Suomen Hyötytuuli Oy

Leading producer and developer of Finnish wind power



Offshore wind in Baltic Sea region

Managing Director Toni Sulameri - 20 March 2018, Vaasa

Suomen Hyötytuuli Oy

- Producing wind energy since 1998
- Production 2018: 478 GWh
- Revenue 2018: 32 726 000 €
- Personnel: 6/17
- The real estate tax 2018: 1 255 380 € (2017 level 555 380 €)
- Wind farms: 4 onshore, 1 offshore
- Turbines: 50 pcs , 150 MW
- Owned by energy companies Helen (Oy Mankala Ab), Jyväskylän Energia, Lahti Energia, Lappeenrannan Energia, Pori Energia, Tampereen Sähkölaitos, Turku Energia and Vantaan Energia

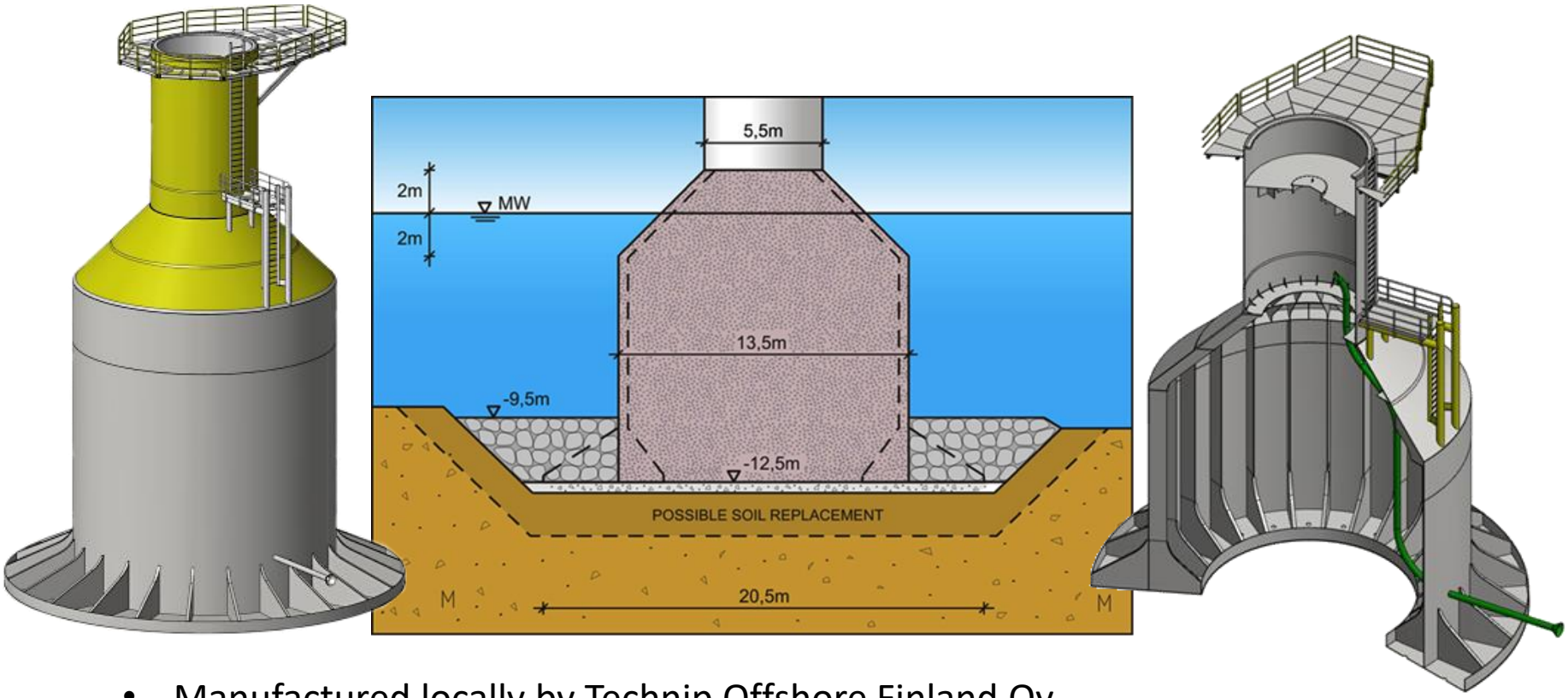


Tahkoluoto Offshore Wind Farm, Pori, Finland

- 10 x Siemens 4,2 MW and offshore pilot Siemens 2,3 MW
- Annual power production approx. 155 GWh
- Average power production 43 % (capacity factor)
- Investment of approx. 120 M€, 20 M€ investment aid from Ministry of Economic Affairs and Employment



Gravity-based steel foundations



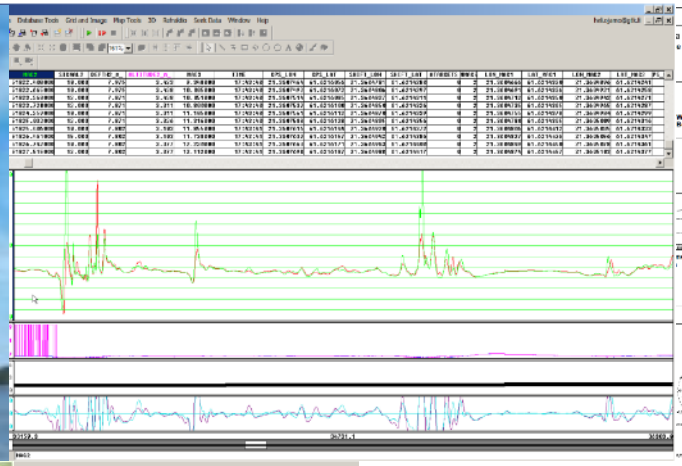
- Manufactured locally by Technip Offshore Finland Oy

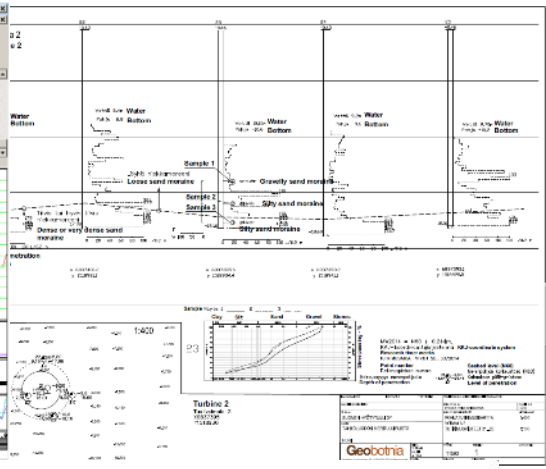
Gravity-based steel foundations



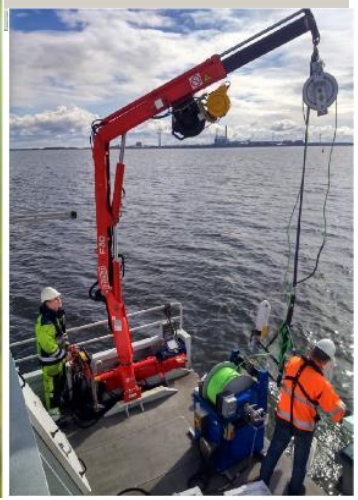
HYDROGRAPHIC AND SUBSEA SURVEYS

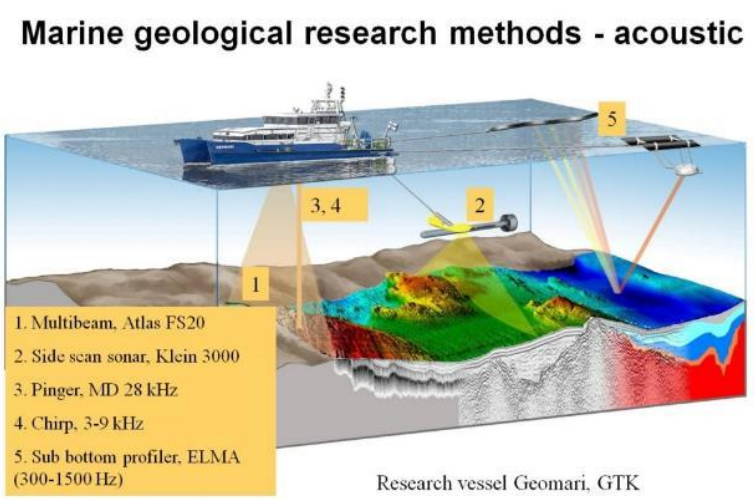












CPT UXO ROV/MBES

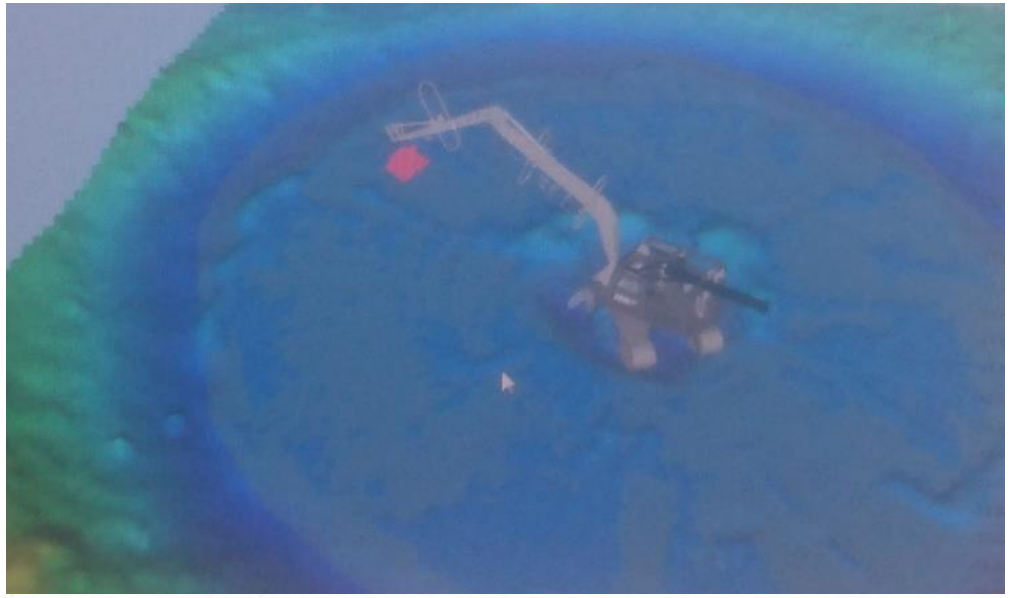
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SUBSEA WORKS – Foundation pit



Kuva: Jan DeNul

SUBSEA WORKS - Foundation pit levelling



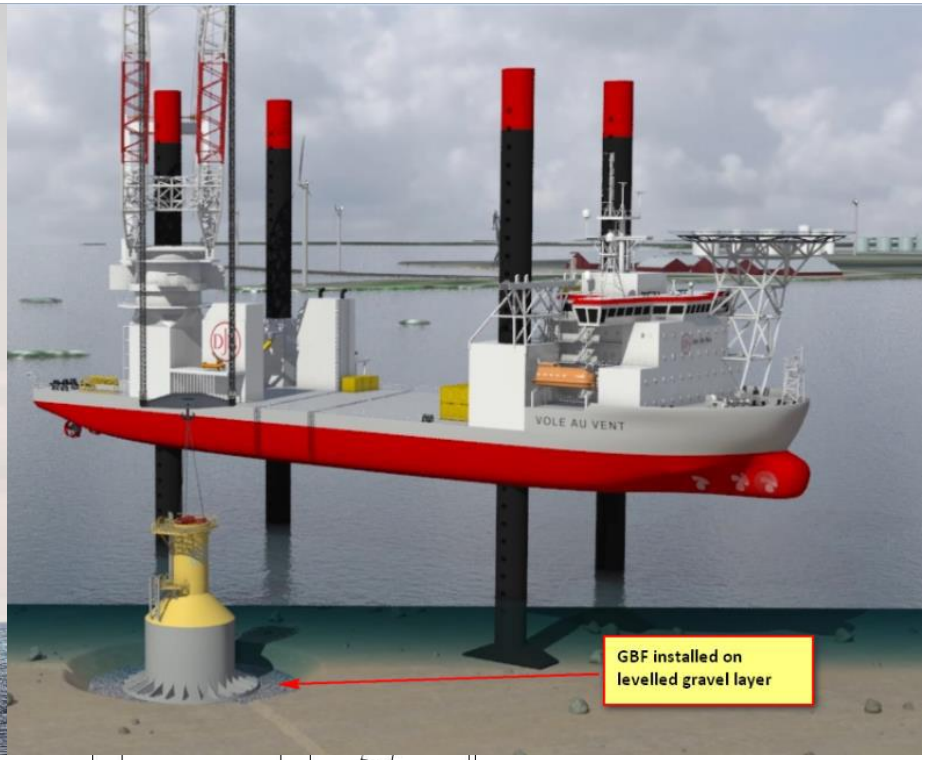


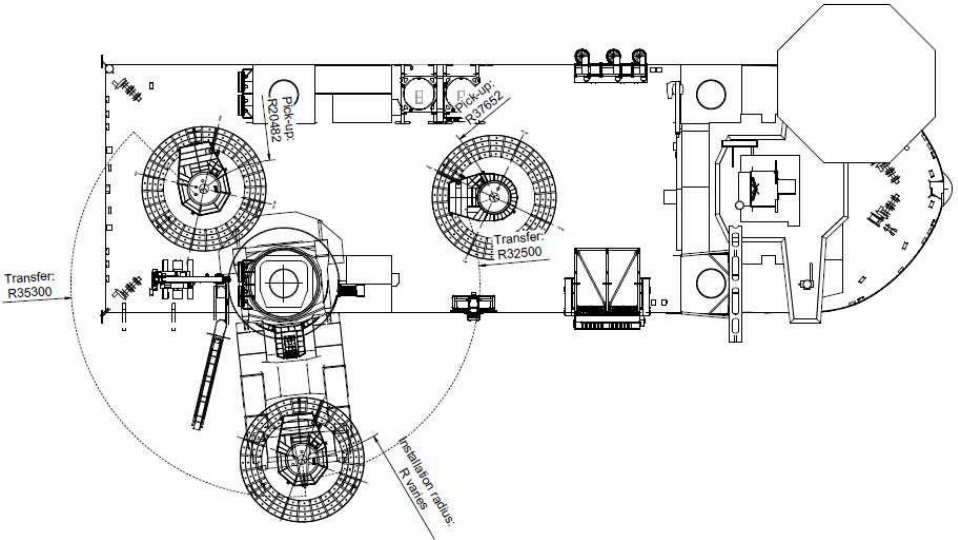


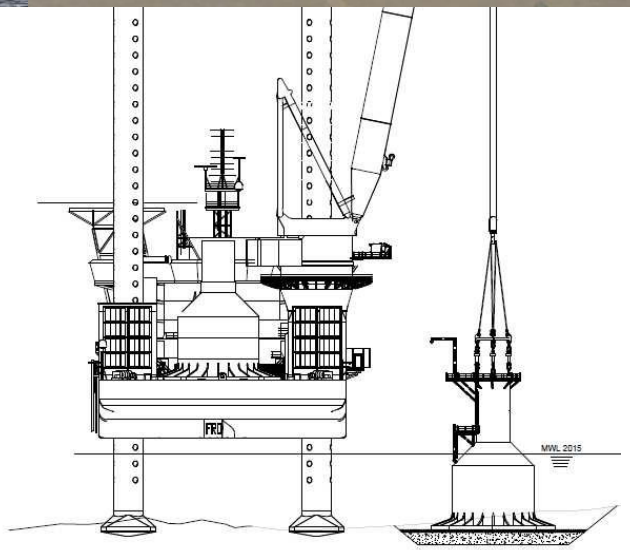
Kuva: Jan DeNul

FOUNDATIONS INSTALLATION



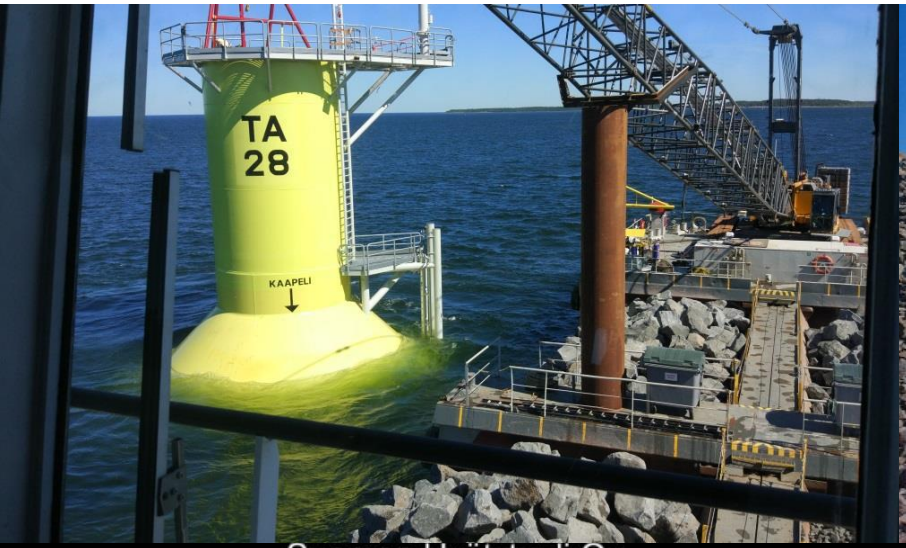


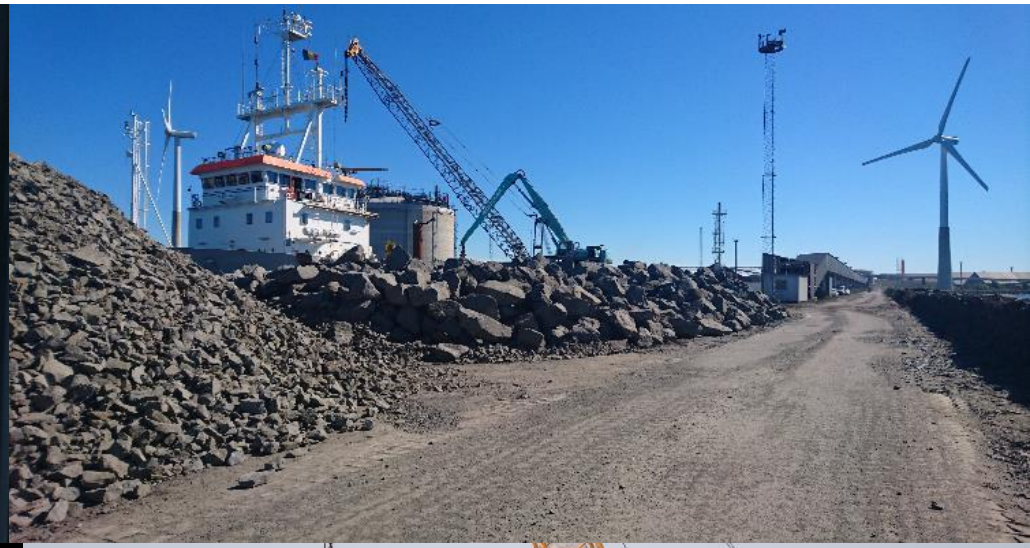


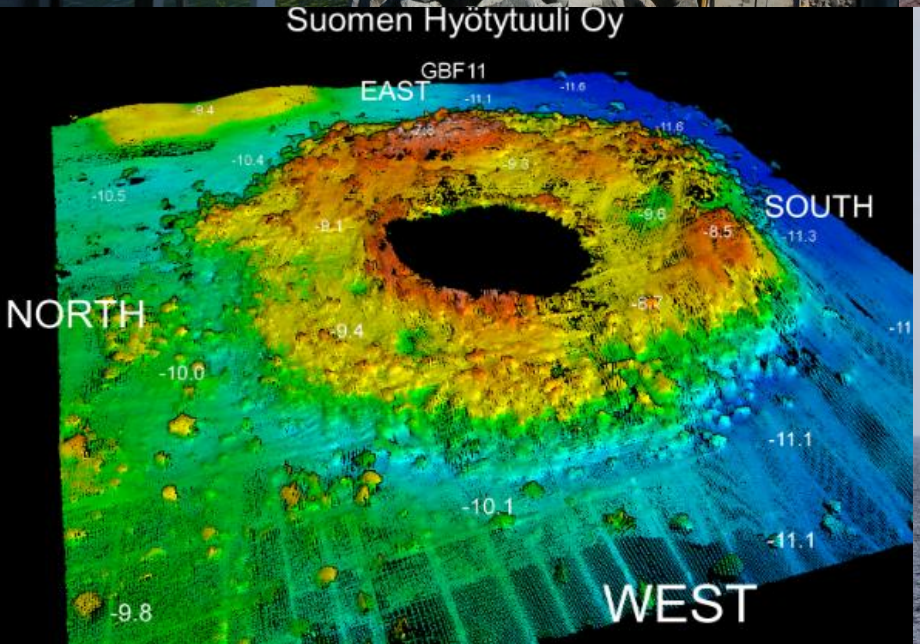


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Rock works : Foundation infill & erosion protection









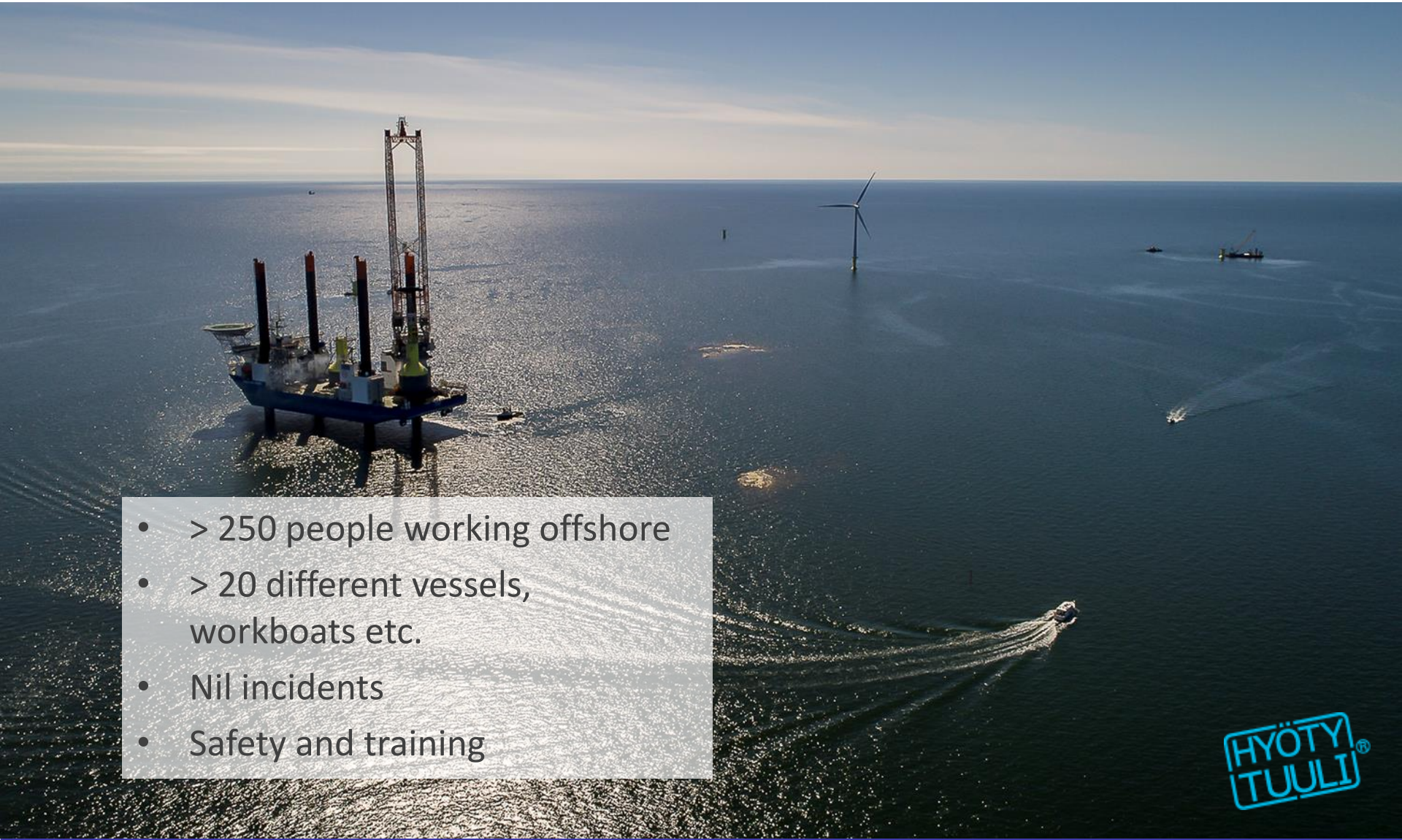
Wind turbine logistics and pre-assembly





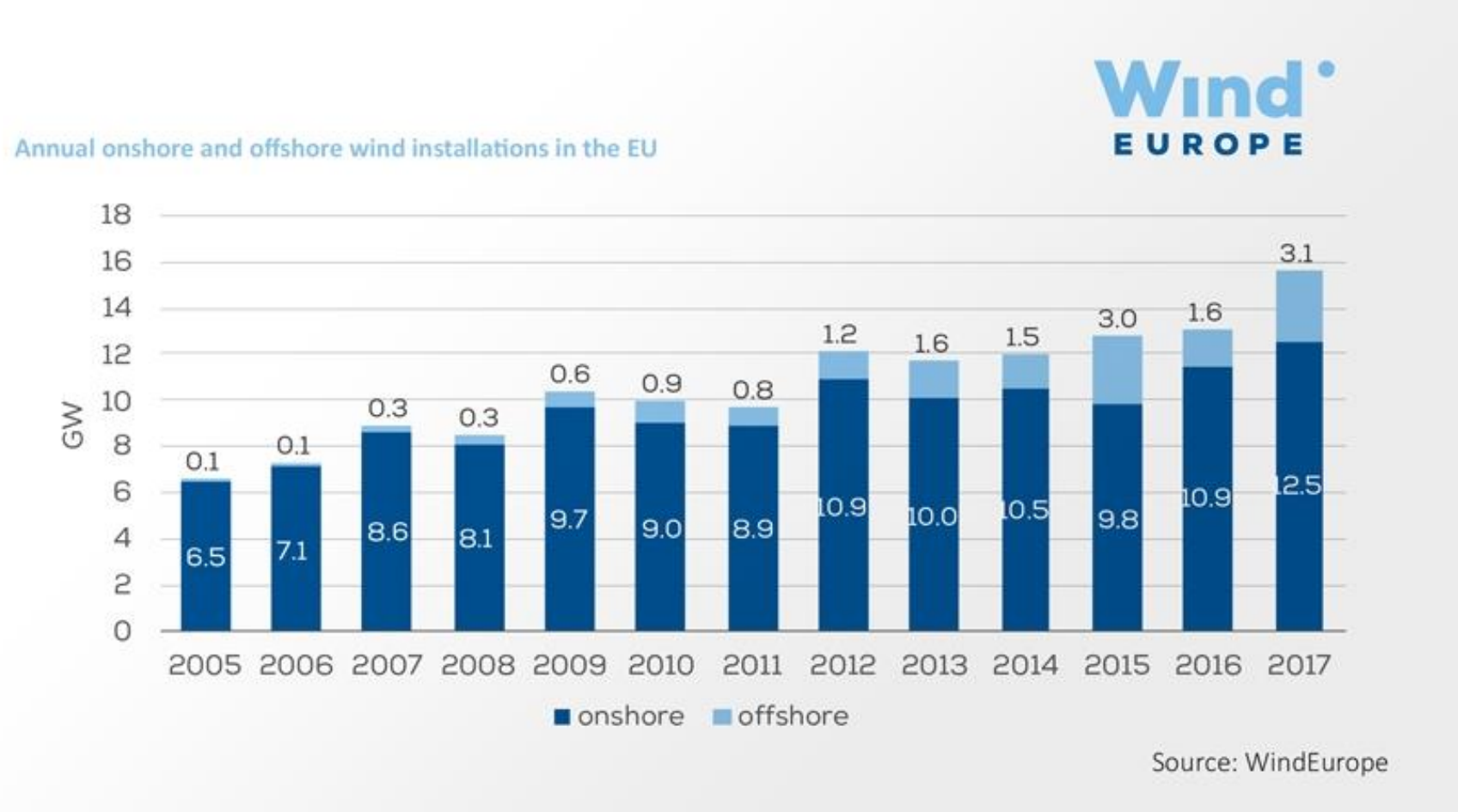


SUMMARY : MARINE RESOURCES

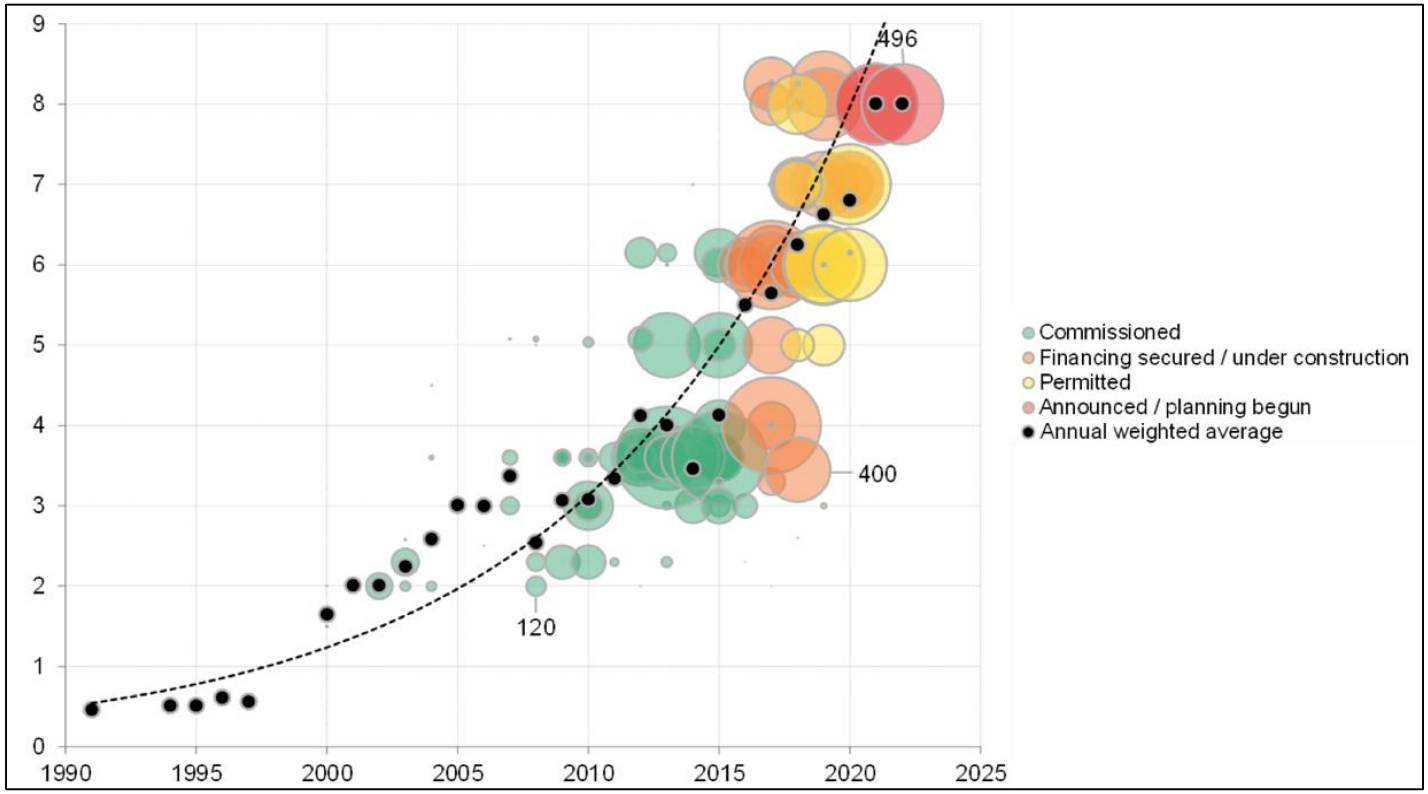


- > 250 people working offshore
- > 20 different vessels, workboats etc.
- Nil incidents
- Safety and training

Onshore and offshore wind installations

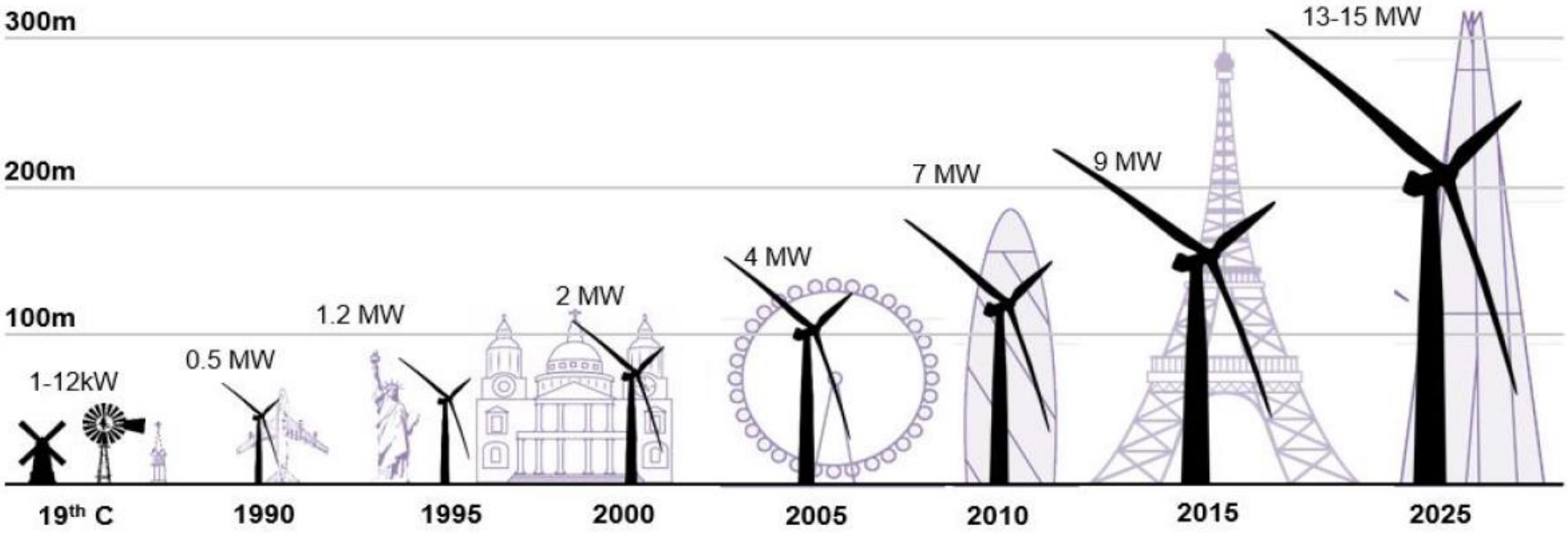


Technology Development of Offshore Wind



Historical data 1990-2015 and forecast 2015-2025 for offshore turbine size development (in MW) by wind farm commissioning date (*Bloomberg 2016*).

Evolution of wind turbine heights and output

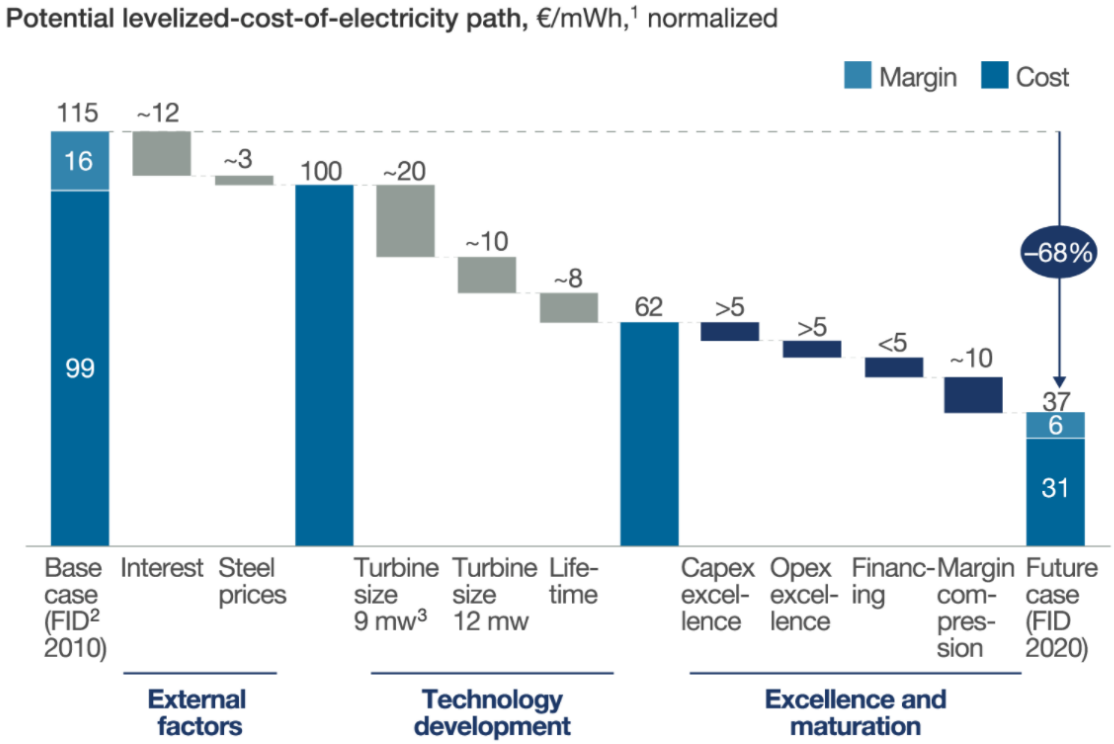


Sources: Various; Bloomberg New Energy Finance

Bloomberg
New Energy Finance

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Potential levelized-cost-of-electricity path



[1]Megawatt-hour.
[2]Final investment decision.
[3]Megawatts.

Source: Jens Hobohm, et al., *Cost reduction potentials of offshore wind power in Germany,* a joint report from the Fichtner and Prognos, 2013, prognos.com; *Cost reduction options for offshore wind in the Netherlands FID 2010-2020,* TKI Wind op Zee (TKI Offshore Wind), October 2015, tki-windopzee.nl; McKinsey analysis

McKinsey&Company

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The Impact of DB for Construction and O&M of the Baltic Sea OWFs

Cost impacts of site conditions of Northern Baltic Sea OWF locations compared to the North Sea locations. Positive impact means cost savings, negative impact additional costs, in comparison to standard North Sea OWF locations.

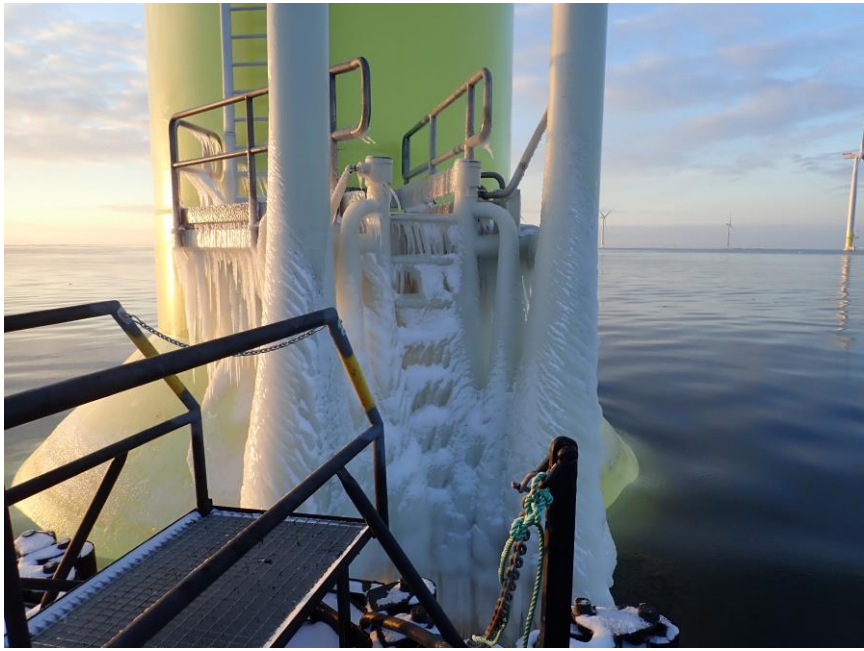
Design parameter	Impact on CAPEX (positive/negative)	Significance of impact (major/minor)	Impact on OPEX (positive/negative)	Significance of impact (major/minor)
Distance to coastline	+	major	+	major/minor
Distance to port / construction hub	+	major	+	major
Water depth	+	major		
Soil quality	+/-	major/minor		
Wave conditions	+	major	+	major
Tide and currents	+	major	+	minor
Corroding water and air	+	minor	+	minor
Operating temperature range	-	minor	-	minor
Ice conditions	-	minor/major	-	minor/major

Conclusions

- ***large-scale offshore wind energy in the Baltic Sea ?***

Developping and commercializing solutions optimized for the Baltic Sea conditions requirements:

- *Optimizing rotors for lower wind speeds*
- *Serial production and installation concept for 1X turbine foundations*
- *Service equipment- and strategy development*
- *Investments for Ports facilities*
- *Supporting political attitude*




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