

Local subsea solutions to a global ocean problem



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Background

- Every structure or object resident at sea will be exposed to marine growth.
- Since the Vikings set sail, humans have tried to control or limit the amount of marine growth under its hulls with regards to drag and reduced speed.
- IMO recommended in 1990 that
- An international ban to use tributyltin (TBT) in 2003 set a new demand for marine growth control. In addition Cybutrine was banned 1. January 2023.
- Today there are a greater awareness of spreading of alien species from one continent to another. For years the focus has been on the ballast water, but what about all the “stuff” that lives under the hull as blind passengers?
- “Stricter regulations on biofouling and its removal are likely to come into force in more regions around the world within the next decade..” *Dr. Bertram, DNVGL, Feb 2020*



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Who we are

Founded

Pilot
station

Prototype

Update
biofouling
platform

2nd Ops
station IOC



2008

2012

2013

First patent

Second
patent



2018

2019

2020

First Subscription
agreement

Testing aqua
culture

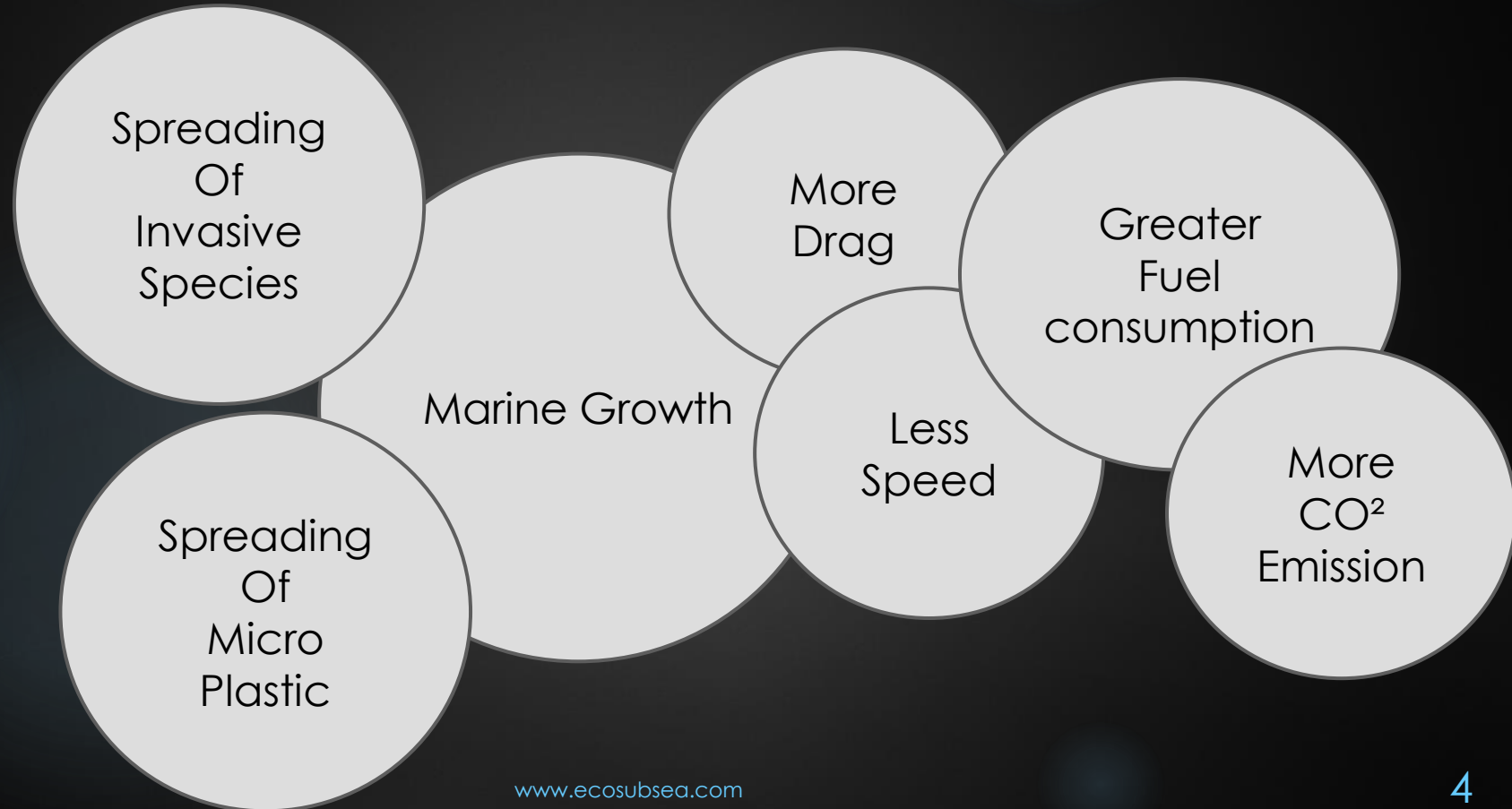
Testing offshore



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Cause and Effect





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Traditional ways to clean a hull



PACIFIC / VANUATU

Vanuatu bans hull cleaning

10:33 am on 13 June 2018

Share this



Vanuatu's maritime regulator has banned all international vessels from carrying out underwater hull cleaning in its waters.



Ban of cybutryne in anti-fouling coating systems from 1 Jan 2023

by The Editorial Team — March 4, 2022 in Regulation



Traditional ways to clean a hull



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HIGH RISK MANUAL OPERATIONS

- The majority of hull cleanings today performed by divers
- High risk operation, which have resulted in the loss of human life

MINIMAL/NO COLLECTION

- Less availability in environmentally aware ports.
- Not ready to meet coming regulations.

TIME CONSUMING

- Additional anchorage cost.
- Potential off-hire

ABRASIVE TO ANTI FOULING

- Damaged paint.
- Faster re-fouling



IMO on Micro Plastic



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INTERNATIONAL
MARITIME
ORGANIZATION

E

MARINE ENVIRONMENT PROTECTION
COMMITTEE
77th session
Agenda item 8

MEPC 77/8/1
17 September 2021
Original: ENGLISH

Pre-session public release: ☒

Microplastics from anti-fouling paints – an overlooked source of marine plastic litter

4 The latest available data relating to paints and anti-foulants as a source of microplastic pollution compiled in the GESAMP report (MEPC 75/INF.23) indicates that 6-7% of marine coatings are lost directly to the sea during the lifetime of a vessel. Another study provided a more detailed breakdown, with 6% of solid anti-fouling coating lost directly to the sea during its lifetime, 1.8% lost during painting, 3.2% during cleaning maintenance and 1% from weathering. Other work estimated that 40% of marine coatings use microplastics as binding agents, with annual input of marine paints to European waters estimated at 400-1194 tonnes per year. A further study found that marine coatings account for 3.7% of releases of primary microplastics in the World's oceans. Finally, one study found that, per capita, the input could be at the level of 2.3 g per year, resulting in approximately 11,270 tonnes per year of marine paint-sourced microplastics introduced to the World's ocean, based on a global population of 7.55 billion inhabitants.

5 The long-term impacts on marine ecosystem health of microplastic pollution from anti-fouling systems are unknown and require further investigation. The GESAMP report however, highlights a study that found that the particle size of material was generally in the size range of 50-300 µm, which is considered equivalent to the general size range of living microplankton, resulting in significant potential for uptake by planktivorous species.

Coating/Paint conditions



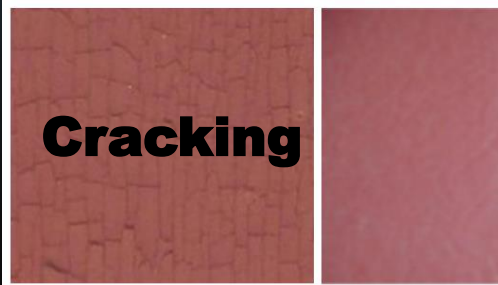
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Adhesion



Blistering



Cracking



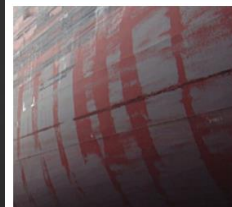
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Cold flow



Delamination
Peeling
Detachment



Polishing off



Grounding
General
damage

How can ECOsubsea make a difference?



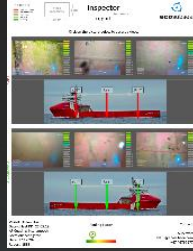
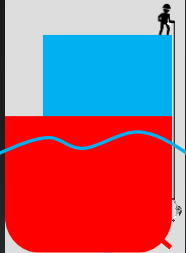
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Sustainable end-to-end solution

BIOFOULING INSPECTION

1



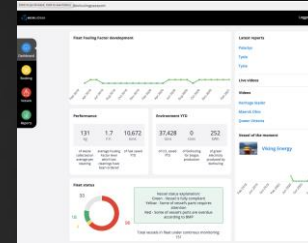
BIOFOULING CLEANING AND CAPTURE

2



CLOUD BASED, BIOFOULING MANAGEMENT

3





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Biofouling Inspection

Onboard equipment & Operation

Chargeable equipment consisting of:

- Cameras
- Lights
- Magnets
- Lasers
- Buoyancy
- Rope
- Memory disc

250 mm

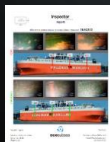


A unique and simple biofouling detection tool for the crew onboard.

Same areas to be monitored on vessel over time, ensuring a consistent and replicable methodology.

The inspection procedure is based on our experience from 500 cleanings and several hundred inspections.

Data Analytics: Utilizing inspection and cleaning data
150 vessels biofouling
compliance data - 340 vessels registered



Complementary services:
inspection by patented detector drone - Image Analysis. Biofouling Detection.

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System setup



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System setup

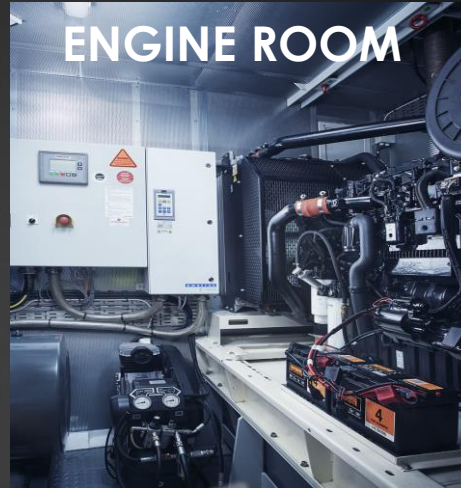
FILTER UNIT



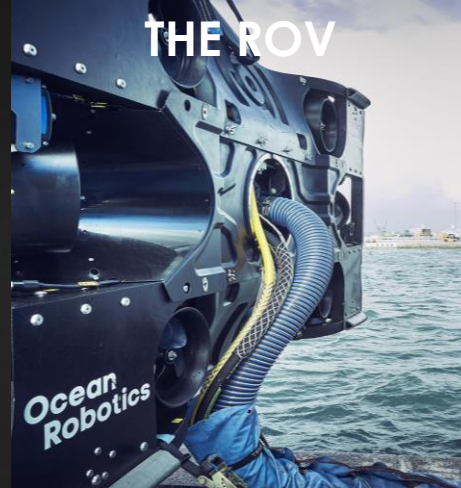
CONTROL ROOM



ENGINE ROOM



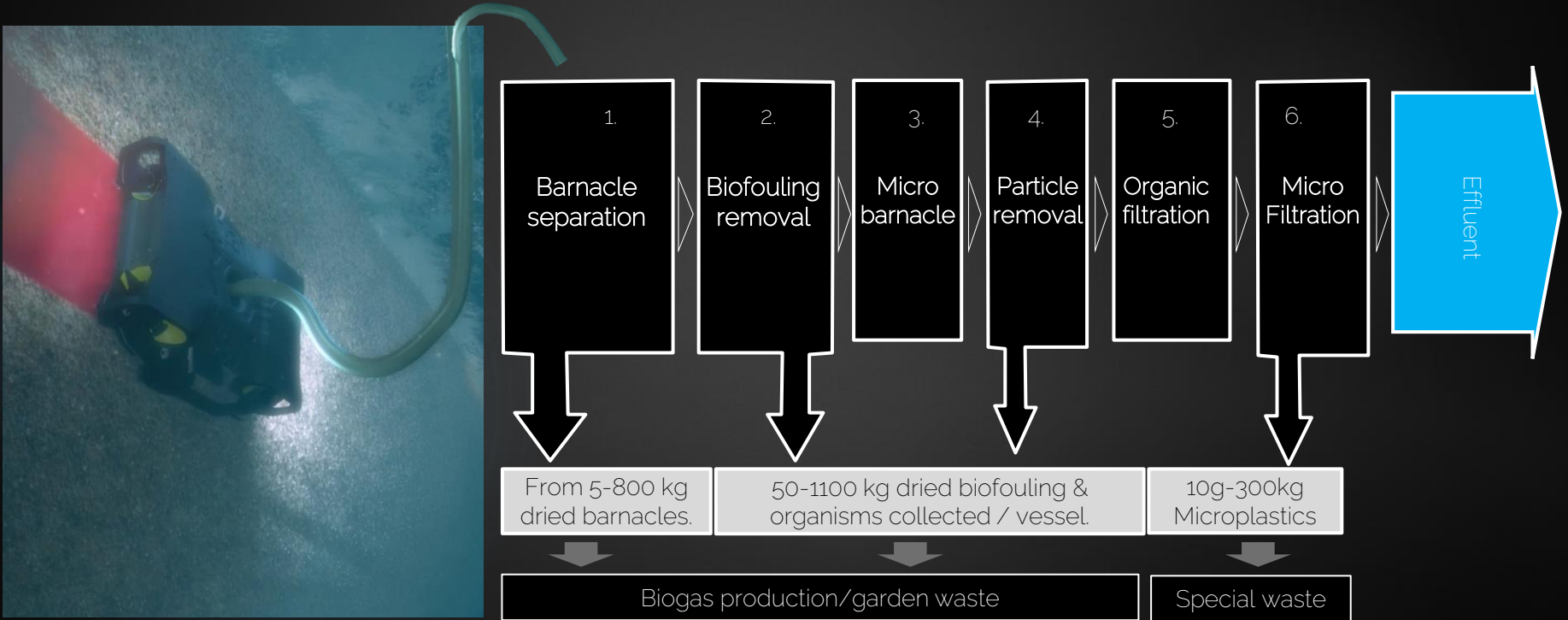
THE ROV



Crane for launch and recovery
And hose management



Biofouling filtration process





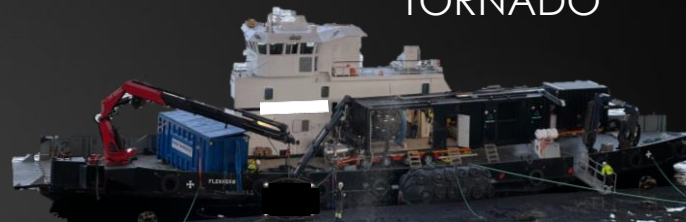
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Biofouling growth and measures

COLLECTOR



TORNADO



Micro-Fouling

Fouling

Macro-Fouling

Bacteria

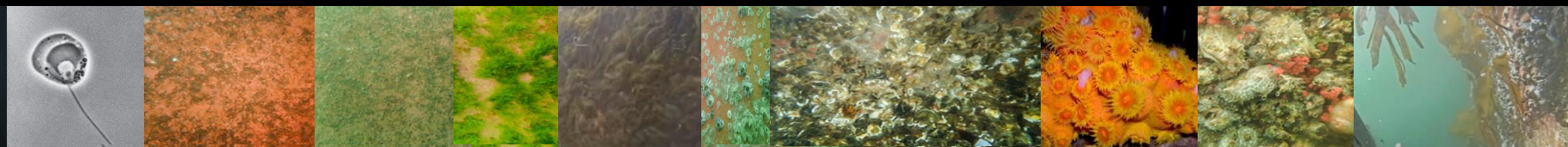
Slime

Algae

Grass

Soft corals/tunicate/Barnacles

Mussels /Tubeworms/Kelp



1 μ m

100 μ m

1mm

1 cm

2 cm

10 cm



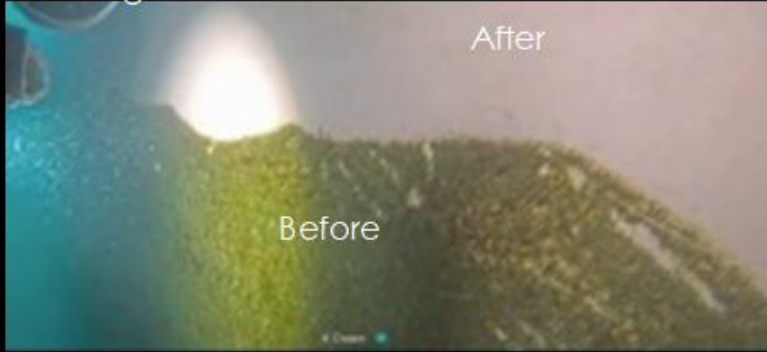
Fouling
Factor:

1 2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 90 100



Visual result

Macro grass



Heavy slime to Light macro



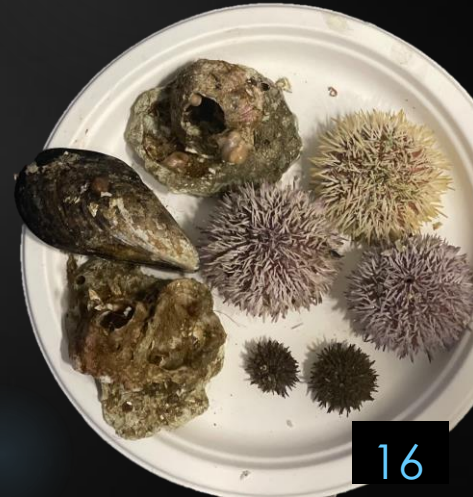
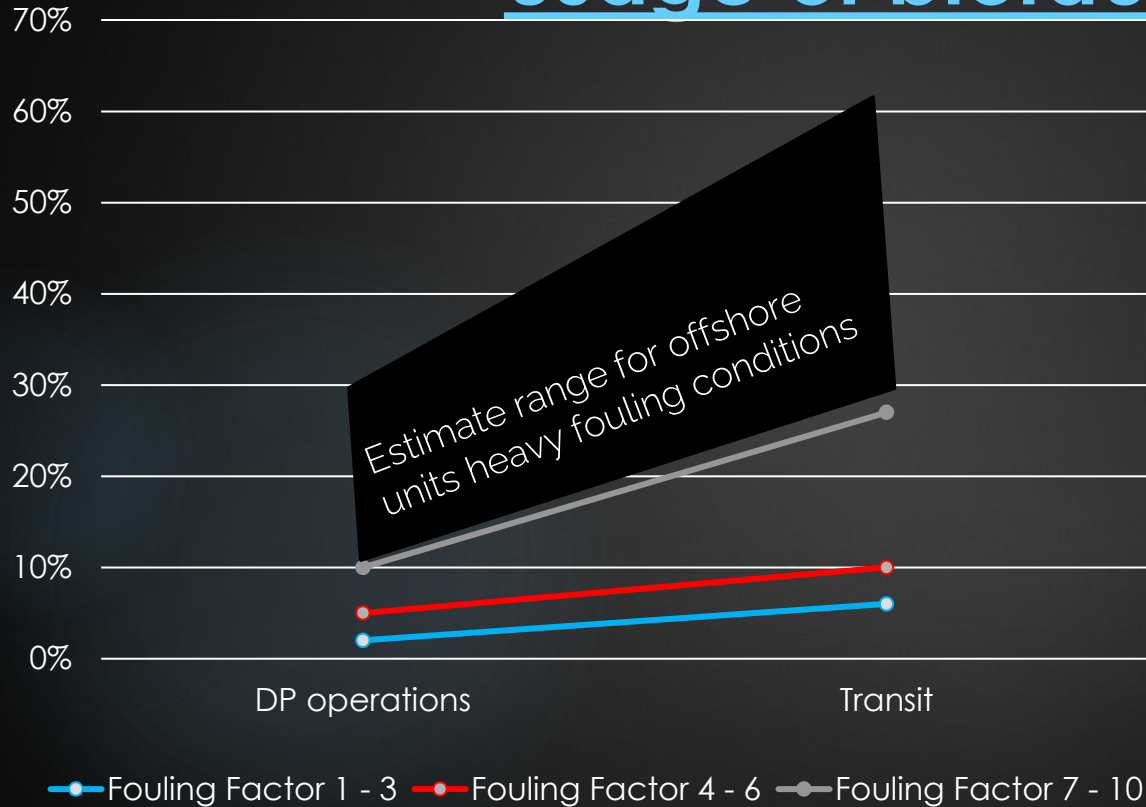
Macro Hard fouling Heavy grass



Fuel saving potential and usage of biofouling



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Online data management



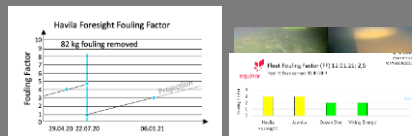
Cleaning track record

- Aggregate service data
- Supplemented with rich ECOsubsea data
 - Photos, videos,
 - Integrated with AIS data



Scheduling future services

- Subscription agreement with corporates
- Take the burden of compliance off individuals
- Forward book revenue



Biofouling passport

- Regulators will insist upon ship compliance with more stringent legislation
- ECOsubsea service provides up-to-date information on ships to authorities



In London, Paris and Key West

Experiment considered as a success on all counts:

- Technical and operational performance significantly improved
- Fuel consumption is lowered
- No coating aggression
- No environmental side-effects



Going offshore



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Marine growth on oil rig



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Marine growth



WEST HERCULES' HIGH-TECH HULL CLEANING IS A FIRST

In preparation for its upcoming contract with Equinor in Canada, the West Hercules underwent a high-tech hull cleaning in Skipavika, Norway. We spoke to project leads Bjørn Bøge (BB), rig leader on the West Hercules, and Kenneth Valen Ekløv (KVE), marine operations manager, to find out more about why the cleaning took place, and what it means for the rig and its upcoming contract.

Why did you run a hull cleaning on the West Hercules?

BB: We have a long transit ahead of us from Norway to the well site in Canada, and we recognized that there was a challenge with the amount of fuel we could carry versus the anticipated fuel usage. So we looked for some potential solutions around this issue, and we decided that the hull cleaning option offered the most potential for fuel savings.

What are the environmental benefits of a hull cleaning?

KVE: There are several environmental benefits. The most significant impact

is on the reduction of fuel required to make the long voyage across Atlantic to Canada. This will lower carbon emissions and increase efficiency. We will also prevent transfer of marine growth from the marine environment to another case from the Norwegian Continental Shelf to Canada.

How was the hull cleaned?

BB: A remotely operated underwater vehicle (ROV) used thrusters, so brushes, and suction to remove and capture the build-up of marine growth before it was transferred to a collection bag on the surface where it was collected and disposed of onshore.

What's new about this?

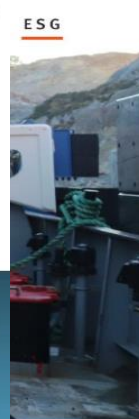
KVE: EcoSubsea, who carried out hull cleaning for Seadrill, developed new technology to remove the quantity of marine growth on the West Hercules. The technology was designed to clean heavier fouling and is the first time that this type of technology has been used on an offshore drilling rig.

Seadrill
374,242 followers
1mo •

West Hercules hit the spa! ECOsubsea carried out an eco-friendly and high-tech hull cleaning on the rig in Skipavika, Norway.

Using new technology, they removed 78,500 kg of marine growth!

Cleaning the hull reduces the rig's fuel consumption AND it helps protect the marine environment by removing invasive species. Saving money and the environment, all with a simple facial. #Seadrill #SettingtheStandard



and high environmental challenges the way we what we already have. transfer to the fleet of large environmental be important for the Seadrill and its ESG targets. and sharing technology. energy efficiency gains, details that can easily for each individual will be critical for our years to come. transfer to the fleet is so make projects like this a

imately 1,000 ships in the fleet and removed marine growth in total.

The Stages of a Hull Cleaning

PRE-PLANNING,
BUSINESS CASE,
SUPPLIER SELECTION
(6-18 MONTHS)



HULL ASSESSMENT



CLEANING ON SITE
(2 WEEKS)



DISPOSAL OF MARINE
WASTE



Rig Marine growth removal



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Stakeholders

Vessel owners/operators



Coating suppliers



Port Authorities



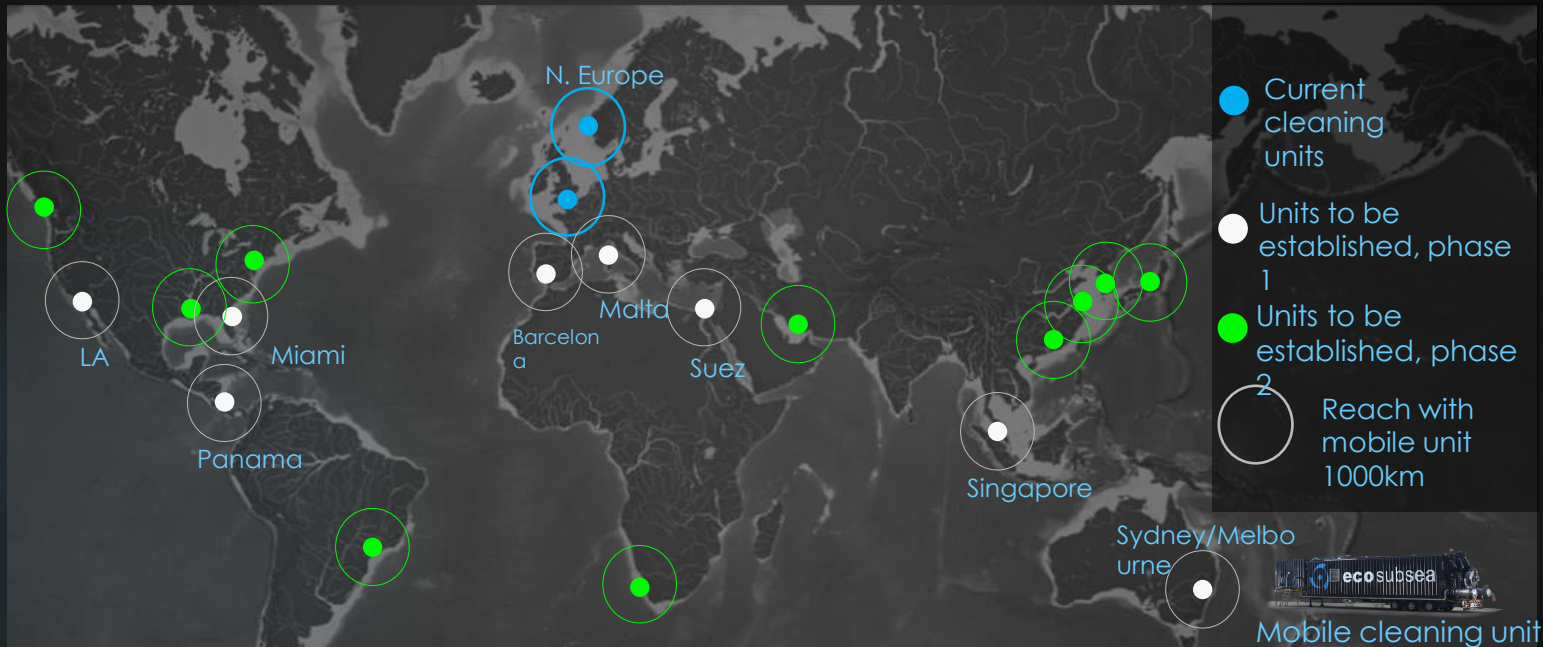
Floating structures



Regulatory



Strategic expansion plans



20 cleaning stations located at key locations to **reach 80 % of world commercial fleet**

THANK YOU

tor@ecosubsea.com

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