Ecosse Subsea Systems

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Presentation Overview

- **Company Introduction**
- **ESS Ethos**
- **The Decommissioning Market – Our Understanding**
- **ESS Offering**
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- **Summary**
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Introduction to Ecosse Subsea Systems

Personnel

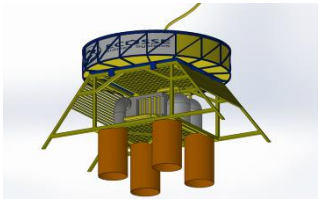
- ESS provide a specialist personnel and resourcing support business service across the full spectrum of offshore requirements.
- Today more than £350 million of subsea projects are managed by ESS personnel resource for and on behalf of our clients.

Engineering Consultancy

- Ecosse offer bespoke engineering and design solutions with a team combining a vast experience curve, specialist subsea expertise, coupled with procurement, fabrication, and installation know-how.

Pipe-lay Engineering

- ESS Pipe-lay technologies comprises of innovative patented offerings specifically developed over more than 25 years to address subsea operational challenges. These include trenching, cable/pipe-lay, and lifting applications.



Ambient Lifting

- ESS subsea lifting and positioning technologies
- Ambient lifting is a flexible mechanism using incompressible gas which facilitates control of the ascent, descent and underwater positioning of offshore structures.

Equipment Hire

- A wide range of equipment is available for hire to support and deliver subsea installation projects. Including 800-2000Te Carousel, 10Te Hydraulic Tensioners, SCAR Plough in its four configurations and PREP (Plastic Reeled Elastic Pipe-lay System).

ESS Ethos

Subsea Services that are focused on being:

- Client focused
- Safe
- Simple
- Robust
- Cost Effective
- Off-the Shelf Components
- Negate the requirement for specialist vessels
- Installable by local people and vessels
- Recoverable, recyclable

The Decommissioning Market – Our Understanding

- Conservative estimates predict market expenditure in UKCS is likely to exceed £35bn before 2040
- Market forecasts indicate that decommissioning expenditure in the North Sea could be between £1.1bn and £2.6bn per year
- There are in excess of 1500 registered installations in the North Sea and only 12% of these have been decommissioned to date
- The timing of these decommissioning activities will be influenced by several factors including the revenue generated from the asset, the market value of the commodity, the costs incurred to maintain the asset and the costs to decommission
- There is a 35% gap between the actual and desired capacity in the decommissioning supply chain
- Huge potential to reduce costs and simplify operations exist through the application of innovative approaches and technologies

** Source – Decommissioning in the North Sea – Demand vs Capacity (ARUP 2014)*

ESS Offering to the Decommissioning Market

- Small, independent Scottish company with different ideas….that can make a big impact
- Safe, Simple, Robust & Cost Effective way of thinking
- ESS can act as main Contractor
  - More likely to act as sub-contractor depending on work-scope
- ESS has the tools and personnel to execute:
  - Removal of subsea architecture (all sizes)
  - Burial of Pipelines and/or Bundles

Operational Capabilities

- Ambient Lifting:
  - Simple lifting apparatus – large or small structures
  - Used as a receptacle for small pieces of subsea architecture (subsea skip!)
- SCARMax:
  - Burial of Pipelines and/or Bundles
- Multi-Functional ROV – Cutter, Grab & MFE Configuration:
  - Used to cut/grab/dredge smaller items of subsea architecture

Ambient Lifting

Ambient Lifting – Introduction

- Ambient lifting is a flexible mechanism that allows accurate control of the ascent, descent and underwater positioning of subsea structures.
- Innovative subsea lifting without use of heavy-lift vessels.
- Ambient lifting can be used in a variety of industries including Oil & Gas, Decommissioning, Offshore Wind, Wave & Tidal Energy.
- Designed with a focus on minimising Client costs:
  - Spread cost is more than halved
  - Weather risk is significantly reduced
  - Vessel choice is increased

Ambient Lifting – Technical and Commercial Features

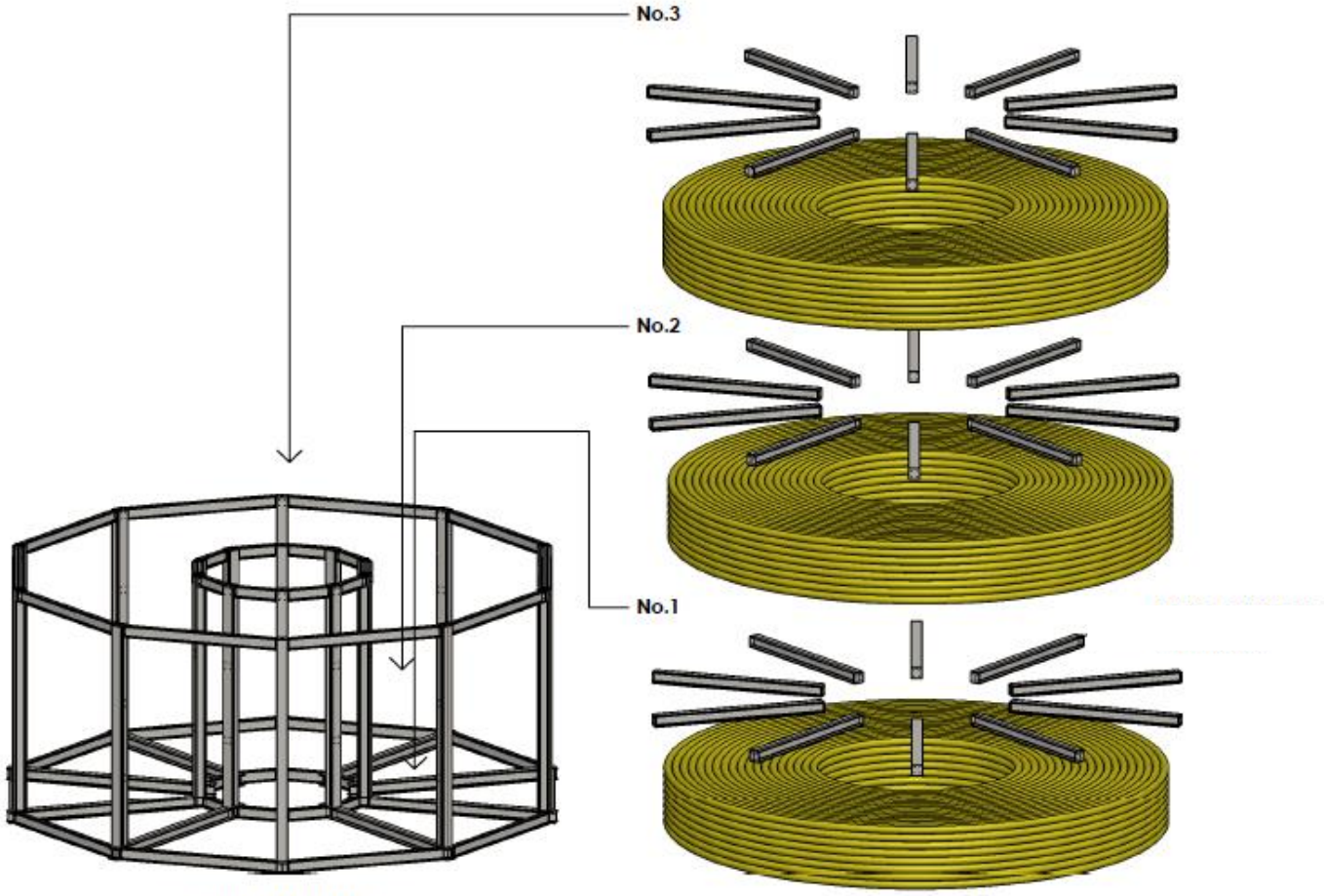
Technical:

- Safe, simple & robust
- Buoyancy and ballast pressure containing system
- Fully scalable
- Can lift <1Te to >1000Te
- Suited for confined operating spaces
- All testing/commissioning done on land
- Controlled descent & ascent for underwater ROV or diver positioning
- Low sensitivity to surface weather conditions for installation
- Recovery process is reverse installation process

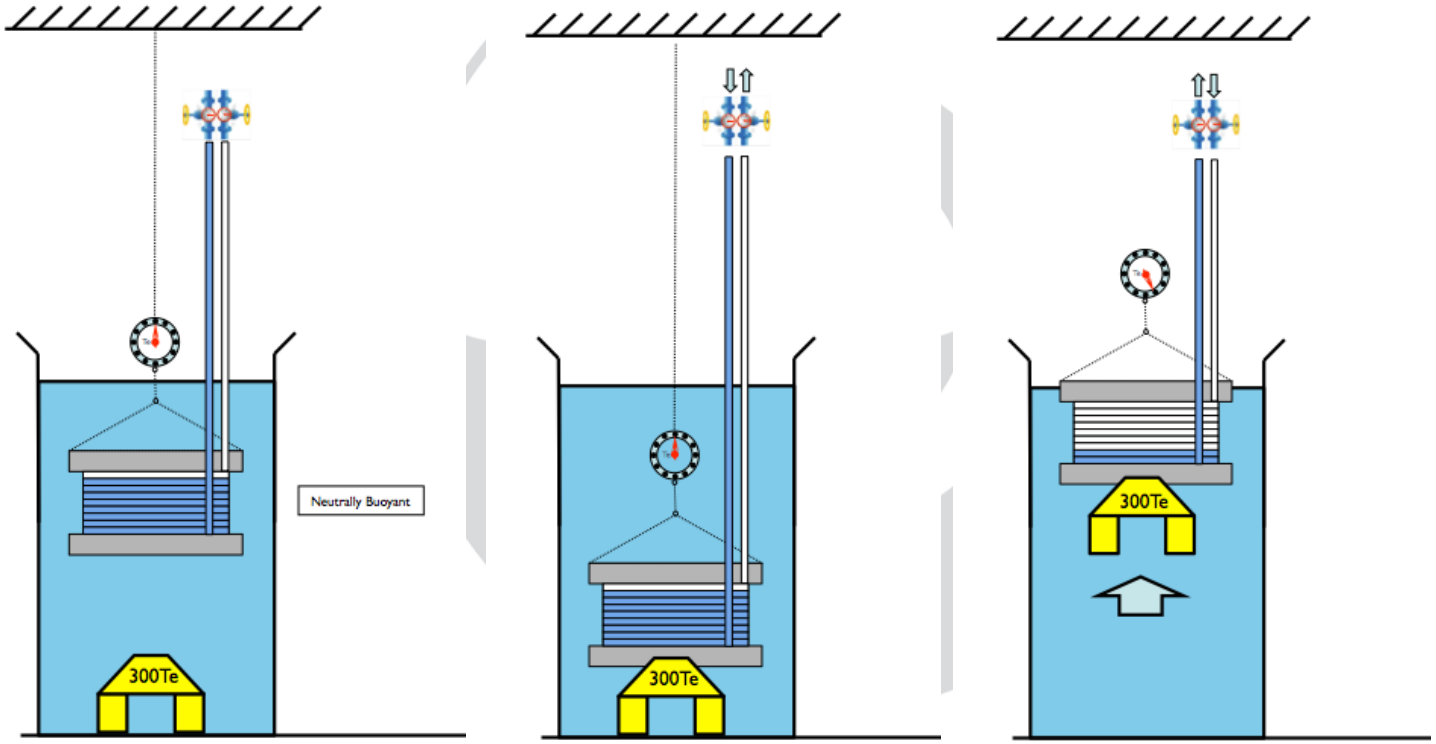
Commercial:

- Low cost materials
- Off-the-shelf components
- Can be built by local contractors
- Rapid fabrication, sized to suit application
- Re-usable
- Installed by small vessels
- Negates the need for expensive heavy lift vessels

Ambient Lifting – Typical Configuration



Ambient Lifting – Lifting Principle



Ambient Lifting – Innovative Mechanical Connection Option

Male portion attached to underside of Ambient Lifting frame

Female portion to be placed on the foundation.

Introducing SEA-STAB*

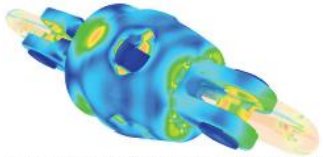
enginuity

A rapidly deployed, re-usable, high-load connector designed for challenging marine environments

Redeployable high-load connections made simple

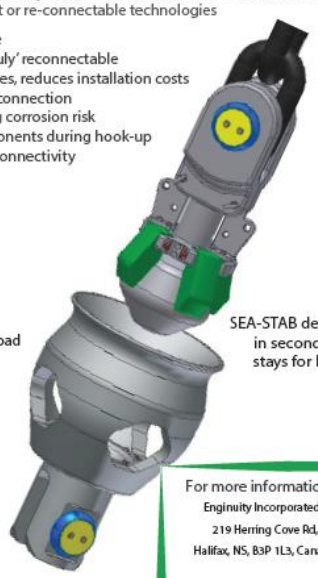
Whether you're installing buoyancy, securing a vessel or deploying subsea architecture, the new SEA-STAB from Enginuity offers elegant, cost-effective and rapid, high load connections.
Designed to be stronger than any equivalent sized chain, with a fully scalable design allowing for working loads up to 30,000kN. SEA-STAB outperforms traditional permanent or re-connectable technologies

- Instant connection saves money, first time and every time
- Won't deform under load ensuring connector remains 'Truly' reconnectable
- Self-centers during deployment with wide approach angles, reduces installation costs
- 'Instant grab' - full load can be applied within seconds of connection
- Only 5 Moving parts with no dissimilar materials reducing corrosion risk
- Configurable coupling reduces need for additional components during hook-up
- Fully redundant secondary locking mechanism, ensures connectivity



Finite Element Analysis showing connector at chain break load

Female and male components with optional padeye



SEA-STAB deploys in seconds, stays for life

Deployable in:
- Marine fendering, docking and mooring
- Oil and Gas exploration, installation and production
- Boom deployment and recovery
- Subsea asset deployment and retrieval
- Dynamic cargo loading and unloading

* Worldwide Patent Pending

Creative Engineering, Intuitively

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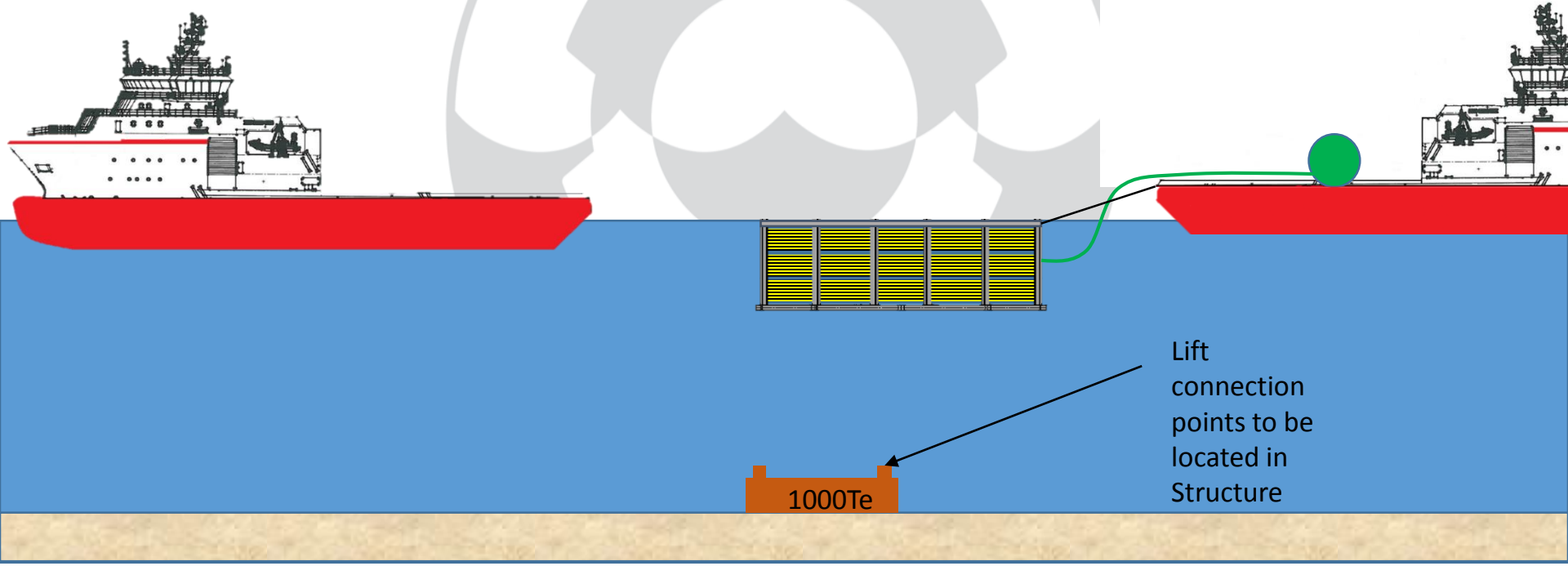
In collaboration with:

OCEANSIDE EQUIPMENT LIMITED

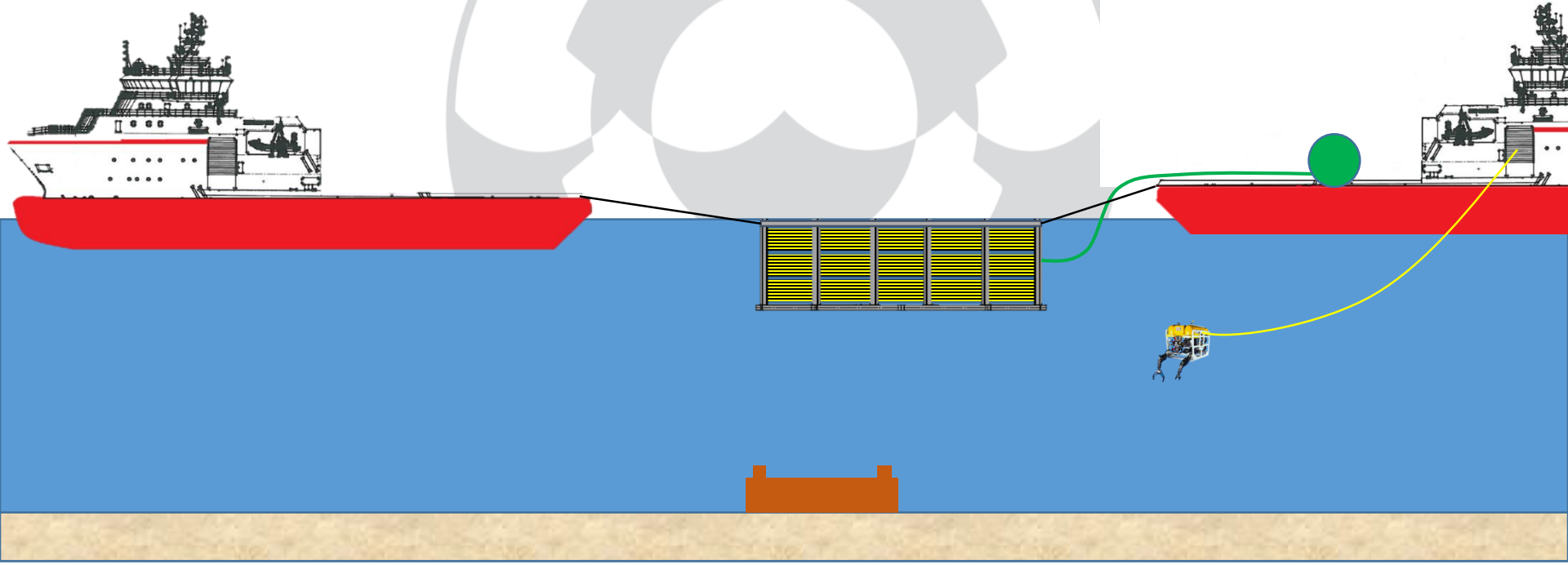
Ambient Lifting – Large Structures Example (1 of 5)

Two AHTS vessels are implemented for the removal of the subsea Structure



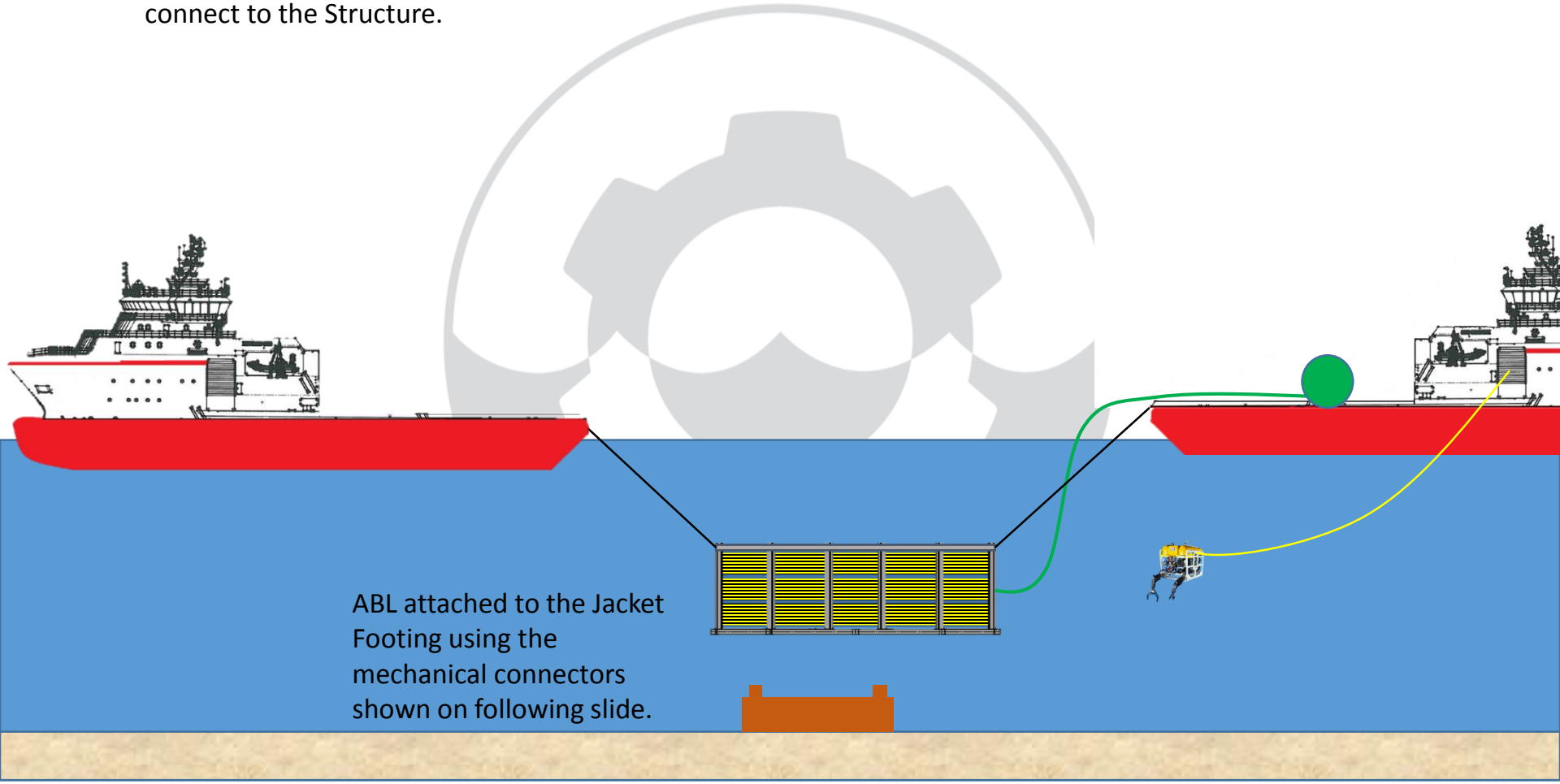
Ambient Lifting – Large Structures Example (2 of 5)

The ABL unit is constrained by tow chains from the vessels.



Ambient Lifting – Large Structures Example (3 of 5)

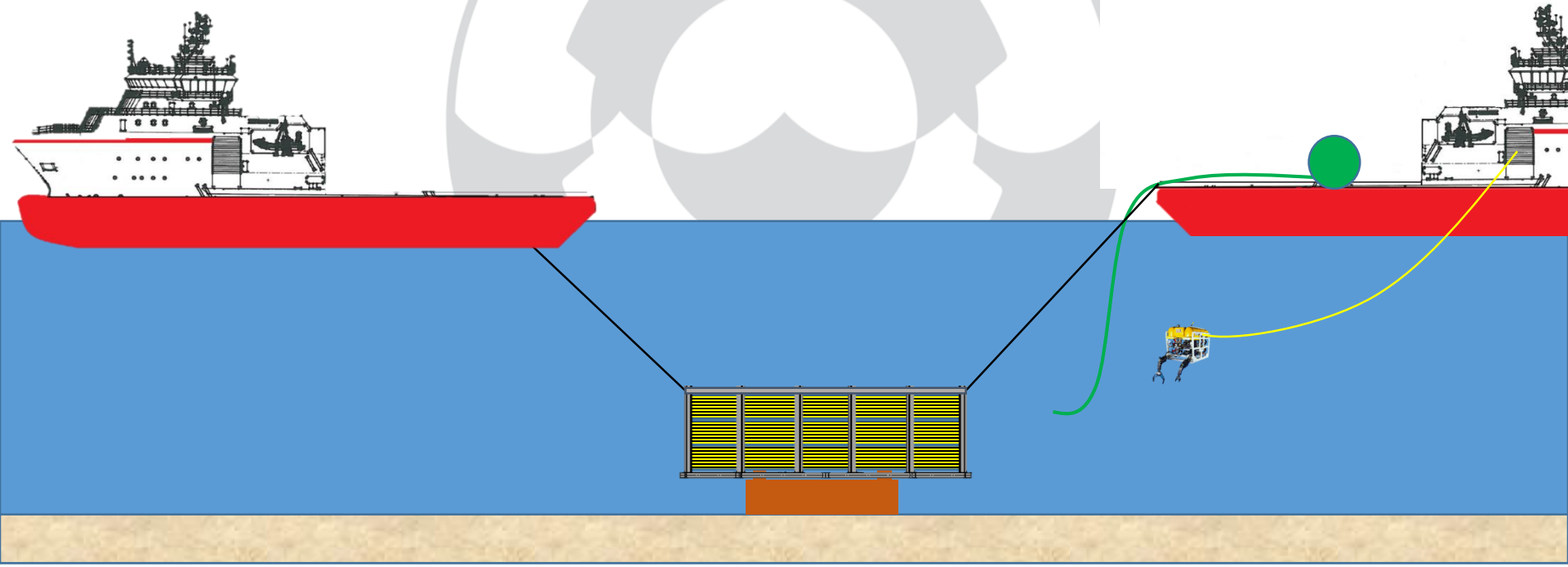
The ABL unit ballasted down to connect to the Structure.



ABL attached to the Jacket Footing using the mechanical connectors shown on following slide.

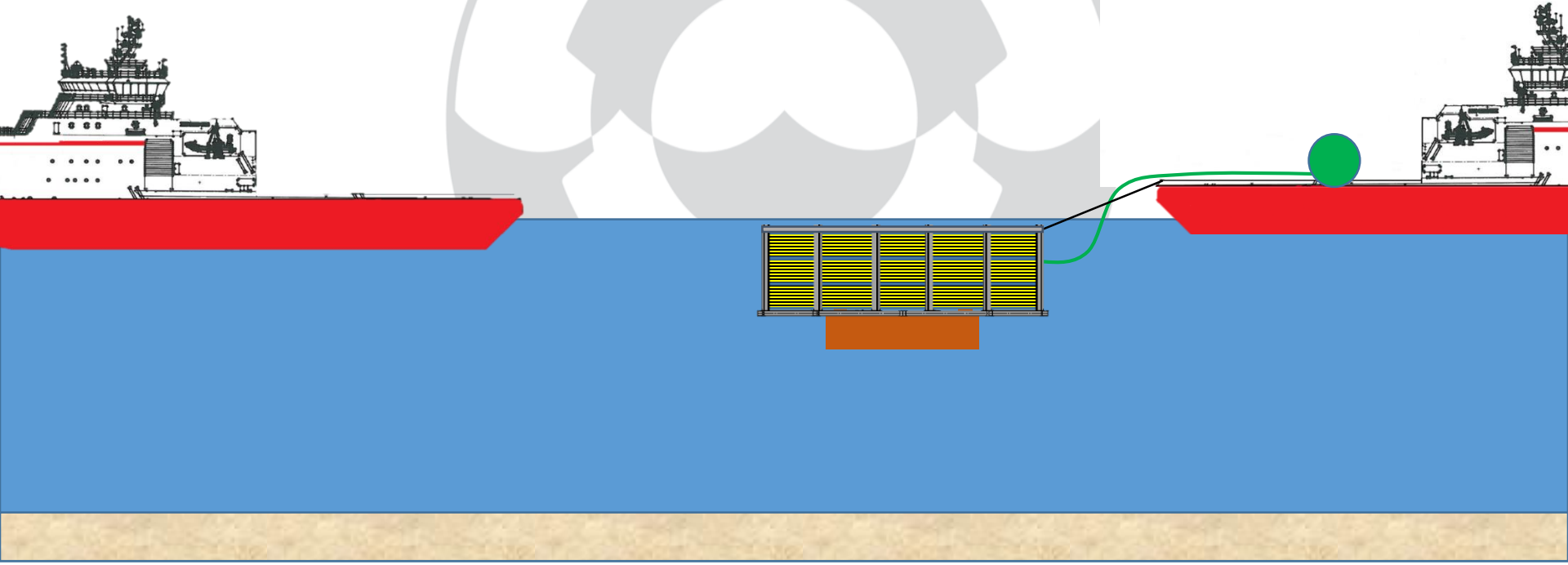
Ambient Lifting – Large Structures Example (4 of 5)

Upon connection, buoyancy is added to ABL unit to lift Structure from the seabed.

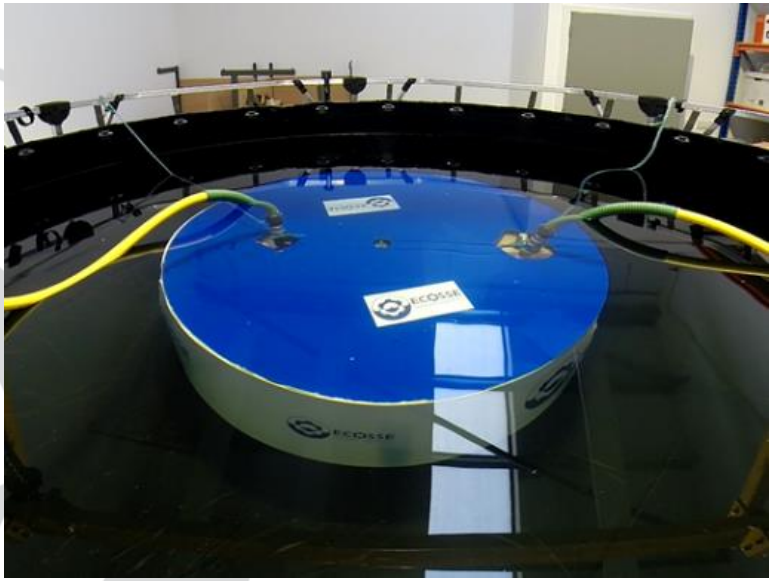


Ambient Lifting – Large Structures Example (1 of 5)

The unit can be towed by a single vessel to port for decommissioning.



Ambient Lifting – Current Status

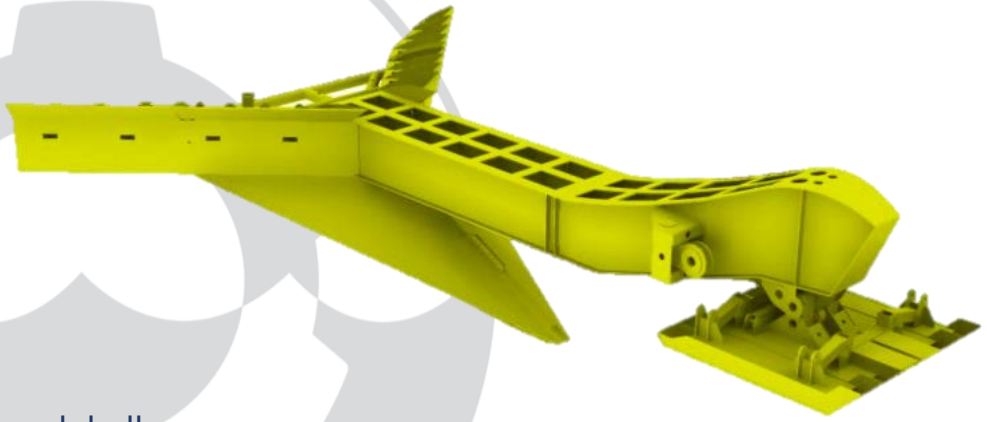


- Prototype constructed, 1:10 model
- Test tank procured for ESS Workshop
- Successful prototype trials undertaken
- Trials witnessed by potential Clients
- Secured 1st Project
  - Installation of gravity based foundation
  - 400Te foundation – on-bottom weight
  - Detailed design complete Q4 2015
  - Installation Q1/Q2 2016 – using multi-cats in extreme currents
- Evaluating and implementing feedback on system e.g. contingency measures

SCARMax

SCARMax

- SCARMax is a modular seabed system:
  - designed with deep burial of pipelines/umbilicals/bundles
- Modular chassis:
  - depths of 2m or 3m during first pass.
- In-trench ploughing configuration:
  - facilitates achievable depths >4m
- 1000Te max load capacity.
- Road Transportable
  - for cost effective shipping and mobilization globally.
- Mobilised to Anchor Handling Vessels for operational flexibility:
  - Stern Roller launched
  - No requirement for heavy A-frames or cranes offshore.
- Trench completed alongside existing product with product guided in simultaneously or on a subsequent pass through roller cradles.



SCARMax – Current Status

- Fabrication completed October 2015
- Trial assembly completed November 2015
- Available for mobilisation – currently assembled at quayside storage location
- Advanced discussions regarding sea trials taking place with vessel owners and current/potential clients.
- Actively being offered and discussed as a solution for interconnectors and offshore renewable export route burial.

SCARMax – Post Lay Burial – Trials

ECOSSE Subsea Systems

ESS Multi-Functional ROV (MFR)

MFR Grab – Multi-Function ROV System

- ESS's MFR system, is a Multi Function ROV with an attachment point on the underside for various tooling such as hydraulic grab, cutter or MFE.
- This system is an fast and accurate way of carrying out subsea relocation or dredging works.
- The depth of the MFR is determined by the length of armoured umbilical, up to a maximum depth of 2000m.
- Weight: 4.5 tons in air and 4 tons in water
- 2.5m long, is 2.0m wide when closed and 3.0m wide when open.
- Height of 3.9m when closed and 3.5m when open
- The MFR Grab is design to lift up to a max subsea weight of 8 tons and has a closed grab capacity of $1.5m^3$

MFR Grab – Boulder Grab System

- The MFR is launched from a dedicated A frame, either off the side of a vessel or though a moonpool.
- System is capable of work in shallow water and higher sea states than crane launched systems.
- No surface hydraulic feed required – ROV provides power for subsea tooling.

Summary

- ESS have available a range of robust complementary technologies that can be used to complete Decommissioning scopes in a safe, simple, yet cost-effective manner.
- ESS can also provide engineering services, consultancy and project management.
- Ambient lifting: used to recover/relocate small to large subsea structures and to recover smaller items of subsea architecture.
- SCARMax: deep burial of pipelines, umbilicals and bundles.
- Multi-Function ROV: shear cutter or grab attachment for recovery/relocation of subsea pipelines or smaller architecture. MFE for burial/de-burial of pipelines/umbilicals or foundations.
- All designed for rapid mobilisation onto many standard offshore vessels from any UK offshore port.
- ESS has recently signed vessel framework agreement with Siem Offshore – so guaranteed access to vessels at known rate.

Thank you

Contacts

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