HM Government

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MARINEi

MOREK

'FLOW Moorings - A probable norm'

Marine-i FLOW Moorings and Anchoring Webinar

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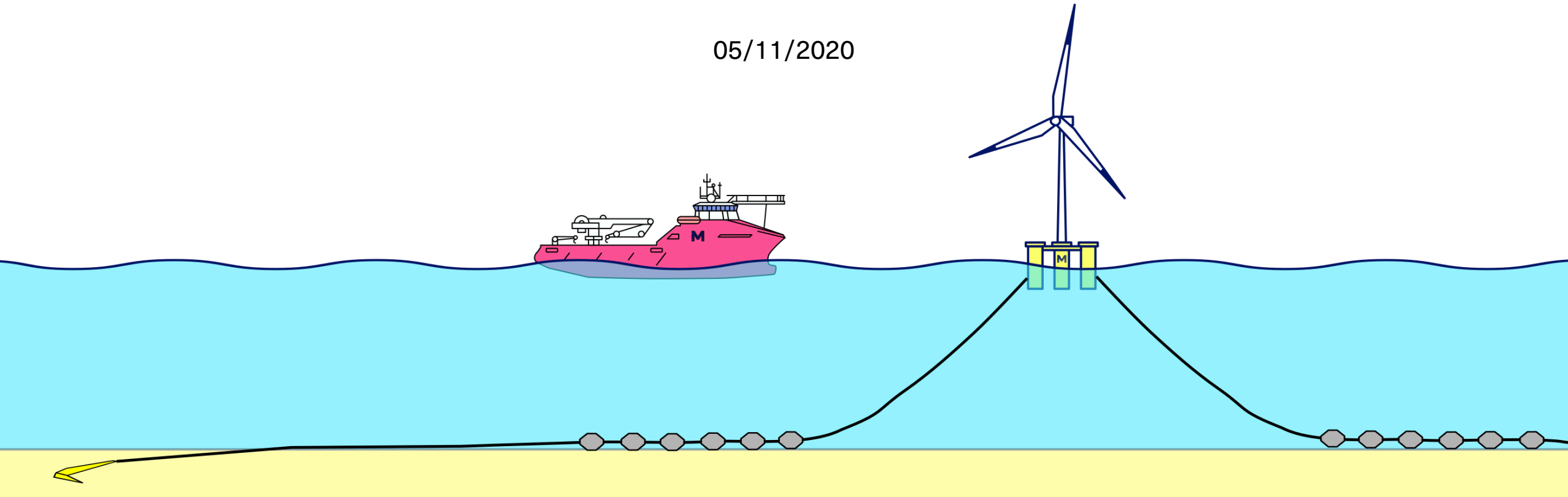

Intro to Morek

- Formed in 2019, Morek (maritime in Cornish) is a specialist technical service provider to the offshore energy market.
- We work both onshore and offshore providing marine engineering and naval architecture skills to a range of customers
- Our experience is mainly in nascent marine renewables (Tide and Wave) but also in offshore wind (fixed and floating)
- Since forming we have delivered 22 projects to 12 customers
- Recently signed an MoU with mechanical engineering partners Blackfish to pursue technology development in FLOW sector

NKT
wave energy SCOTLAND
SIMEC ATLANTIS ENERGY
Fisher Offshore
tsm
VRYHOF ANCHORS
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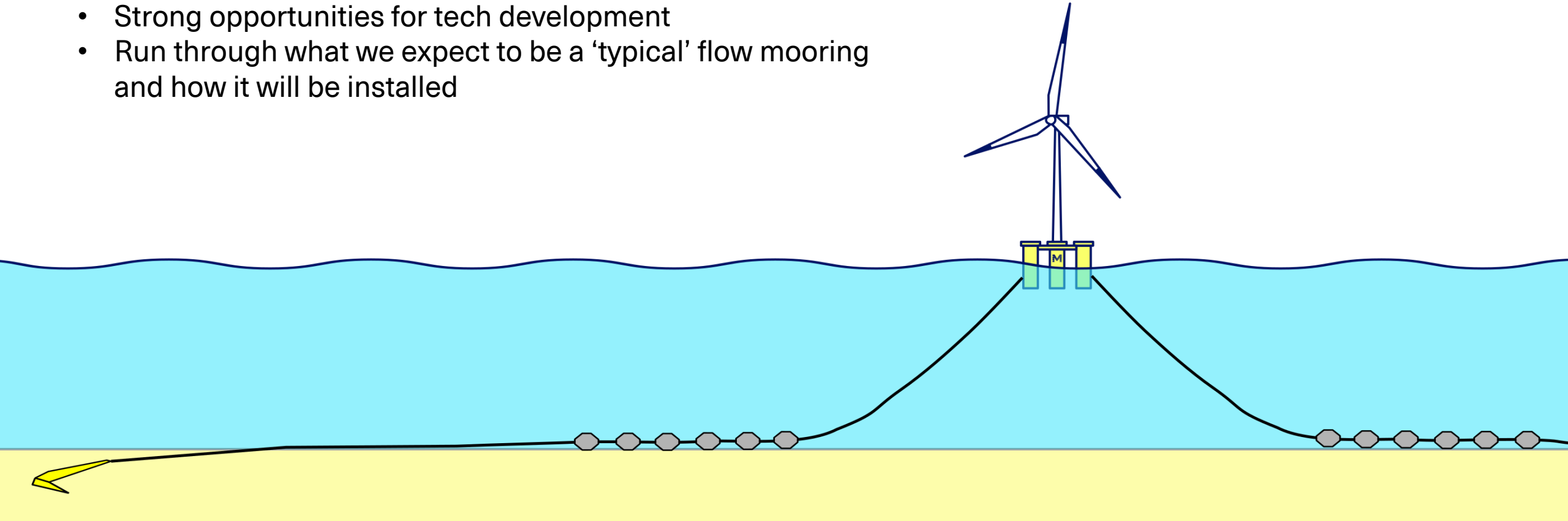
SISGEN

‘A Probable Norm’

- Definition of a ‘Vanilla’ FLOW mooring spread to help understand the challenges and potential solutions
- Many aspects of FLOW moorings will be borrowed from years of north sea O&G experience, it is however important to identify and address the nuances
- Strong opportunities for tech development
- Run through what we expect to be a ‘typical’ flow mooring and how it will be installed



Starting assumptions

- Geotechnical conditions suitable for Drag embedment anchors
- Semi-sub or Barge type platform
- Catenary spread type mooring
- Heavy ground chain with excursion limiting clump weight at thrash zone
- Potential for synthetic lines in water column
- 3 line spread

Image: Windfloat Semi-Sub FLOW foundation
Courtesy: Principle Power

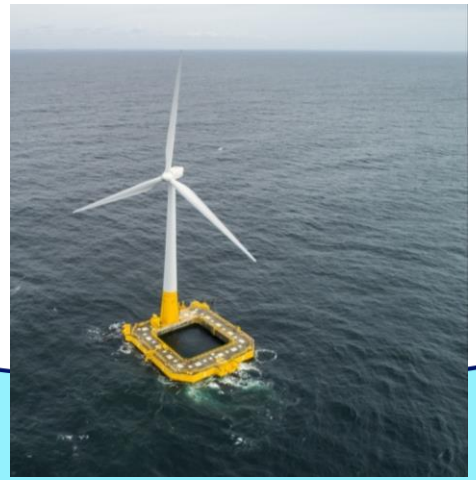
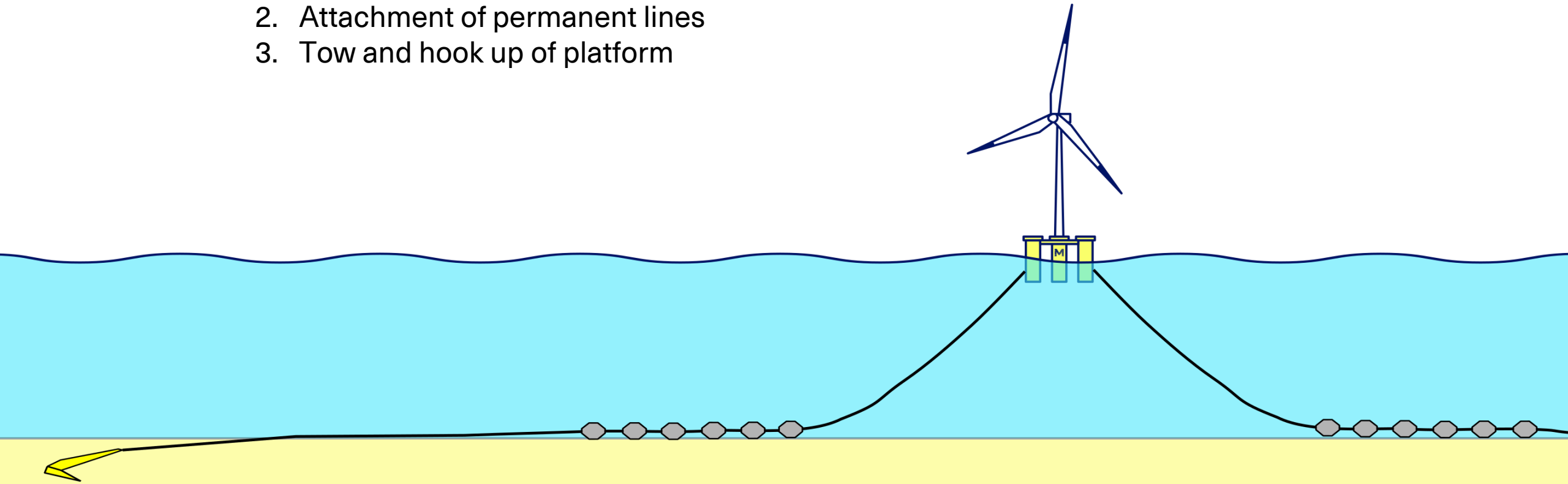


Image: Floatgen Barge FLOW foundation
Courtesy: Ideol

Mooring and Foundation Installation

Installation conducted in three phases;

1. Anchor deployment and preloading
2. Attachment of permanent lines
3. Tow and hook up of platform



Installation 1 –
Anchor deployment and preloading

- To ensure adequate holding capacity the anchors must be preloaded
- Typically this is done either by bollard pull of a vessel, or, for higher preload a separate work anchor can be used to pull together
- Ground chain left buoyed off or on seabed for ROV retrieval

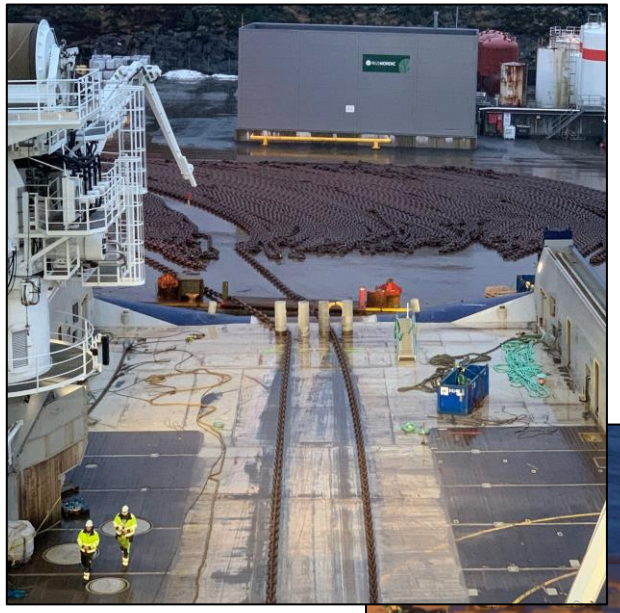
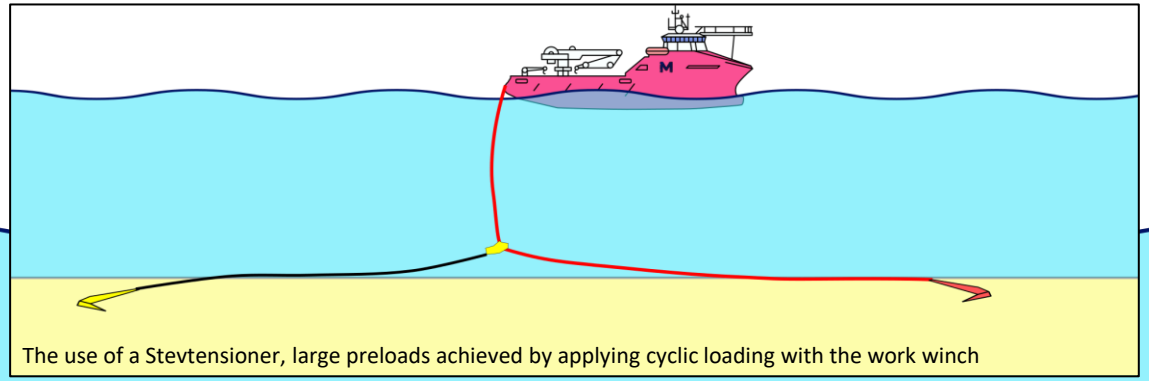


Image: Island Victory loading 24500m of 84mm chain and 16 anchors
Courtesy: Island Offshore

Image: Stevshark Rex drag embedment anchors *Courtesy: Vryhof*



The use of a Stevtensioner, large preloads achieved by applying cyclic loading with the work winch

Installation 2 –
Attachment of permanent lines

- Following the preloading the remaining sections of the line can be installed
- Clump weights are preassembled and deployed in line
- Any synthetics can also be deployed if required

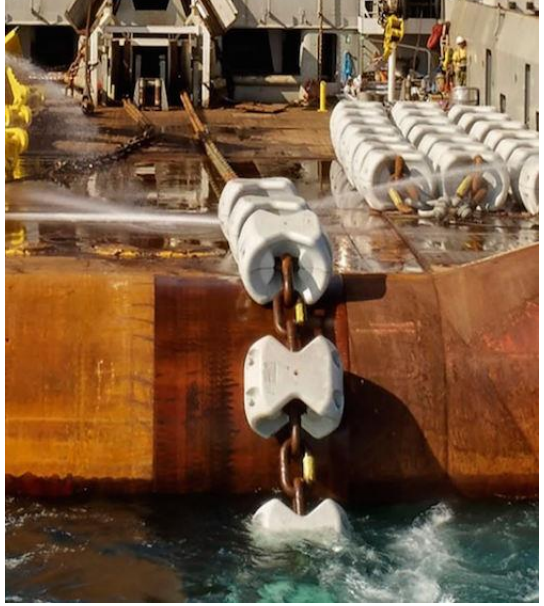
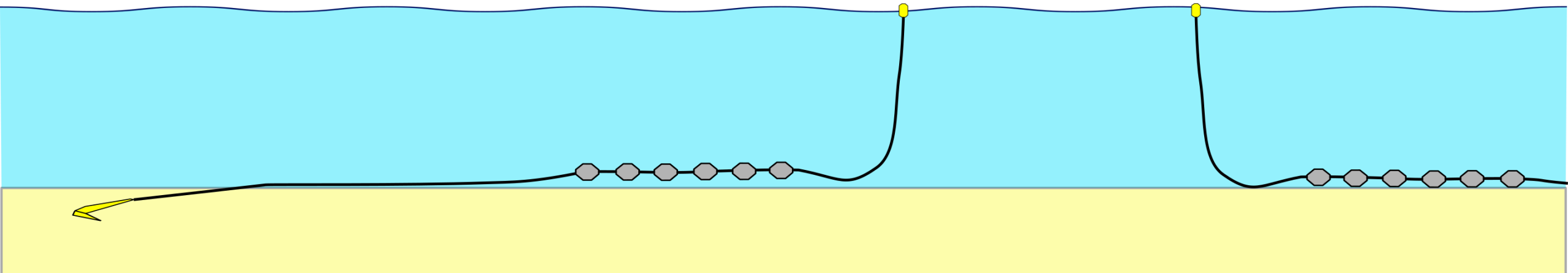


Image: Cast iron clump weights *Courtesy: FMGC*

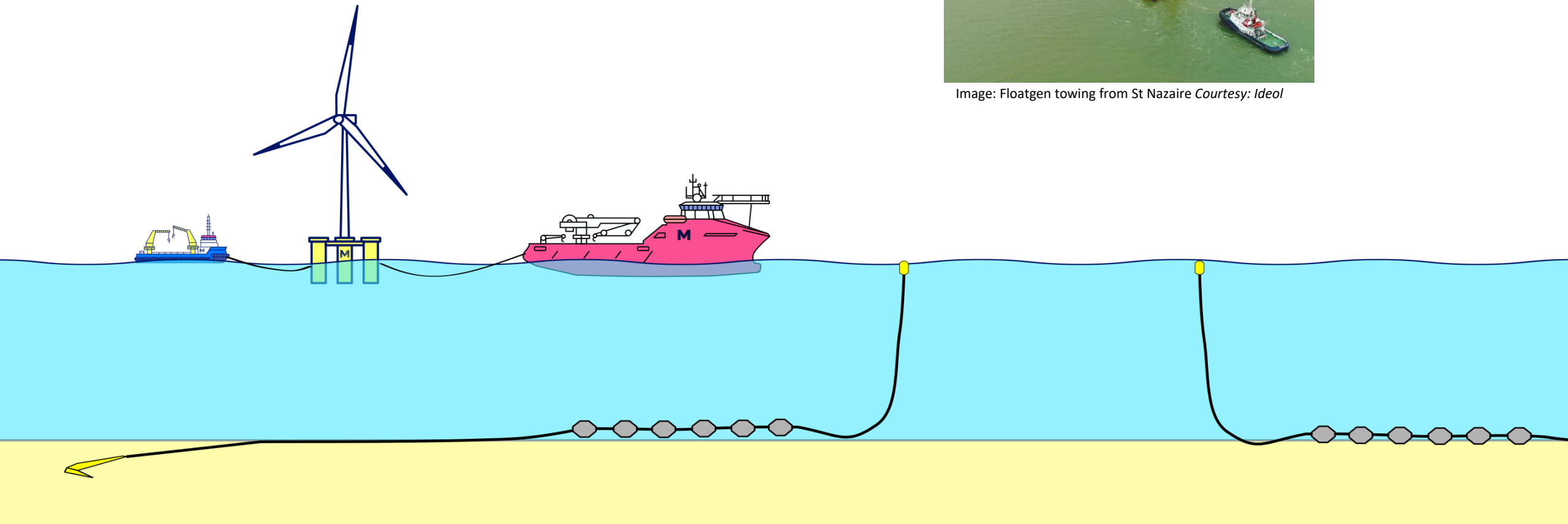
Image: Synthetic end to chain Courtesy: Lankhorst Offshore



Installation 3 –
Tow and Hookup

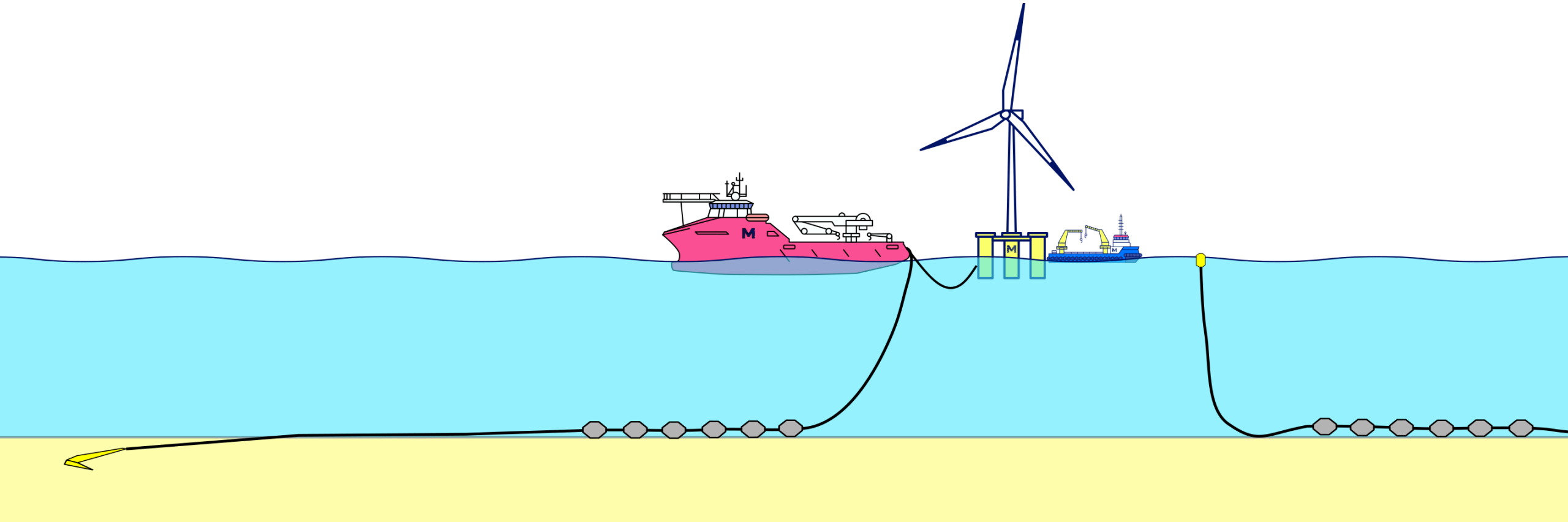
- Tow to site likely to be 2 AHT/Tugs

Image: Floatgen towing from St Nazaire *Courtesy: Ideol*



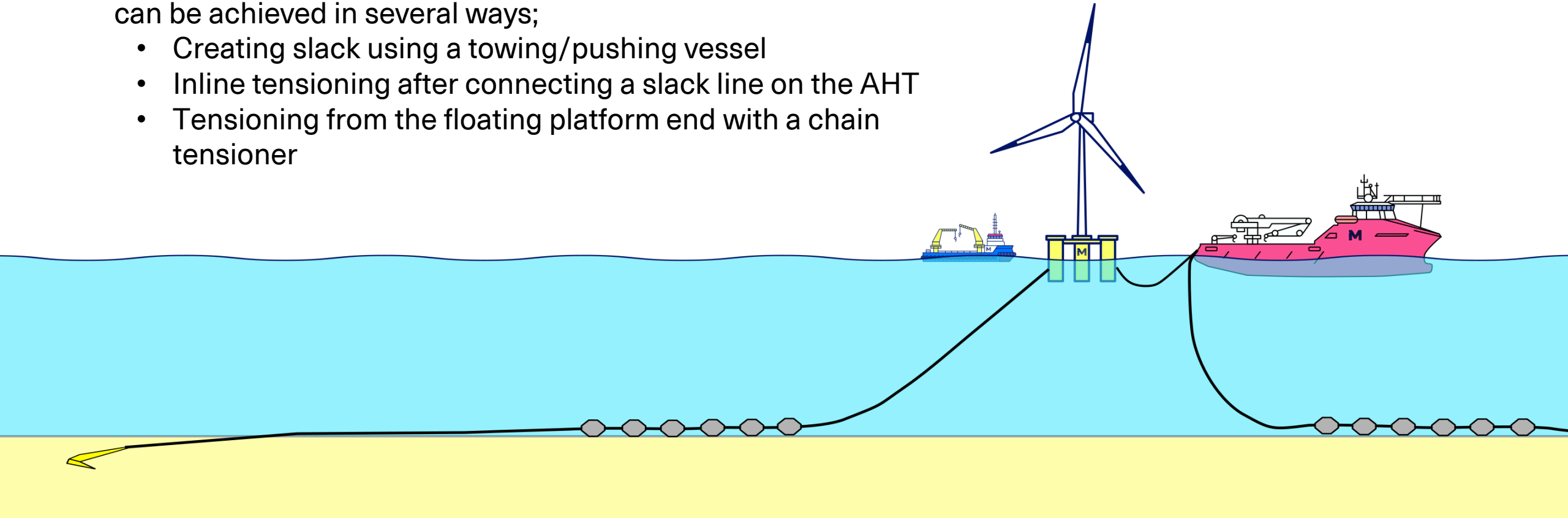
Installation 3 –
Tow and Hookup

- Tow to site likely to be 2 AHT/Tugs
- One vessel controls platform whilst second vessel collects and connects platform tail
- Repeated for the second line



Installation 3 –
Tow and Hookup

- Tow to site likely to be 2 AHT/Tugs
- One vessel controls platform whilst second vessel collects and connects platform tail
- Repeated for the second line
- The hook up of the final line and final tensioning of the spread can be achieved in several ways;
  - Creating slack using a towing/pushing vessel
  - Inline tensioning after connecting a slack line on the AHT
  - Tensioning from the floating platform end with a chain tensioner

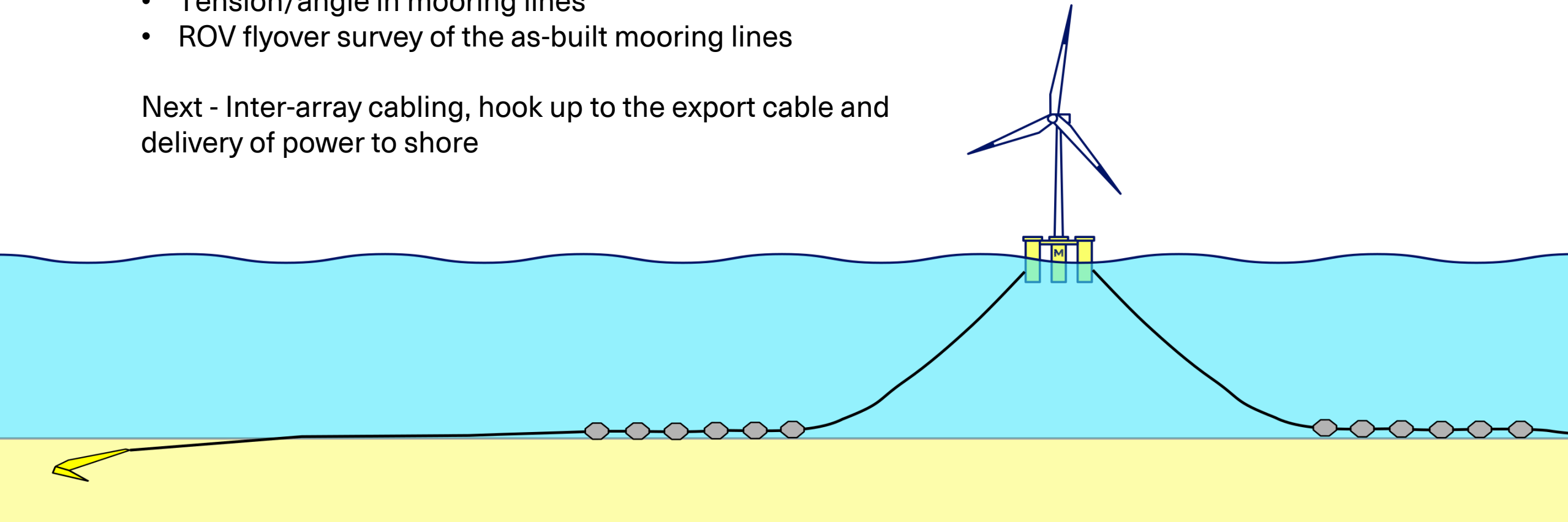


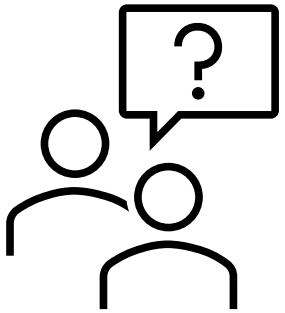
Completion

Before handing over the completed installation a few checks will be conducted to confirm;

- Evidence of anchor preloading
- The final platform location
- Tension/angle in mooring lines
- ROV flyover survey of the as-built mooring lines

Next - Inter-array cabling, hook up to the export cable and delivery of power to shore





Thank you for listening

Questions or follow up enquiries

Contact:
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