

Finding Space for Offshore Wind to Support Net Zero

GIS multivariate framework for marine spatial planning

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Big Data and Geographic Information System (GIS)

Number of public surveys
1659

Terabytes of data
260+

Number of users
7800

Number of Countries Searching the MDE
78+

MDE in Numbers, 2023

The Marine Data Exchange

The Marine Data Exchange collates survey data from offshore projects around the UK, giving an unparalleled big picture view of the survey data collected by industry.

It also hosts evidence and research that has been generated through evidence programmes such as The Crown Estate's Offshore Wind Evidence and Change (OWEC) programme, and by our partners and stakeholders.

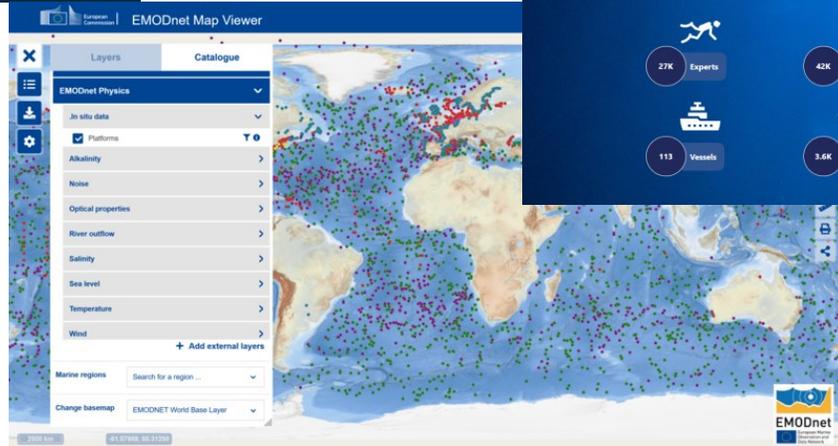
Data hosted on the Marine Data Exchange also feeds into other initiatives and tools that support in the sustainable development of the seabed. For example, data collected by the aggregates industry is hosted on the Marine Data Exchange and then fed into OneBenthic (Cefas), a collection of high-quality standardised datasets used to generate new science and collaborative ways of working.

Through the Marine Data Exchange, The Crown Estate can ensure that existing data and evidence drives positive impact, whilst identifying and addressing data and evidence gaps. Through this we will deliver the best outcomes for the seabed to achieve Net Zero, energy security and biodiversity growth.



The Marine Data Exchange: Spatial Search Interface Tool

The Marine Data Exchange utilises carbon neutral technology and data storage through Azure and low energy website designs.



MEDIN The Marine Environmental Data and Information Network (MEDIN) is the hub for UK marine data. We work with UK organisations to improve the stewardship and access to UK marine data.

- 7 data archive centres**: MEDIN delivers data through a co-ordinated network of accredited data archive centres, that provide expertise to the marine community.
- 15 sponsors**: Providing funding and governance, our consortium of sponsors steer MEDIN's direction.
- 50+ partners**: UK organisations that have committed to practising and promoting good marine data management, our partners help deliver MEDIN's vision.
- 17,500+ marine datasets** are accessible from the online MEDIN portal.
- from 600+ organisations** that collect or manage marine data.

7 data archive centres include: Bathymetry, Meteorology, Oceanography, Fisheries, Flora, Fauna and Habitat, Geology and Geophysics, Historic Environment.

HAPPY COEXISTENCE

Construction to Operation

1. Components are assembled at the port site on land.
2. Position is marked into the water, usually on a barge.
3. The tower, nacelle and blades are installed by a crane placed on land.
4. The structure (foundation and turbine) is towed by tugboat to the site offshore.
5. The structure is hooked up to array cables and mooring lines.
6. The turbine is in operation.

CC-BY: RenewableUK

CC-BY: Wind Europe

GIS multivariate framework

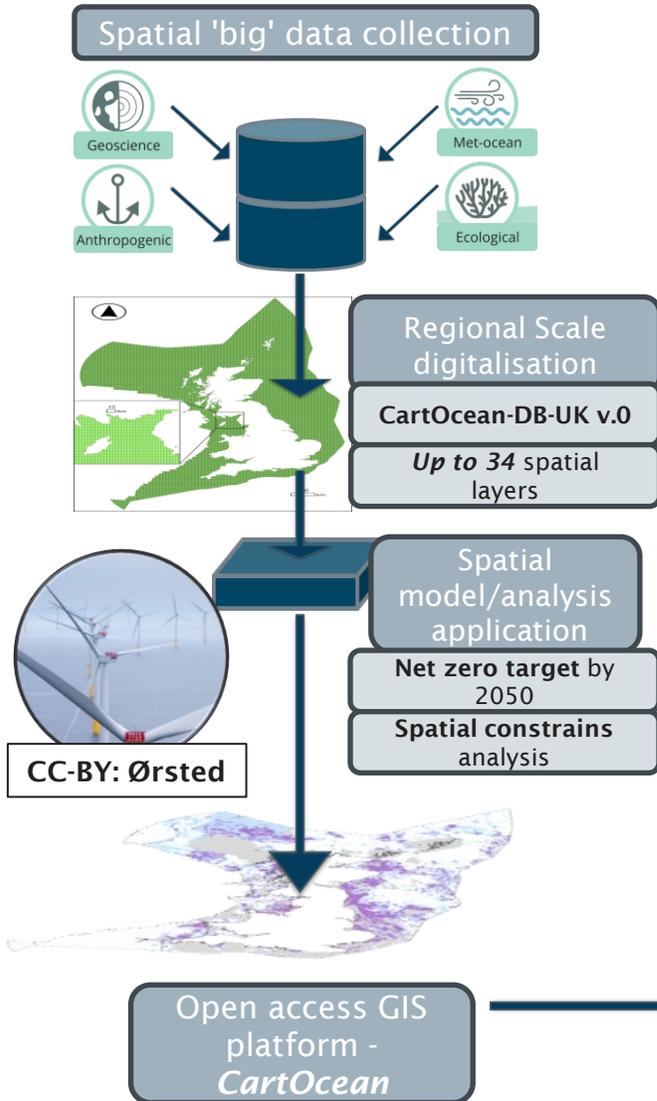
Dashboard: Calibrated availability level for Offshore Wind (OW) in UK-EEZ waters & future scenarios

Available space: **467k km²**

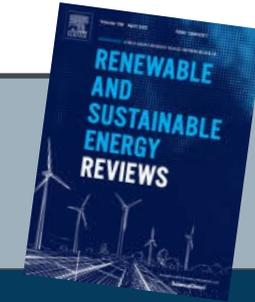
Space of current OW based sites: 22k km²



GIS-based multivariate framework - CartOcean



Published work → Finding space for offshore wind to support net zero: spatial constraints and future scenarios in UK case study



Video tour of StoryMap for:

“Finding space for offshore wind constraints and future scenarios”

Future challenges

<p>[1]</p> <p>Cumulative effects on marine ecosystems</p>	<p>[2]</p> <p>Deeper water & further from shore</p>	<p>[3]</p> <p>Demands on supply chain</p>
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30% is available

70% is in difficult seabed
is with at least an ecological/ anthropogenic constraint

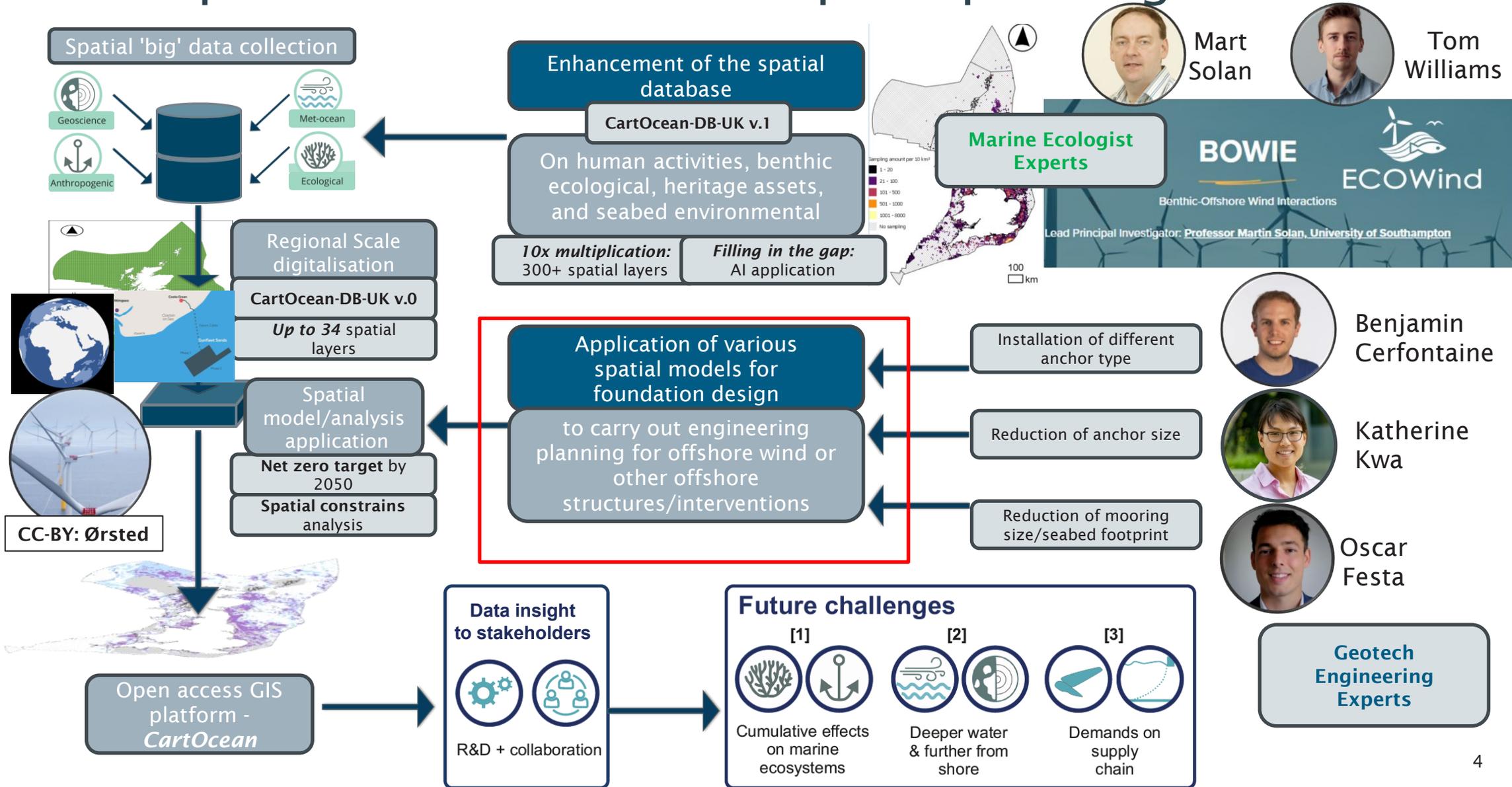
86% is in deep water

5% of UK-EEZ (1/5 of avail area) needed for net zero (+150GW)

Total UK-EEZ Waters: 774k km²

- 70% - unavailable due to constraints
- 0.2% - active sites
- 3% - leased sites
- 13% - crowded sites
- 24% - no-go zones
- 30% - too far/deep

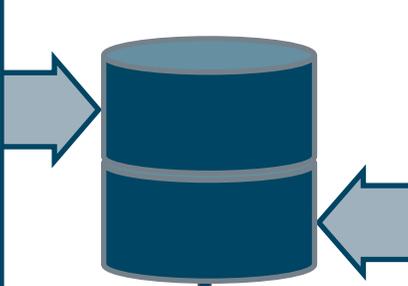
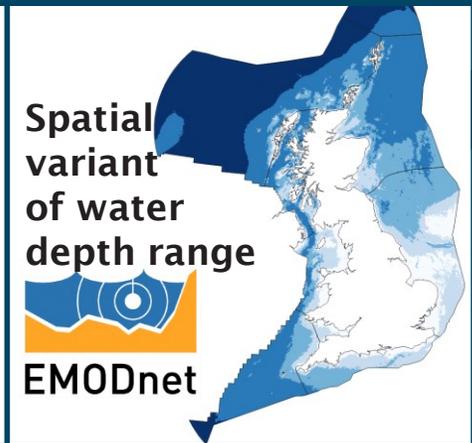
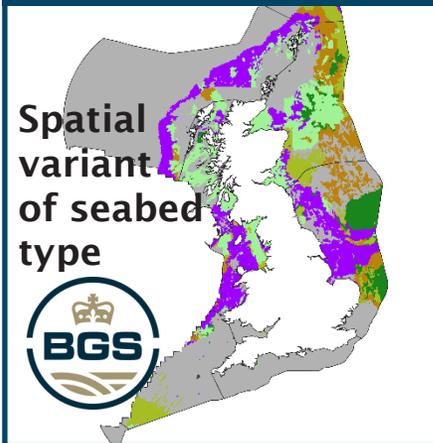
Development for future marine spatial planning



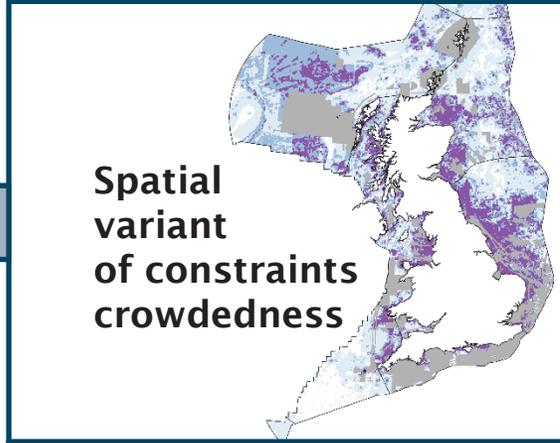
Geospatial assessment for drag anchors suitability and supply chain needed



Seabed data Water depth data

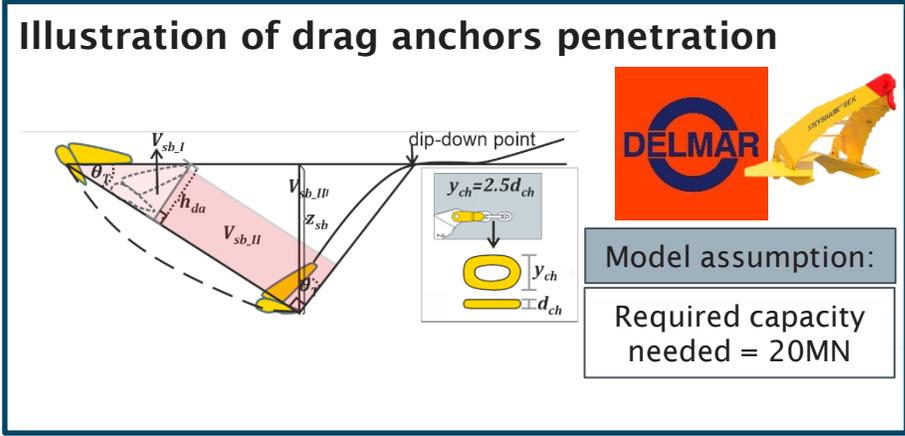


Spatial constraints and net zero target

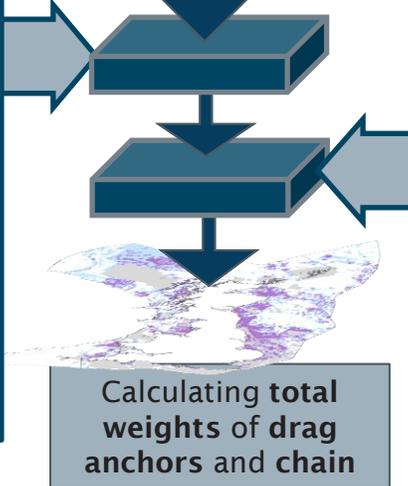
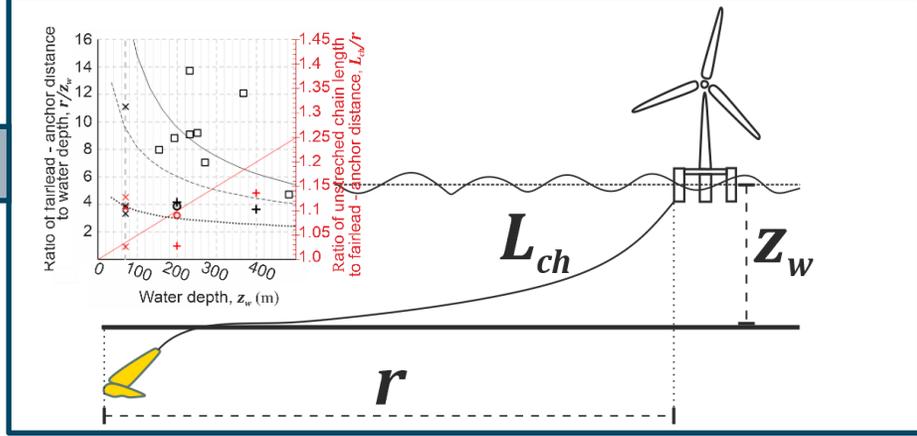


Further reading
Putuhena et al. 2023. RSER.

Anchors penetration and mooring dimension model (Stevpris Mk-6)



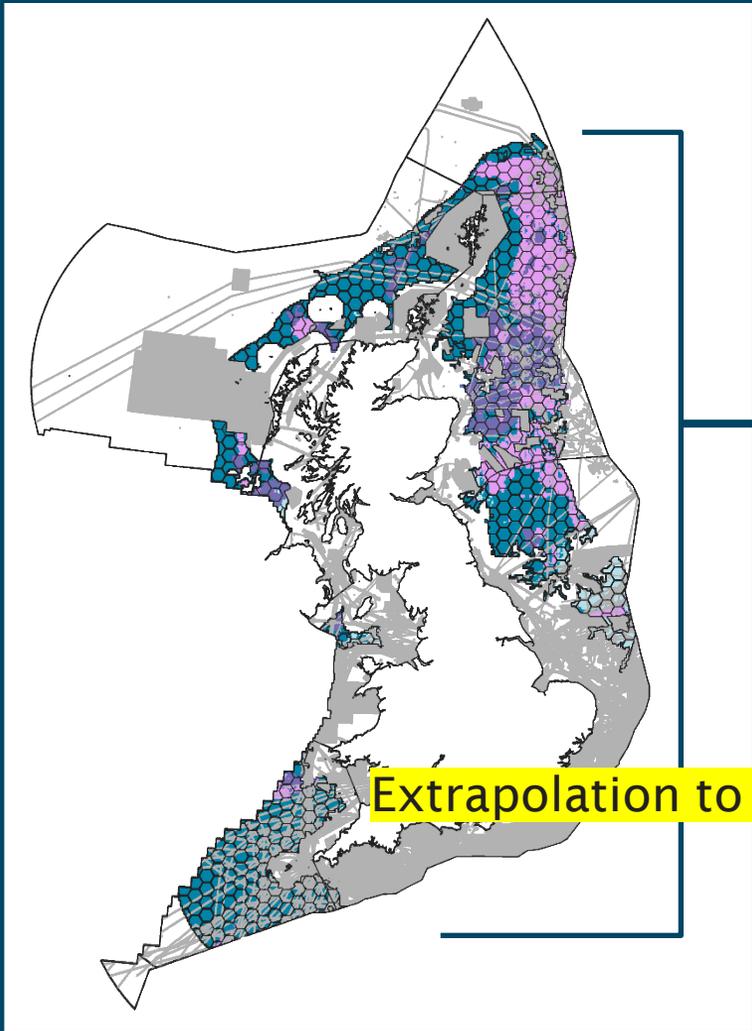
Simplified estimation of length/weight of chain needed for different water depth



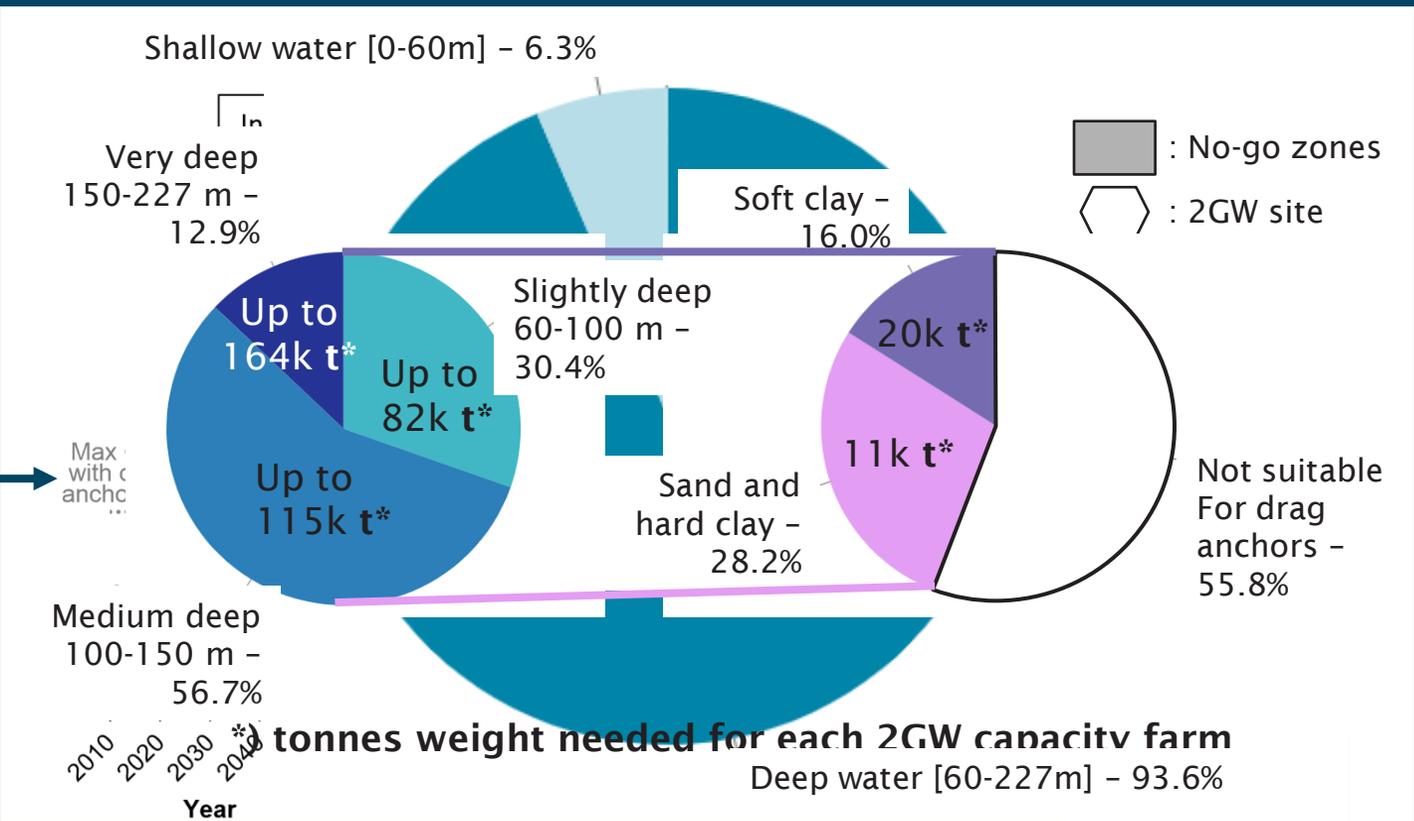
Key results



Suitable area for drag anchors in UK waters (water depth variety)



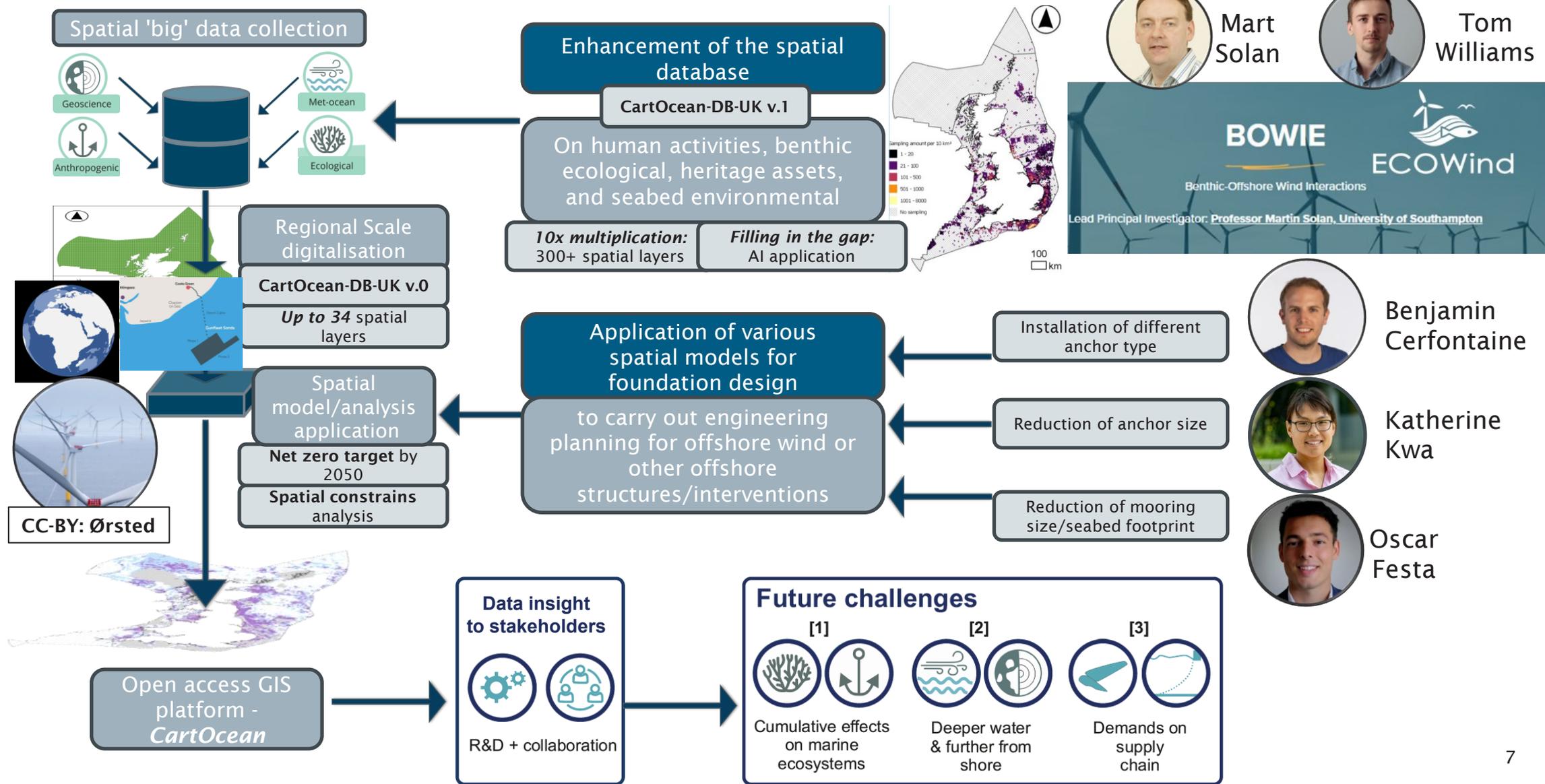
Suitable area for drag anchors in UK waters in chart



Extrapolation to Global floating OW target: 264 GW, DNV (2022)

To achieve 140 GW: Areas suitable for drag anchors → $63 \times 10^6 \text{ km}^2$
 → $38 \times 10^3 \text{ km}^2$ Available areas for future offshore wind → $187 \times 10^6 \text{ km}^2$
 → $26 \times 10^3 \text{ km}^2$ Areas w/ shallow water depth (<60m) → $12 \times 10^6 \text{ km}^2$
 → $11 \times 10^6 \text{ km}^2$ Areas w/ deep water depth (60-227m) → $175 \times 10^6 \text{ km}^2$

Development for future marine spatial planning



Mart Solan



Tom Williams



Benjamin Cerfontaine



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