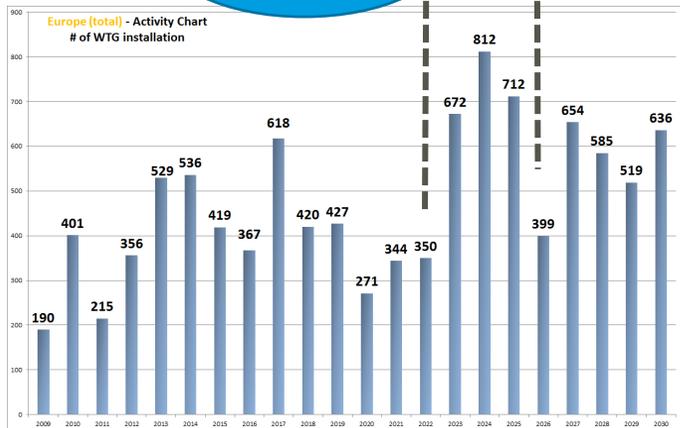
Abt. 11 ships left in Europe with the biggest activity in history coming up 2022-2025

- Aelous (Van Oord)
- Bold Tern (FOWIC)
- Installer (DEME)?
- Innovation (DEME)
- Apollo (DEME)
- Challenger (DEME)
- Pacific Orca (Swire)
- Pacific Osprey (Swire)
- Adventure (Van Oord)
- Discovery/Taillevent (Jan de Null)
- SeaFox5/Blue Tern

So far 2 newbuildings announced 2019:

- Jan de Null
- Shimizu (Japan)

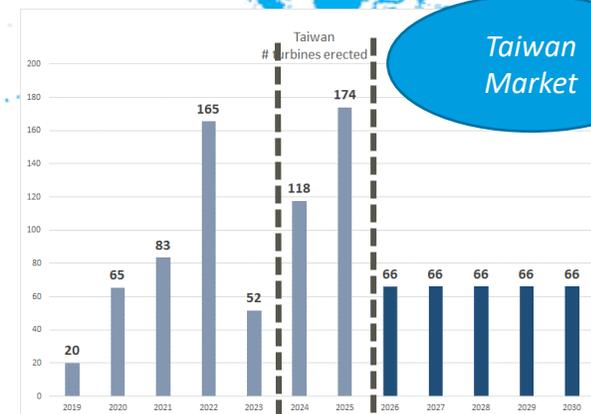
European Market



Starts 2020 – big uplift in activity 2021-2024

- (Jan de Null)?
- Zarathan (SeaJack)
- Scylla (SeaJack)
- Brave Tern (FOWIC)

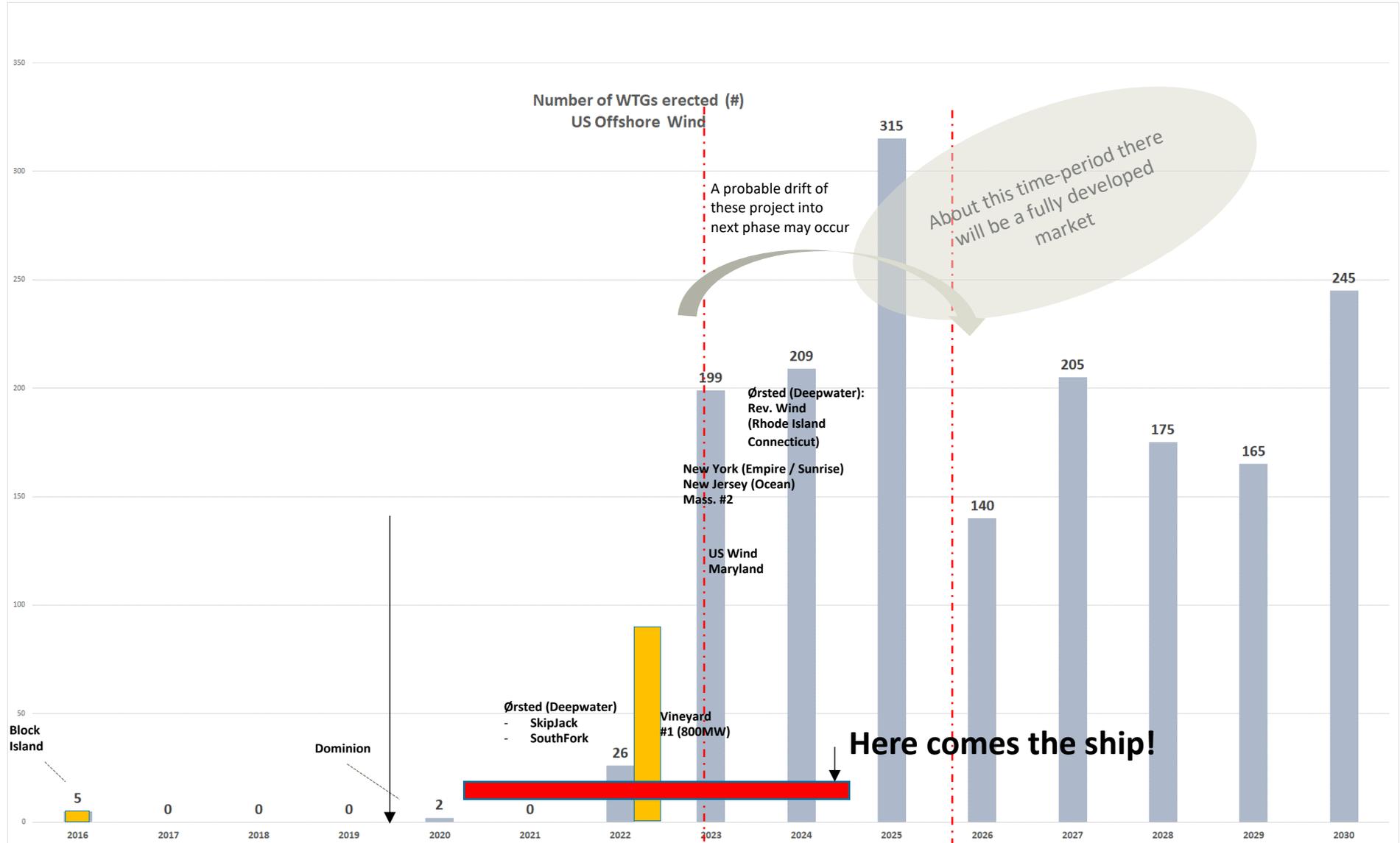
Taiwan Market



Australia

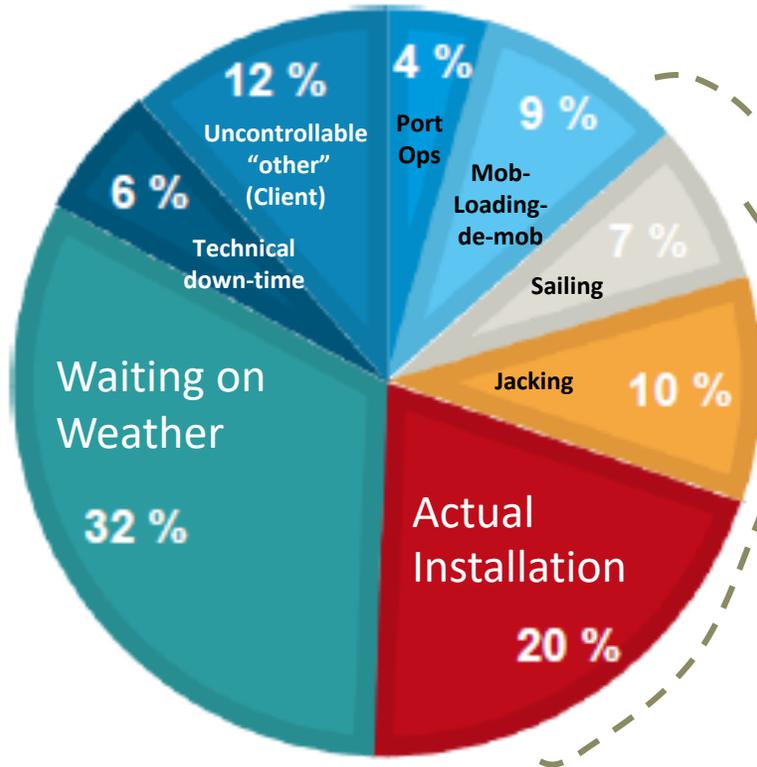
Likely development of US Offshore Wind (all going well)

There are considerable risks to this timeline (permitting, infrastructure, ships)



Economics – how to get profitability, it’s a “puzzle” on several levels, there are “a hundred risks” here

Average over a year
(highly site dependent)



Contract Structure

- Not really long term contracts
- Good visibility, 2-2,5 years ahead
- Will there be a change to longer term contracts going forwards?

Day Rate

- Risk level

Utilization

- This is the key point (!)

Mobilization

- Grillage / Seafastening

OPEX

- Crew
- Maintenance

Let's Talk Vessels

Personnel and Equipment Transfer Vessels

- Crew Transfer Vessels (New Build U.S.A.)
- Service Operations Vessels (New Build & Retrofit U.S.A)

Feeder Solutions

- Jack-up/Liftboat Feeder (Existing and New Build U.S.A.)
 - Tugs (Existing U.S.A.)
 - Barges (Existing U.S.A)





Let's Talk Vessels



Pre-construction Vessels

- Survey (Existing Foreign or U.S.A.)
- Rock Dumper (Existing Foreign)

Construction/Installation Vessels

- Jack-up Heavy Lift (Existing Foreign)
- DP Heavy Lift (Existing Foreign)
- Cable (Existing Foreign or U.S.A.)

Miscellaneous Vessels

- Guard (Existing U.S.A.)
- Various Utility Vessels (Existing U.S.A.)



Let's Talk Vessels



Vessel Financing

- Traditional Bank
- Private Equity
- Government

