Introduction to Allseas

13 July 2023 – Kingston, Jamaica

Allseas' activities

(video)

Allseas – Dare to Pioneer

Founded in 1985, pushing the boundaries of technology, with innovation and entrepreneurial spirit.

- A world-leading contractor in the offshore energy market.
- Experts in pipelay, heavy lift, subsea construction and deep-sea mineral collection.
- Offices in Switzerland, The Netherlands, Belgium, Houston TX, Australia and Malaysia.
- Over 2,500 employees worldwide.
- Eight offshore construction vessels.

Pushing the boundaries of technology in 1986

Allseas' first vessel *Lorelay* was the world's first pipelay vessel to operate on full Dynamic Positioning.

This revolutionised offshore pipelaying.

She installed more than 9000 km of pipeline worldwide in depths up to 2730 m.

Pushing the boundaries of technology in 1998

Solitaire, the world's largest and most technically advanced pipelay vessel when launched in 1998.

Holds almost every deep-water pipelay record.

Pushing the boundaries of technology in 2016

Pioneering Spirit, operational since 2016.

Installs and removes large offshore platforms in a single piece and record-weight pipelines in all water depths.

The world's largest and most sophisticated construction vessel.

Capacity and efficiency unrivalled anywhere in the industry.

- (video)

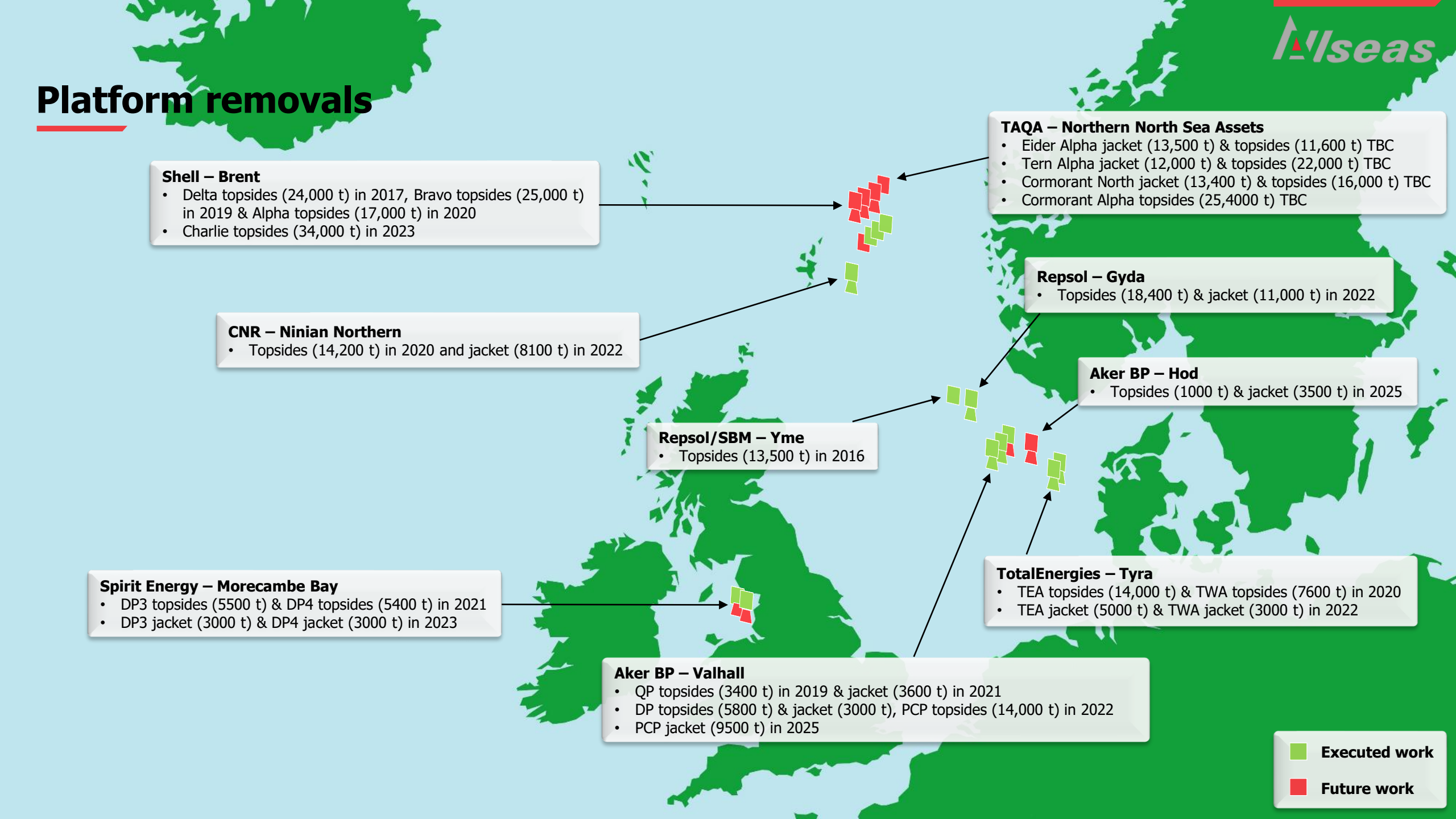
Pipelines installed

27,000 km

>300 projects

<3000 m deep

Platform removals



Shell – Brent
- Delta topsides (24,000 t) in 2017, Bravo topsides (25,000 t) in 2019 & Alpha topsides (17,000 t) in 2020
- Charlie topsides (34,000 t) in 2023

TAQA – Northern North Sea Assets
- Eider Alpha jacket (13,500 t) & topsides (11,600 t) TBC
- Tern Alpha jacket (12,000 t) & topsides (22,000 t) TBC
- Cormorant North jacket (13,400 t) & topsides (16,000 t) TBC
- Cormorant Alpha topsides (25,4000 t) TBC

Repsol – Gyda
- Topsides (18,400 t) & jacket (11,000 t) in 2022

CNR – Ninian Northern
- Topsides (14,200 t) in 2020 and jacket (8100 t) in 2022

Aker BP – Hod
- Topsides (1000 t) & jacket (3500 t) in 2025

Repsol/SBM – Yme
- Topsides (13,500 t) in 2016

TotalEnergies – Tyra
- TEA topsides (14,000 t) & TWA topsides (7600 t) in 2020
- TEA jacket (5000 t) & TWA jacket (3000 t) in 2022

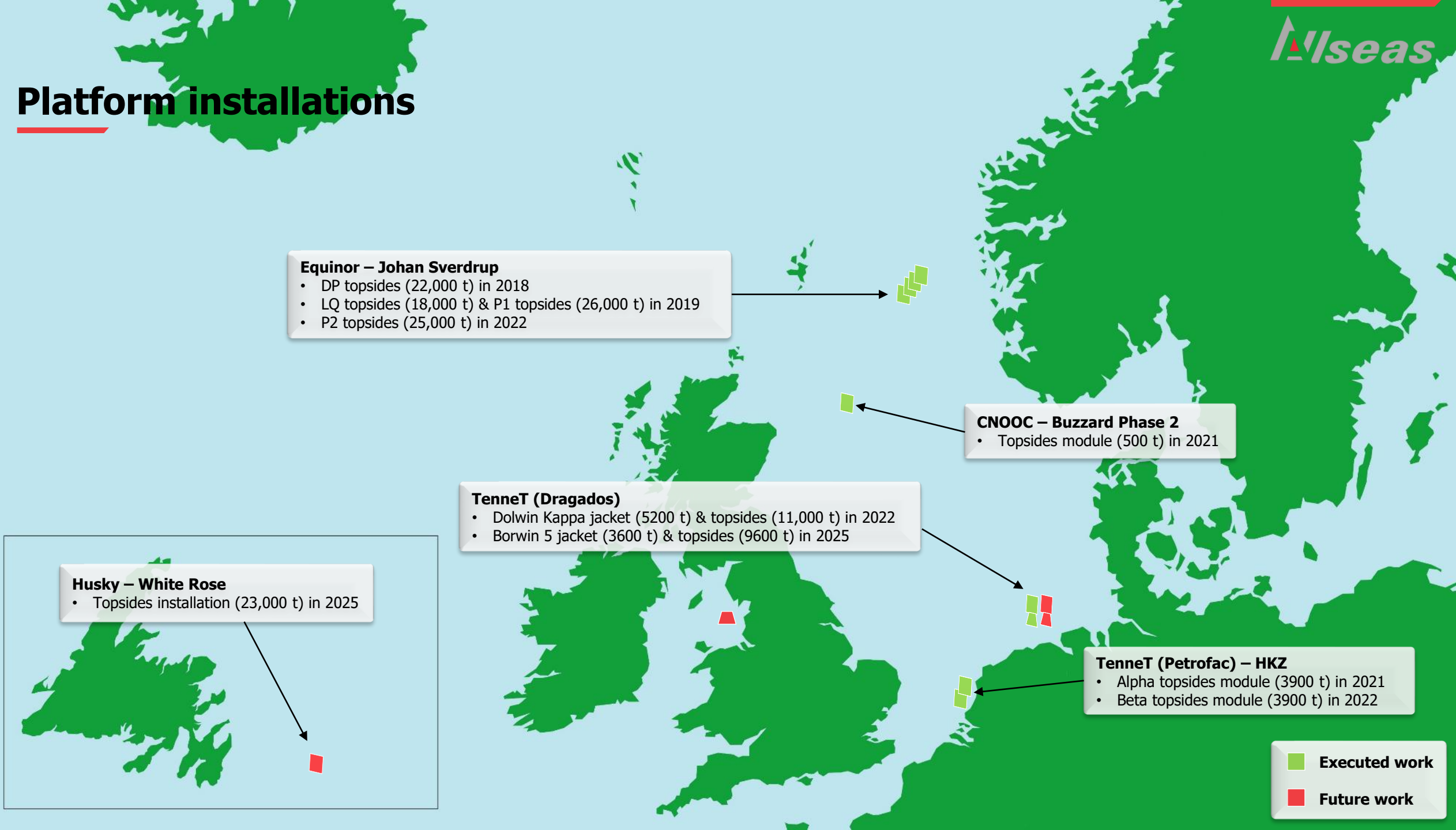
Spirit Energy – Morecambe Bay
- DP3 topsides (5500 t) & DP4 topsides (5400 t) in 2021
- DP3 jacket (3000 t) & DP4 jacket (3000 t) in 2023

Aker BP – Valhall
- QP topsides (3400 t) in 2019 & jacket (3600 t) in 2021
- DP topsides (5800 t) & jacket (3000 t), PCP topsides (14,000 t) in 2022
- PCP jacket (9500 t) in 2025

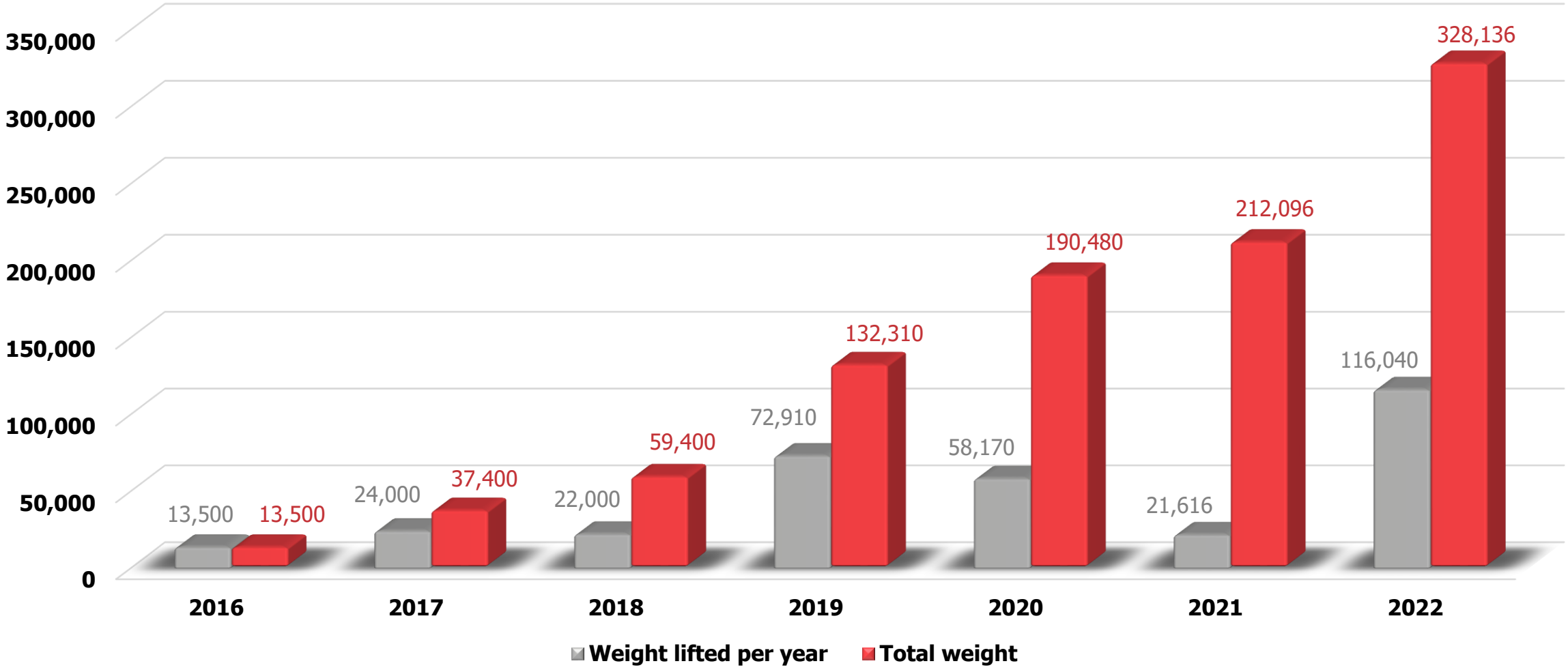
Executed work

Future work

Platform installations



Platform facilities weight lifted year on year (end 2022)



Our mission

We are pioneers in heart and soul. In a world that is changing more than ever, we are constantly finding new ways to enable and deploy groundbreaking advances in the offshore energy market.

Our mission is to remain a frontrunner in the offshore energy market by continuously pushing the boundaries of technology.

That’s how we’ve always done it…

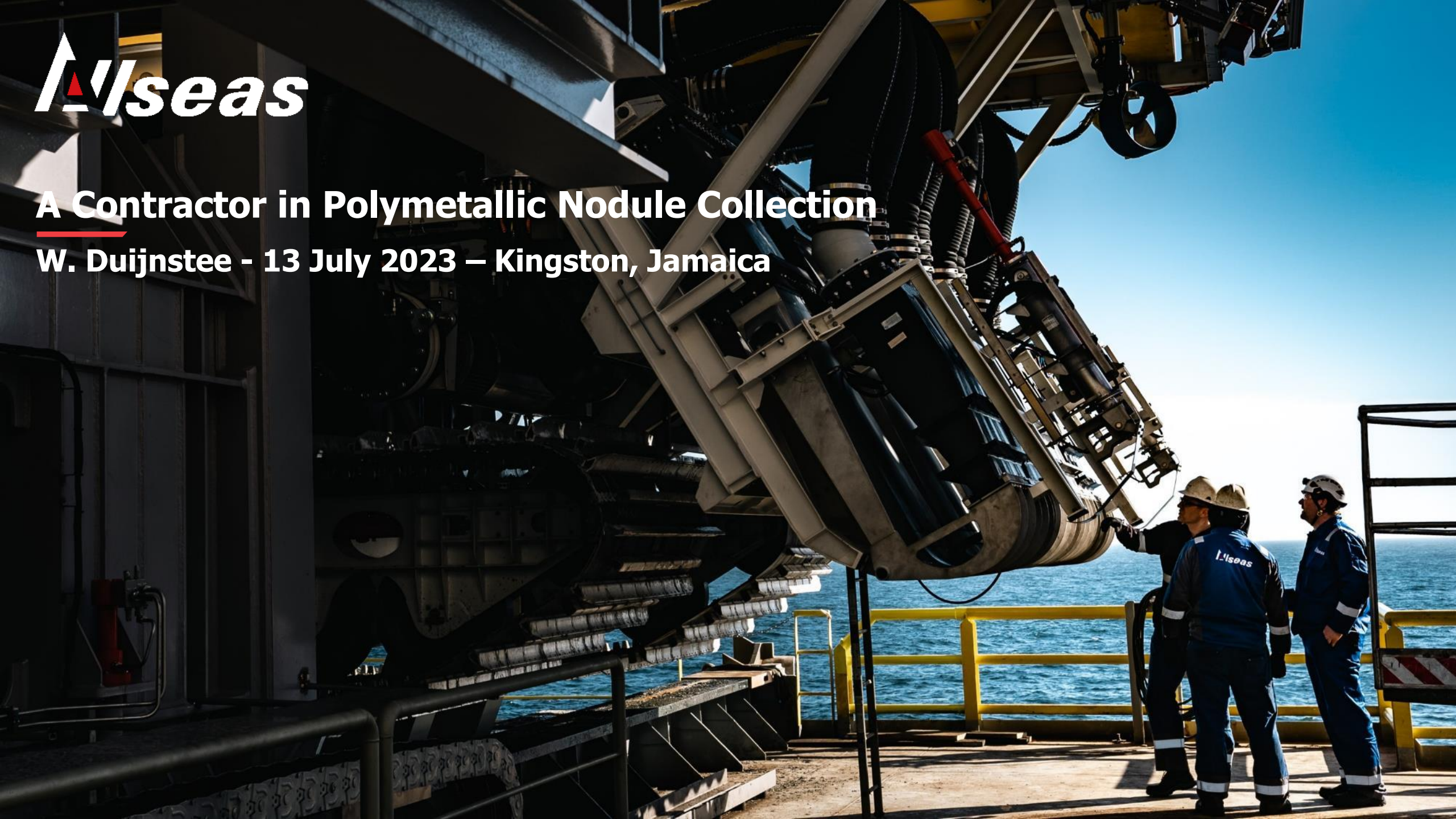
Our vision for the future

As new markets emerge, so do opportunities to apply our engineering expertise to develop new technology that will play a key role in the energy transition.

We optimise our solutions to drive efficiency and minimise the potential environmental impact.

We pioneer the development of ground-breaking offshore technology, driven by creative thinkers who dare to try new things.

So which technical boundary will we push next…?



A Contractor in Polymetallic Nodule Collection

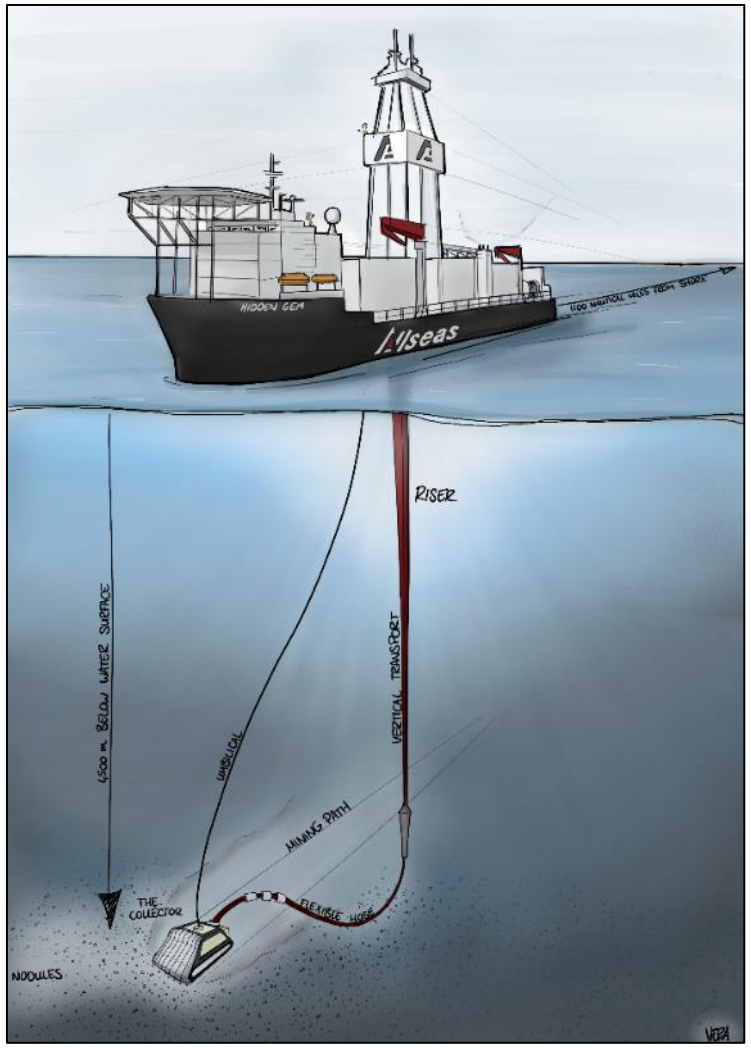
W. Duijnstee - 13 July 2023 – Kingston, Jamaica

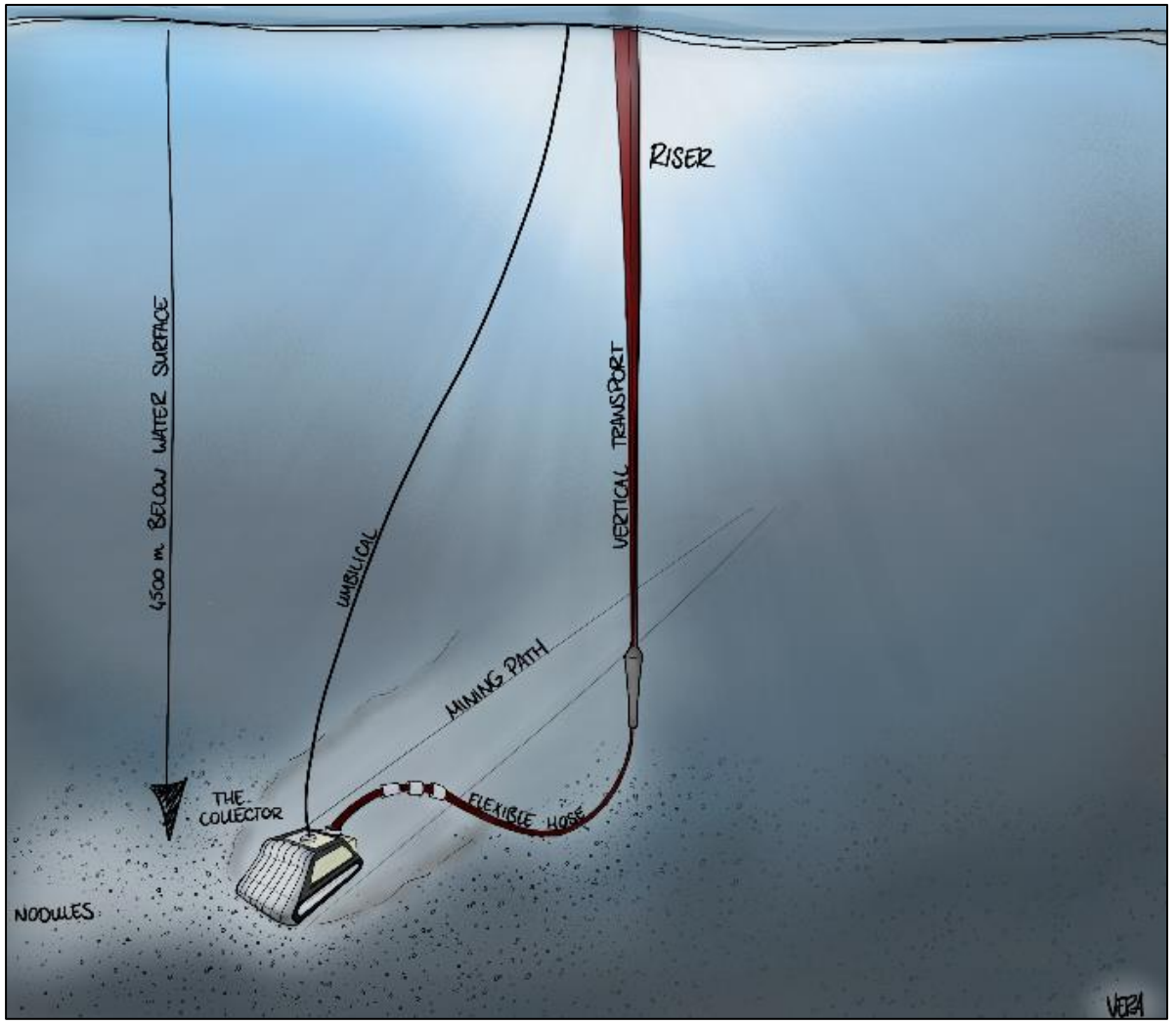
Layout of today's presentation

- The start: Design and pilot test preparations
- Pre-testing our concept
- Integrated Nodule Pilot Collection Test, the "Pilot Test"
- What's next? The Follow-up

Design and pilot test preparations

How to: Nodule collecting concept





Nodule Collection Support Vessel

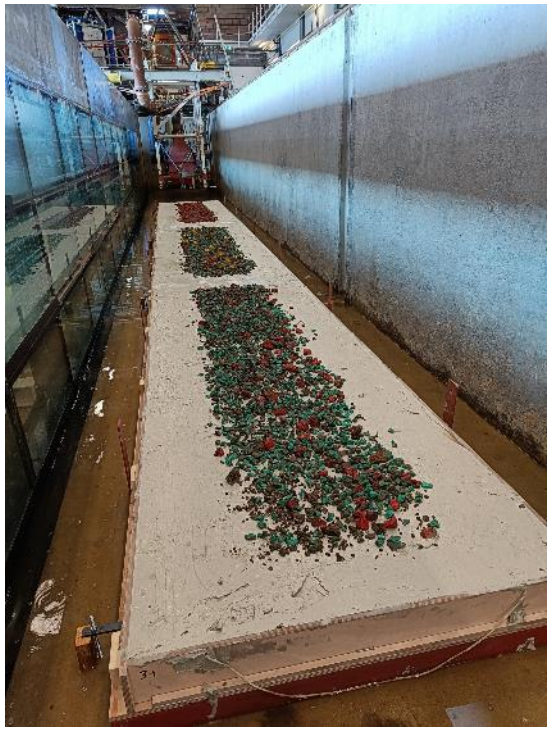
- Former drilling vessel:
  - Capabilities to build a riser pipe;
  - More sustainable compared to a new vessel;
  - With minimum adjustments, fulfils all requirements.

Method of collecting

(video)

Film of test

Before

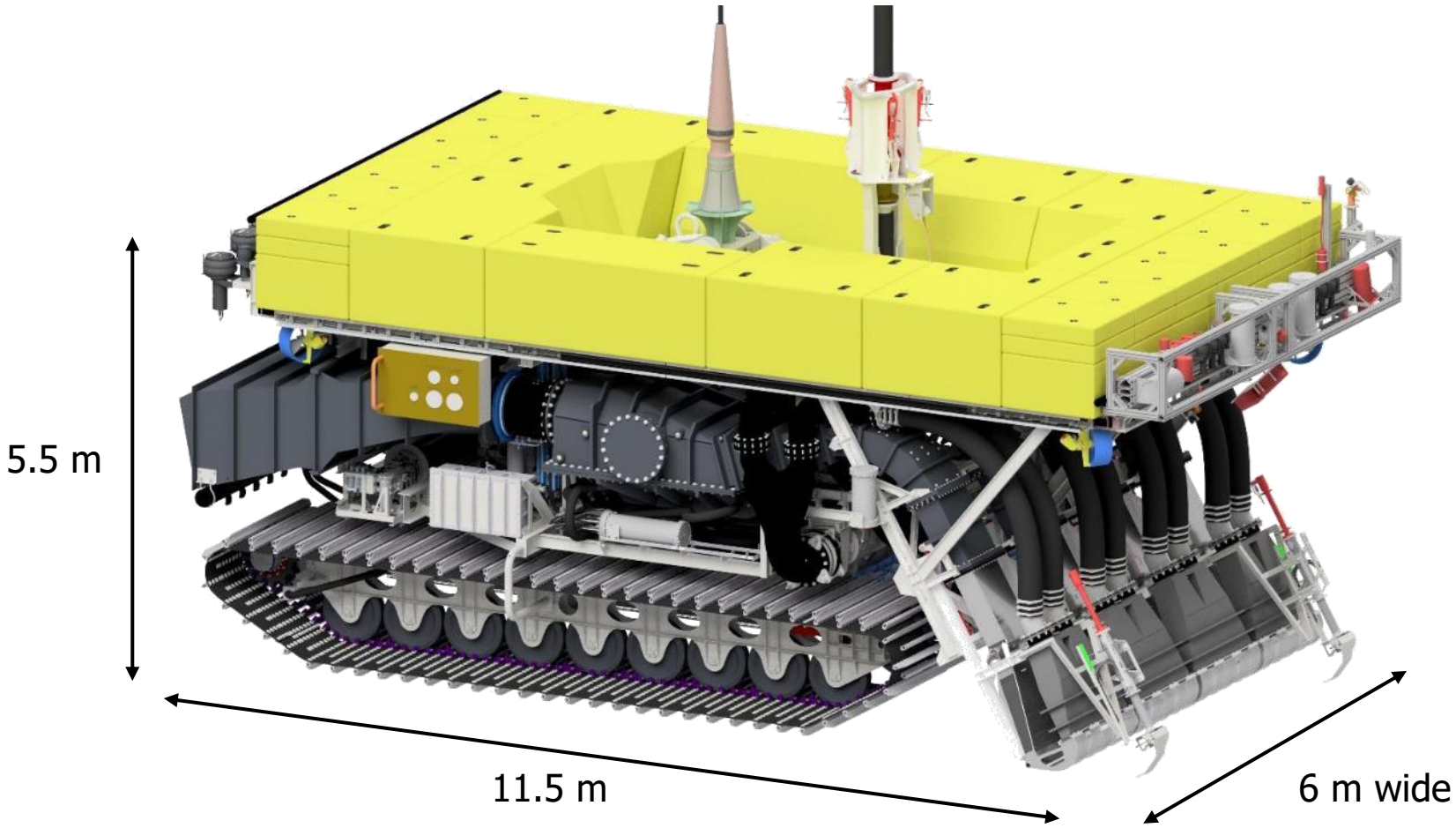


Nozzles are designed to minimize seabed disturbance in combination with high pick-up efficiency.

Multiple tests were done in a Dutch water and soil flume (water tank) using artificial nodules.

After

Designing a collector



4,300 m maximum operating depth

Designed to minimize environmental impact:

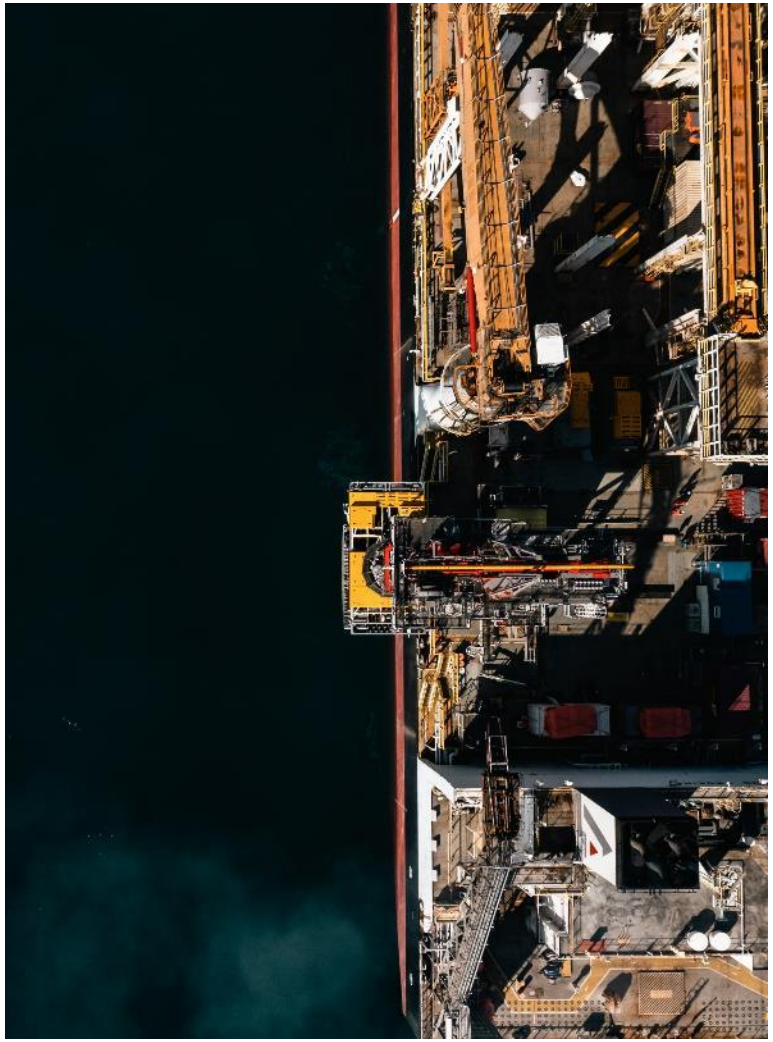
- Low-impact tracks;
- Fines rejection system;
- Efficient diffuser configuration;
- Coandă-effect nozzles.

Pre-testing our concept

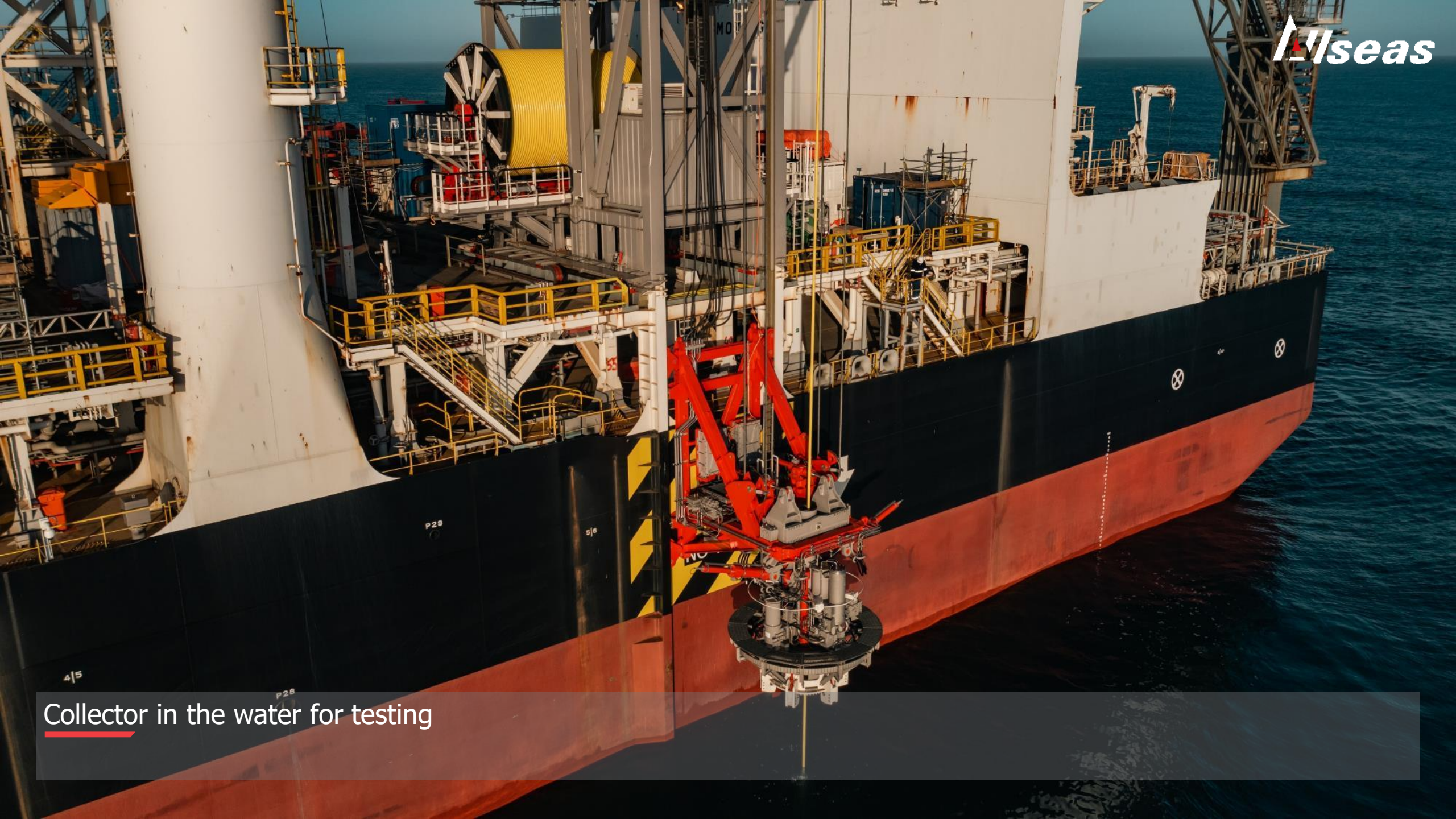
The goals for the pre-tests

- Functional and integration test of equipment.
- Prove the functioning of mechanical and software systems of the collector during driving on the seafloor.
- Prove the functioning of the system under high load.

First pre-test (21): North Sea, Dutch Section.
Second pre-test (9): Atlantic, Canary Islands, Spain.



Hidden Gem ready for drive testing on the North Sea, Dutch Section



Collector in the water for testing

Testing of vertical lift system, Atlantic, Spain.

Testing of vertical lift system, Atlantic, Spain.

The results of the pre-test

- Functional and integration test of equipment - **PASSED**.
- Prove the functioning of mechanical and software systems of the collector during driving on the seafloor - **PASSED**.
- Prove the functioning of the system under high load - **PASSED**.

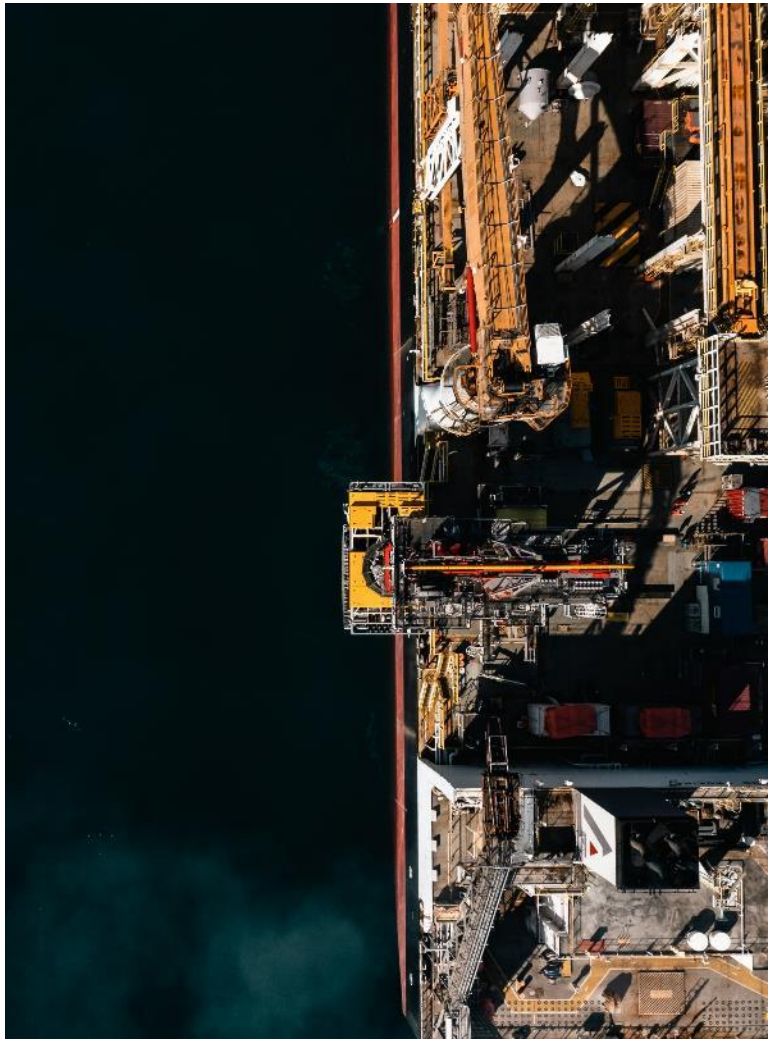
- The system passed a total of 30 tests offshore.

- System ready for the Integrated Nodule Pilot Collection Test in the Clarion Clipperton Zone.

Integrated Nodule Pilot Collection Test

The goals for the pilot test

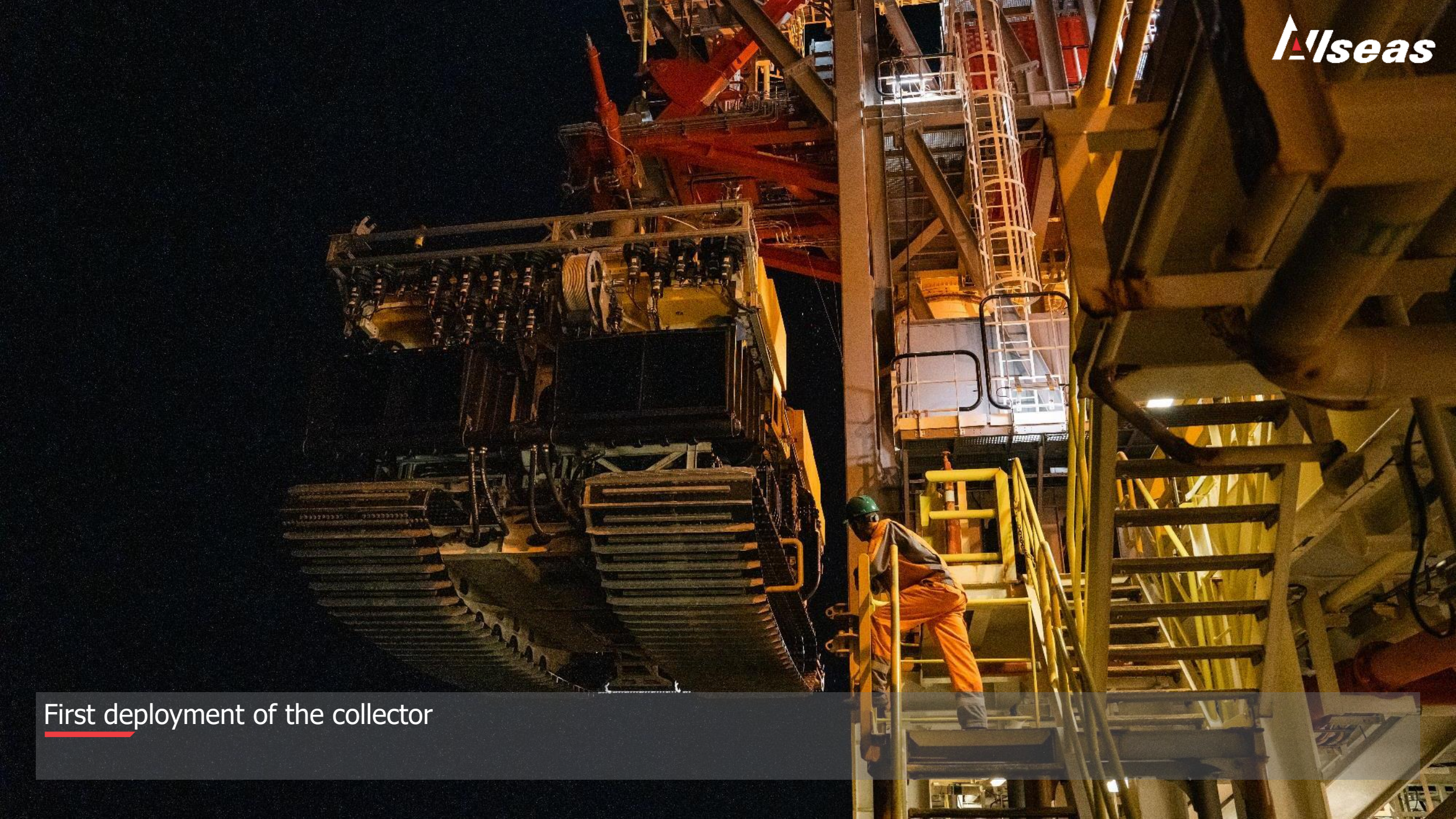
- Assess environmental impact both short and long term;
  - Monitoring of the mid-water and benthic plumes;
  - Monitoring of the physical and biological impacts.
- Proof of concept of prototype collecting equipment;
- Reliable collecting system:
  - Operate 24/7;
  - Minimize mechanical downtime.
- Nodule collecting efficiency.



Allseas vessel Fortress delivers final project material

Arrival in Nori D field on 19th of September

First ROV dive – first glimpse of the nodules on the seabed



First deployment of the collector

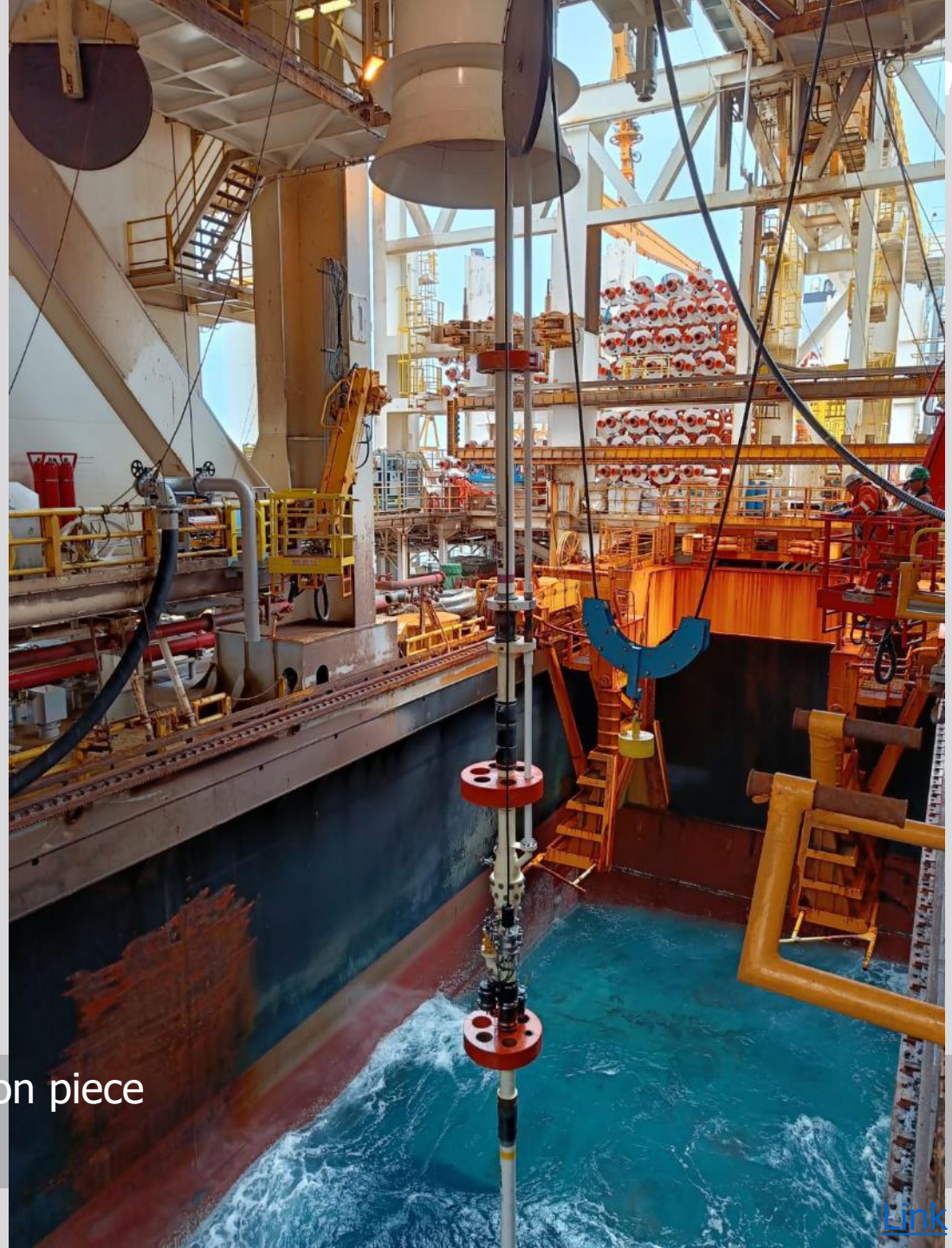
The seabed after collecting

First nodules recovered by the collector

3t bulk sample of nodules from the diffusor

Link

Deployment of the flexible jumper including its buoyancy elements



Deployment of riser special sections; riser base and airinjection piece

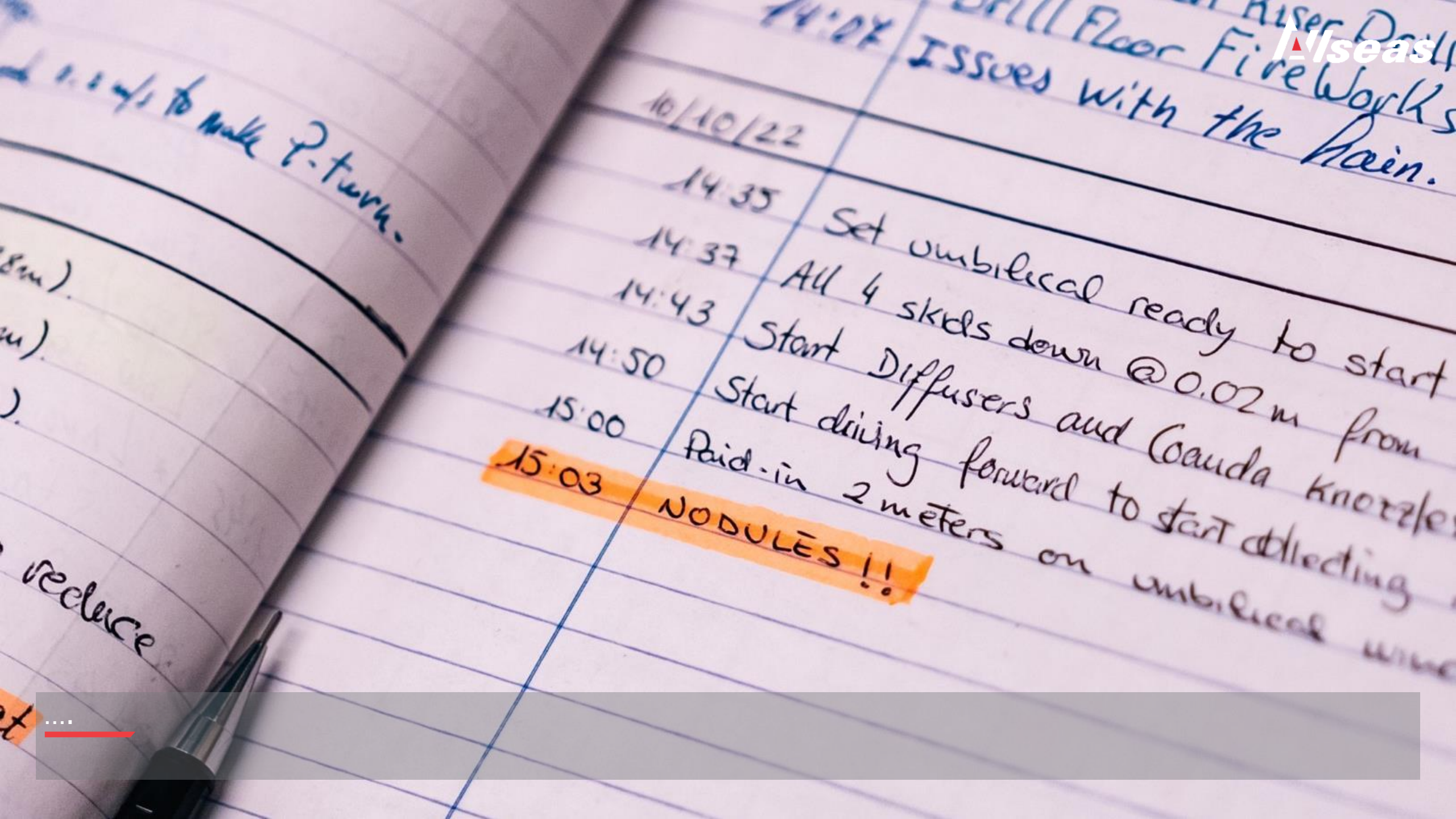
Link

Connection the rigging to lift the riser sections

Environmental sampling of return water

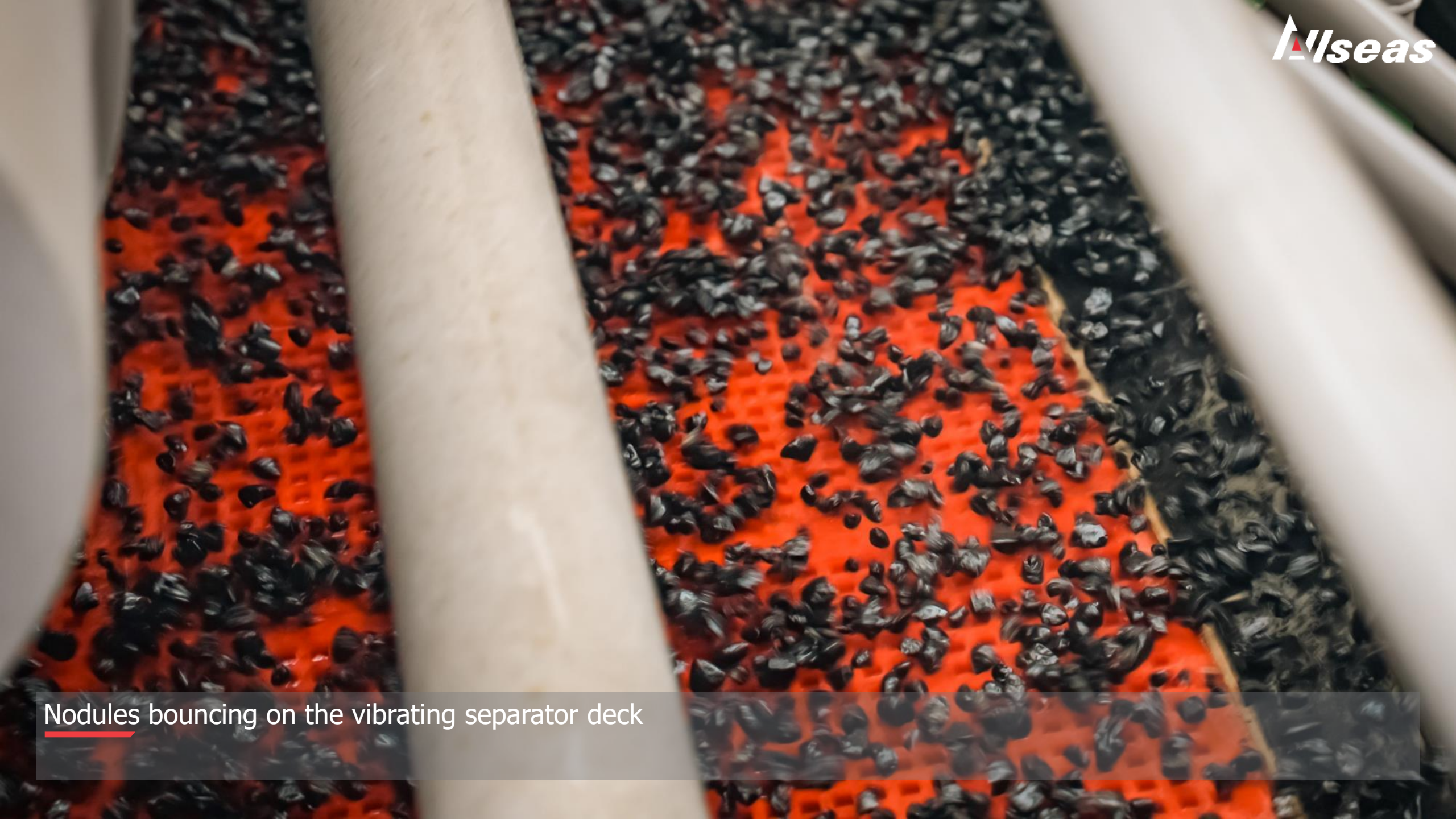
Analysing the samples in the refurbished mud laboratory

Trainee from the International Seabed Authority


14:02
Issues with the Main.
10/10/22
14:35
Set umbilical ready to start
14:37
All 4 skids down @ 0.02m from
14:43
Start Diffusers and Coanda knozzle
14:50
Start driving forward to start collecting
15:00
Paid-in 2 meters on umbilical
15:03
NODULES!!

....

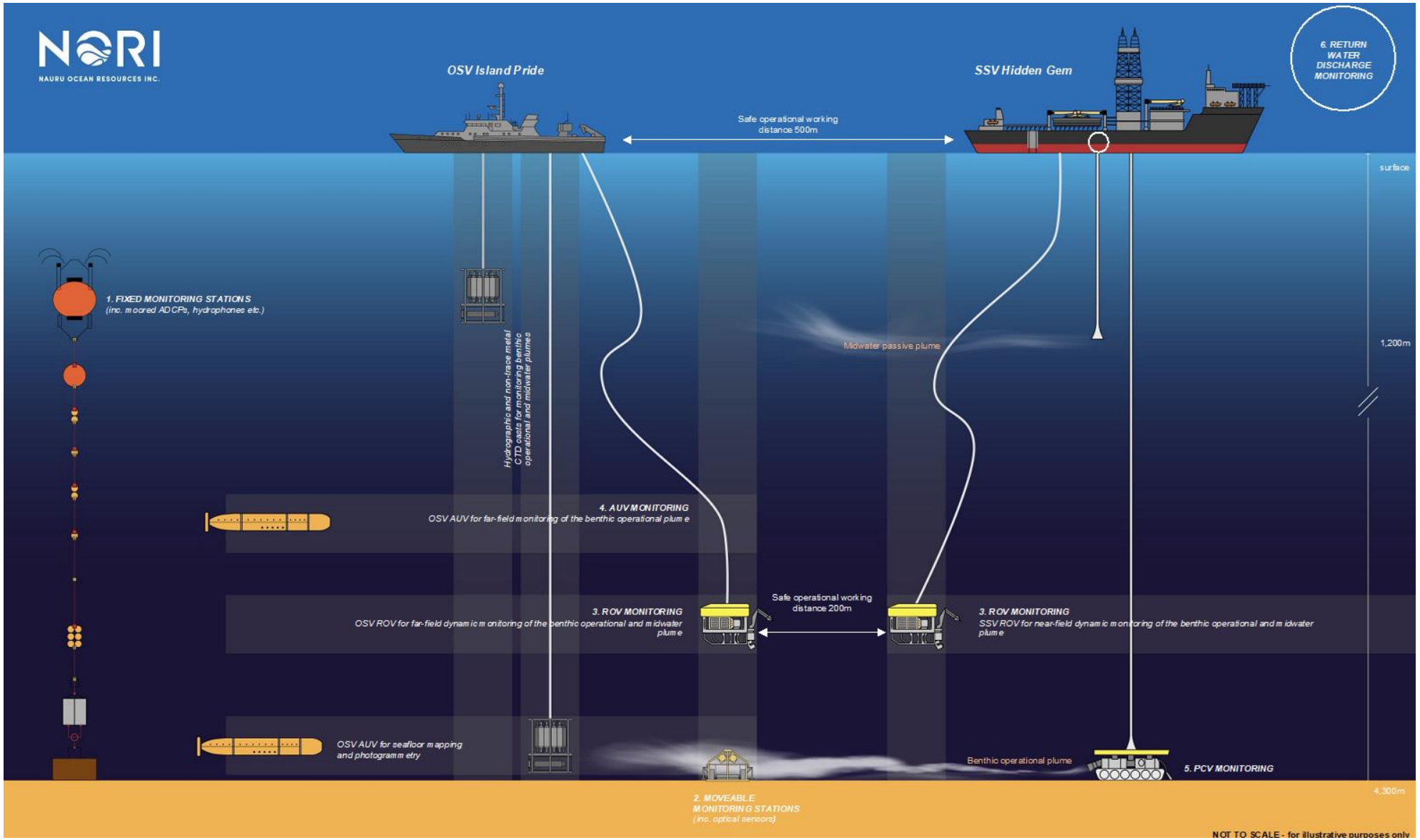
Cyclone feeder of the separator deck



Nodules bouncing on the vibrating separator deck

Nodule production on the conveyor belt

Environmental scope during pilot test



Figures of the environmental scope

50 monitoring stations distributed in and around the test field to monitor and map the far field plume *in situ*

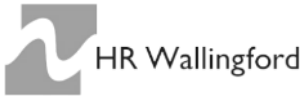
BENTHIC PLUME ARRAY

- 7 x Fixed Landers with ADCPs, CTDs, OBS – optical backscatter
- 2 x Fixed bottom current and turbidity landers with acoustic modems that we interrogate in real time
- 3 x McLane sediment traps
- 20 x sediment plates measuring sedimentation
- 4 x Camera landers recording sedimentation
- 1 x acoustic mooring
- 1 X acoustic lander
- 1 x midwater mooring that we interrogate for midwater currents
- 7 x DGTs diffuse gel samplers
- 2 x AUVs mapping near and far field

MID WATER PLUME ARRAY

- 3 x ROVs (1 x on Island Pride with 10 x Niskin array for water sampling + ADCP + CTD and
- 2 x ROVs on Hidden Gem
- 1 x Trace metals CTD rosette with 12 Go-Flos for water samples
- 1 x Hydrographic CTD rosette with 24 niskins for water samples
- 1 x McLane Pump rosette with 7 x pumps

Biological and physical impacts: Collaborating with leading research institutions



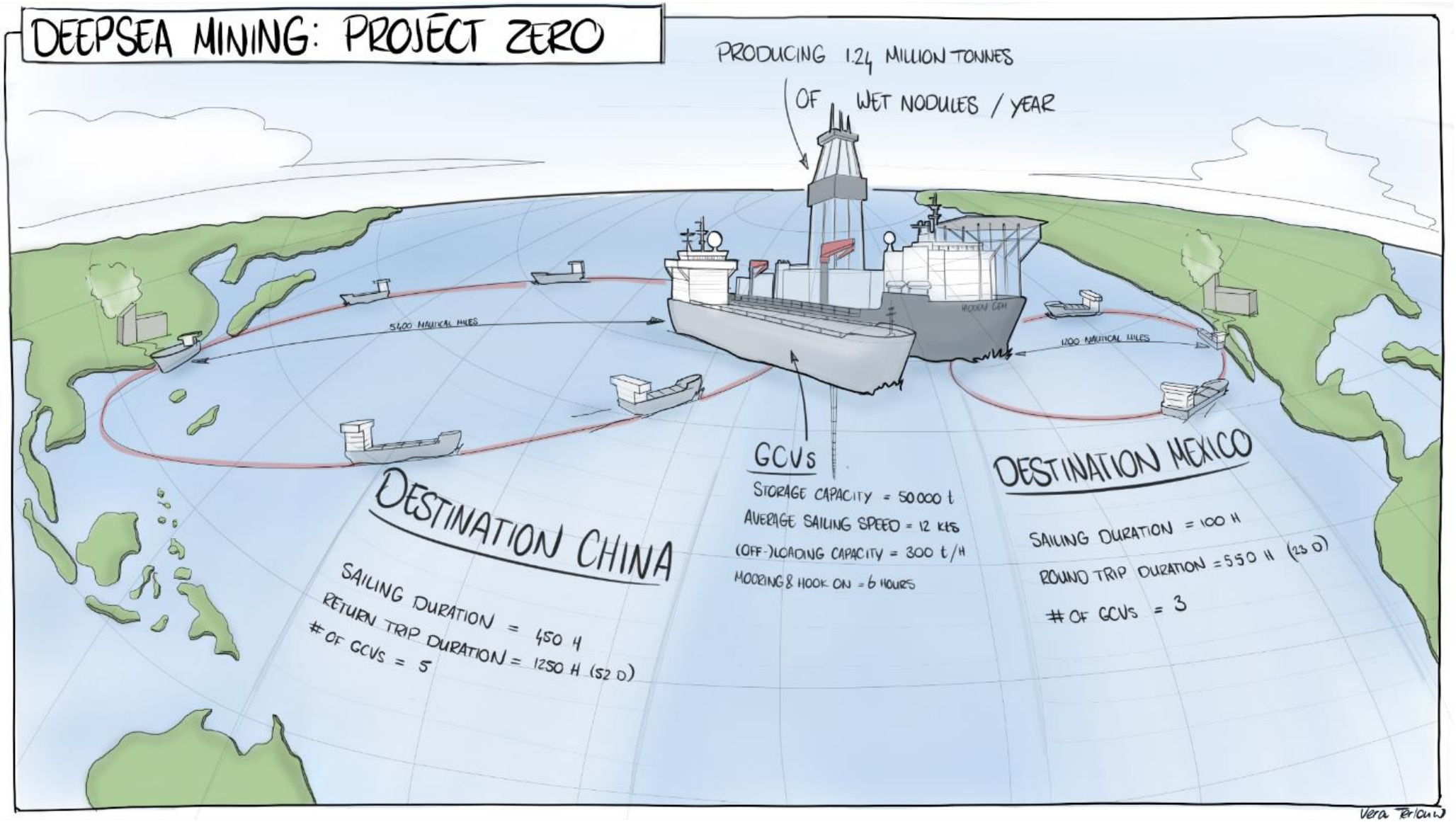
The results of the pilot test

- All samples for environmental impact assessment are collected;
- All commissioning tests successfully executed;
- The collector has driven **83.4 km** on the seabed;
- In total, **3,020 t** of nodules were collected.
- Proved confidence in minimal environmental impact by system.

(video)

Follow-up

New scale


DEEPSEA MINING: PROJECT ZERO
PRODUCING 1.24 MILLION TONNES
OF WET NODULES / YEAR
5400 NAUTICAL MILES
1200 NAUTICAL MILES
GCVs
STORAGE CAPACITY = 50000 t
AVERAGE SAILING SPEED = 12 KTS
(OFF-)LOADING CAPACITY = 300 t/H
MOORING & HOOK ON = 6 HOURS
DESTINATION CHINA
SAILING DURATION = 450 H
RETURN TRIP DURATION = 1250 H (52 D)
OF GCVs = 5
DESTINATION MEXICO
SAILING DURATION = 100 H
ROUND TRIP DURATION = 550 H (23 D)
OF GCVs = 3
Vera Brown

Design of a new, more efficient, lower-on-impact, collector

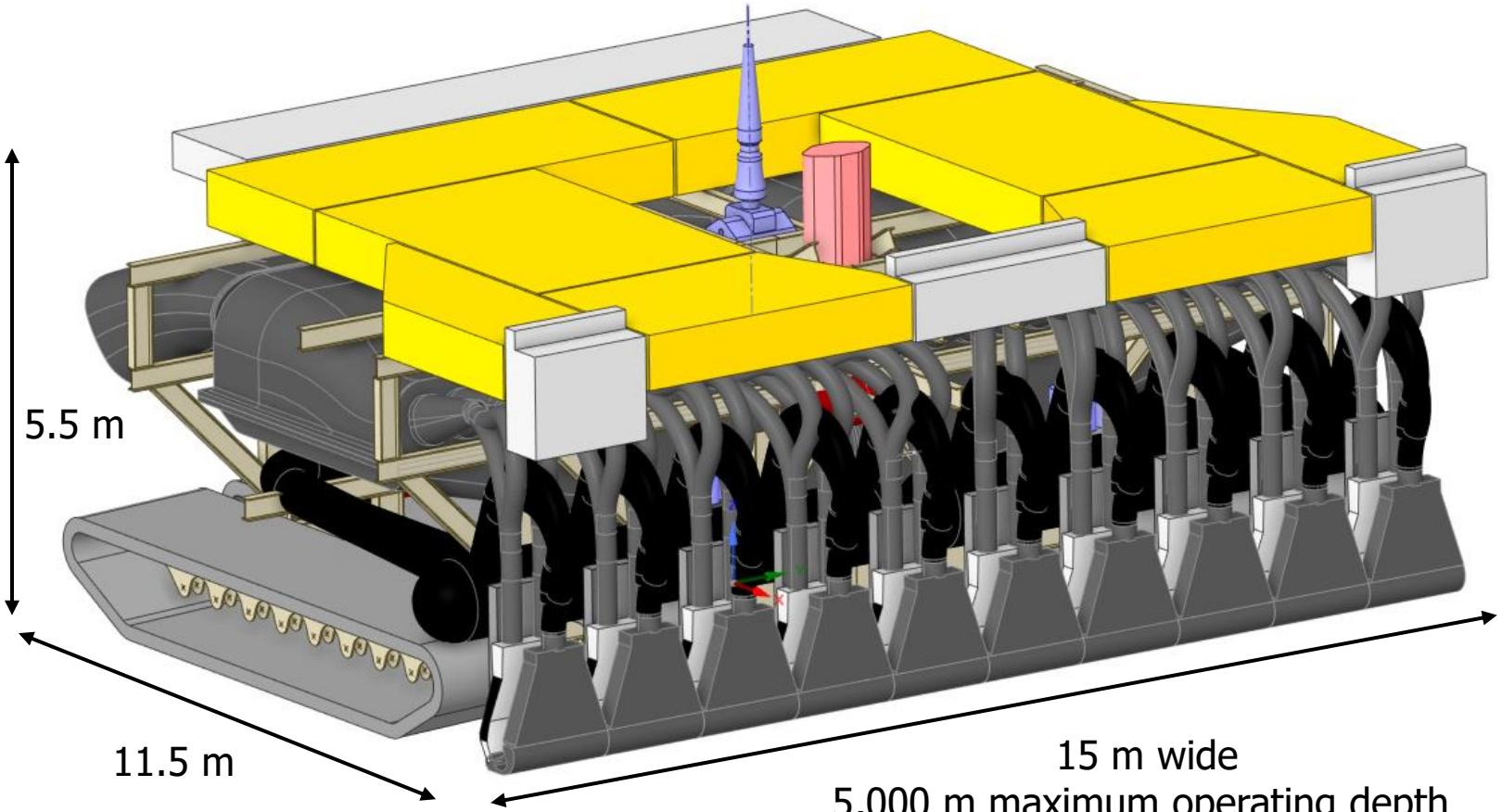
Pilot Collector

6 m wide
4,300 m maximum operating depth

Improve design to further lower the environmental impact:

- Low-impact tracks;
- Fines rejection system;
- Efficient diffuser configuration;
- Coandă-effect nozzles.

Project Zero Collector



Improvements highlights on the system

- Lowering the return water line outlet;
- Installation of additional sensors for even closer and real-time monitoring;
- Improved Coandă-effect nozzles for higher pick-up efficiency and plume reduction.