



# USP DragGone™

## Say hello to the next-generation of ultrasonic antifouling

DragGone™ is Cathelco's ultrasonic antifouling system designed to prevent biofouling on vessel hulls by using patented ultrasonic technologies.

# The problem

Transport demand from shipping is increasing

Increasing compliance requirements

Increasing impact of biofouling

**Transport demand from shipping is increasing:**

- 90% of world trade, 11 billion tons/year
- 3% of global greenhouse gases

**IMO GHG goals:** 40% carbon intensity reduction by 2030, net zero by 2050

**Biofouling impact:**

- 25% increase in GHG emissions from fouling
- Transfer of invasive aquatic species



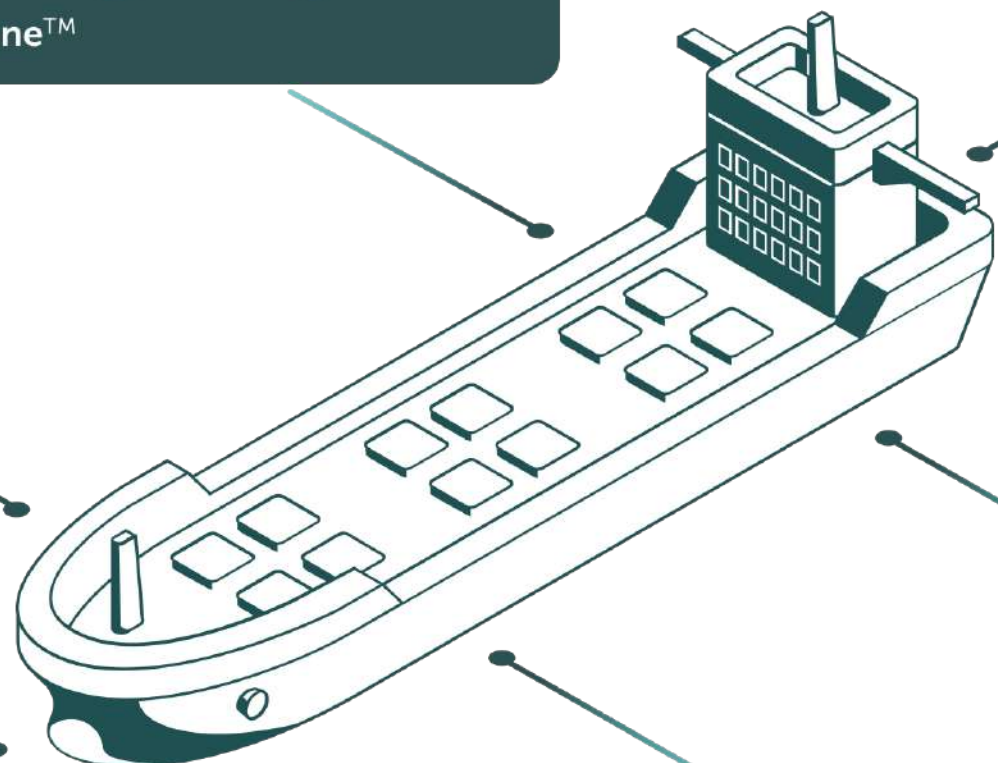
# Decarbonization is **achievable**

**5-25%** Hull biofouling management

USP DragGone™

**5-15%** Power and propulsion systems

**2-50%** Concept, speed and capability  
**up to 75%** Extensive speed optimization

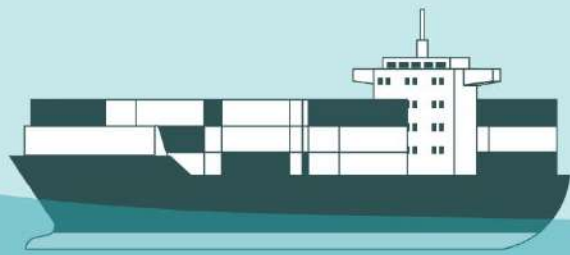


**50-90%** Full electric  
**35%** Bio-LNG/LPG  
**90%** Biofuel 3rd generation  
**80-100%** Hydrogen and other synthetic fuels  
**1-10%** Energy management

**2-20%** Hull and superstructure

**5-50%** Fleet management, logistics and incentives  
**1-10%** Voyage optimization

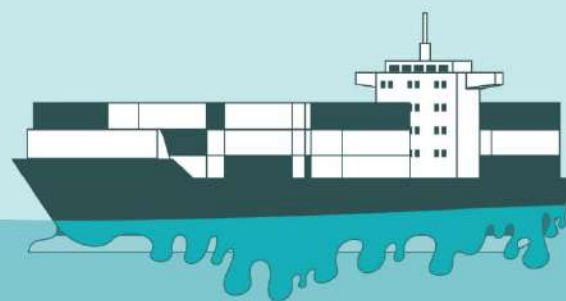
# The **biofouling** sequence and its effects



## How does it spiral out of control?

The moment a ship touches water, microorganisms latch on, setting off a chain reaction that leads to larger and more costly challenges.

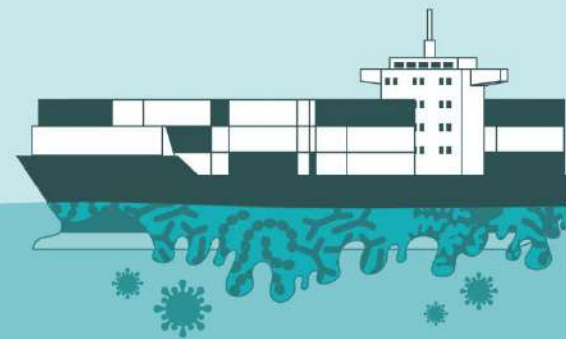
*Seconds to minutes*



## Microorganisms settle first, creating a slimy layer

Bacteria quickly form a slick biofilm, laying the groundwork for more severe fouling.

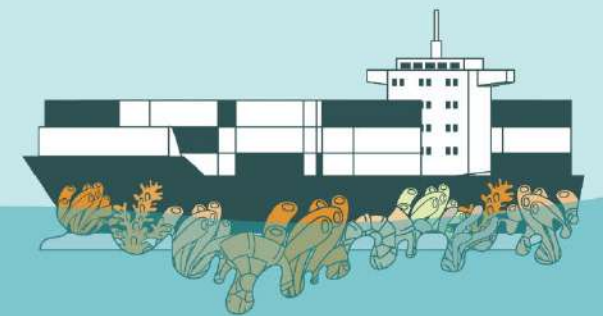
*Minutes to hours*



## Biofilm forms, providing a base for algae and small organisms

The biofilm offers a sticky surface that facilitates the attachment of algae and small invertebrates, escalating the fouling.

*Hours to days*



## Larger organisms attach, compounding drag and fuel consumption

Barnacles and seaweeds accumulate, increasing the hull's roughness and resistance in water.

*Days to months*

# The consequence?

**Increased fuel costs and greater engine workload**

This fouling buildup leads to increased hydrodynamic drag, demanding more power and elevating fuel consumption and operational costs.



How can our **patented** Cathelco USP  
DragGone™ help?

# How can our **patented** Cathelco USP DragGone™ help?



# Our solution

Investing in the **Cathelco DragGone™** Ultrasonic system for your yacht isn't just a choice for cleaner hulls; it's a smart financial decision. With a typical annual fuel consumption of 400 tonnes, our system can **save up to 13%** each year through its contribution to hull biofouling management. Over ten years, this amounts to significant savings which translate to **1.5 kilotonnes of CO<sub>2</sub>** saved annually.

- **Non-toxic solution**
- **Advanced technology**
- **Non-intrusive**
- **Non-disruptive**
- **Easy to install**
- **Minimal maintenance**
- **Extended hull protection**



**Successfully  
patented**



**Cathelco**<sup>®</sup>  
Evac Group

**Cathelco's ultrasonic antifouling  
technology**

# Findings from the **Cleanship Project** (2012 to 2014)

- Research into ultrasonic antifouling using guided waves began in 2012
- Brunel University led the project to evaluate the effectiveness of this technology in preventing hull fouling on ships
- The project had a total budget of £1.17 million, with £900,000 funded by the EU



Test plate after 35 days in the water  
with no sign of fouling



Control plate after 34 days in water  
with biofouling growth

## Conclusions\*

- The prevention of hull fouling helps ship operators **schedule their dry dock intervals**
- The technology has potential for important **economical savings**
- Cleanship project led **Lloyds Register to recommend Cathelco to be industry expert and join project**
- With global take up of the new technology the **savings could exceed 14.9 billion Euros per annum**



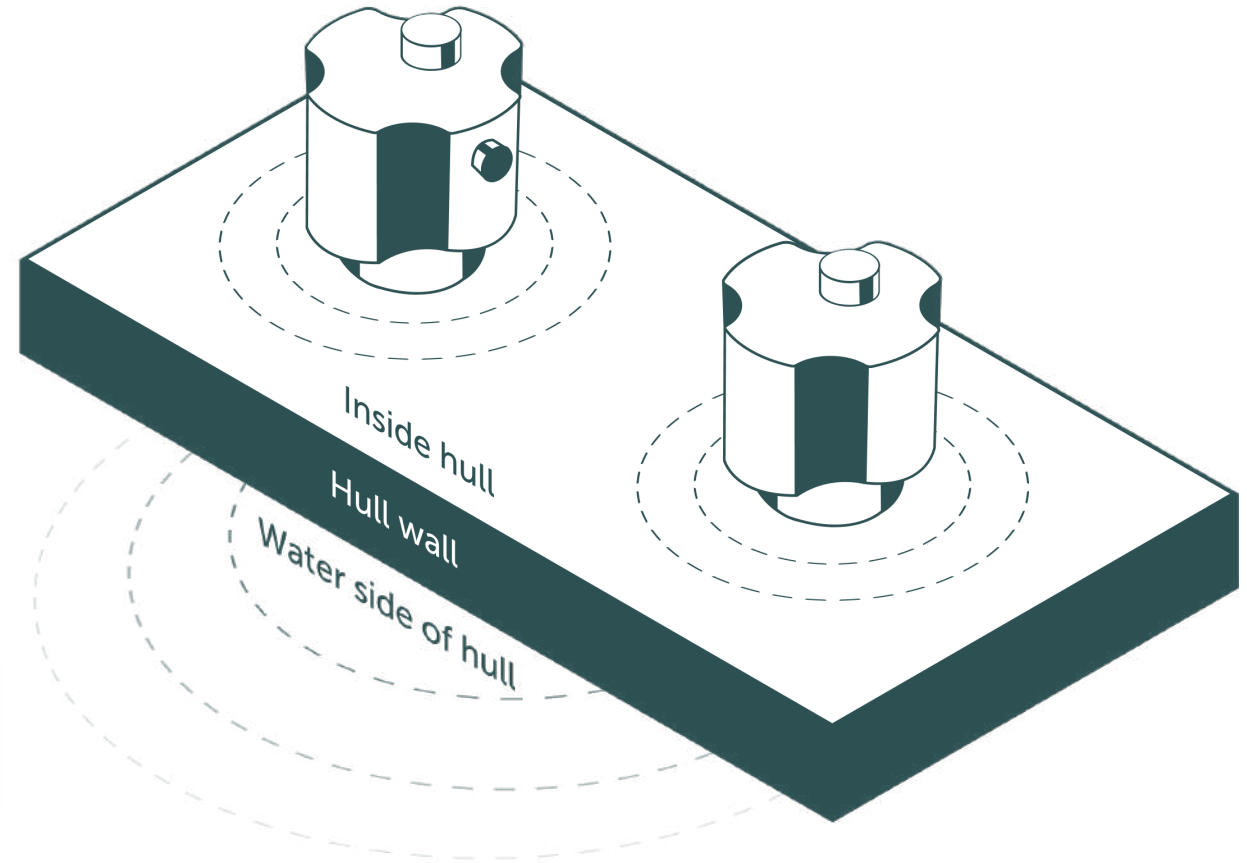
# What is **ultrasonic antifouling** technology?

## Ultrasonic antifouling:

- Uses high-frequency sound (ultrasound) to prevent or reduce biofouling on underwater structures, surfaces, and medium
- On vessels, ultrasonic transducers are installed on the **inside of the vessel hull**
- High frequency sound waves **prevent the formation of micro- and macrofouling**



Using conventional methods, each single transducer can protect ~5m radius (50-80 m<sup>2</sup>)



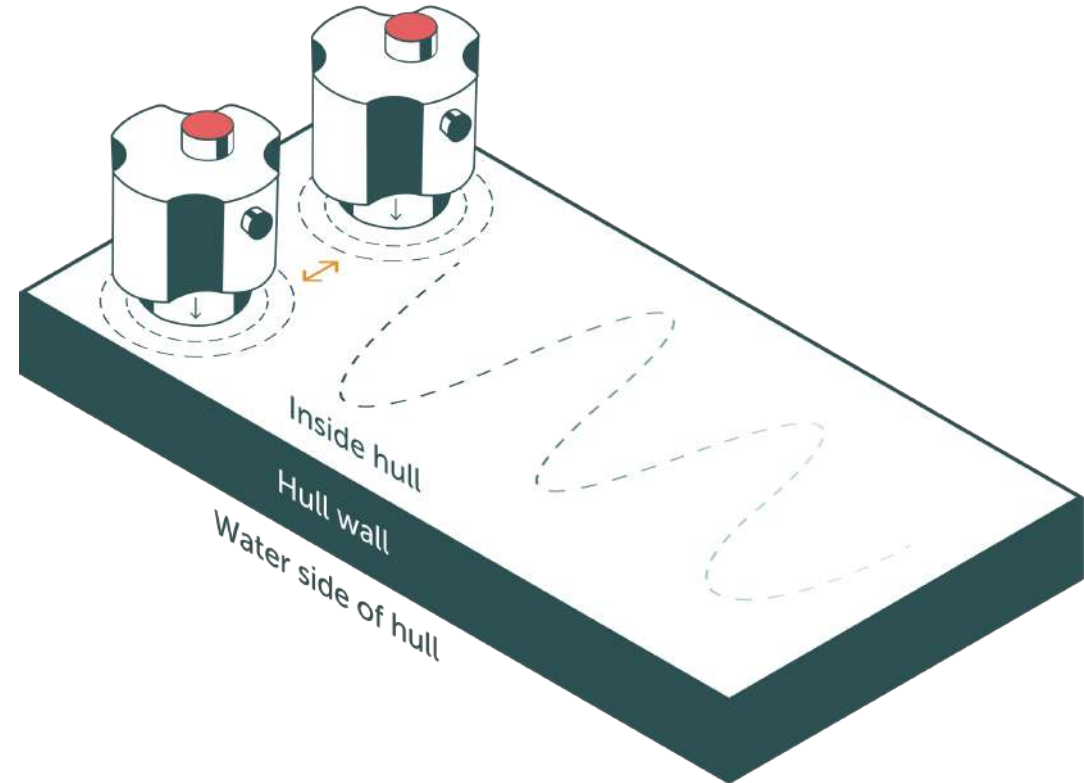
# Our **patented solutions** for better performance

## Guided wave principle

- Guided waves are **ultrasonic waves** that travel along the boundaries or surfaces of structures
- When used in ultrasonic antifouling devices, guided waves channel energy along the surface structure, **minimizing energy loss to the surrounding water**
- Wider coverage provides antifouling protection over a larger area, 25m radius,  $\sim 2,000\text{m}^2$ , **40 times more than traditional ultrasonic technology** (5m radius,  $50\text{-}80\text{m}^2$ )

### How it is applied in our system:

two transducers at the same frequency placed at a specific distance apart to generate guided waves



Complete hull protection with **60% fewer transducers** – cut installation and operating costs vs. competitors

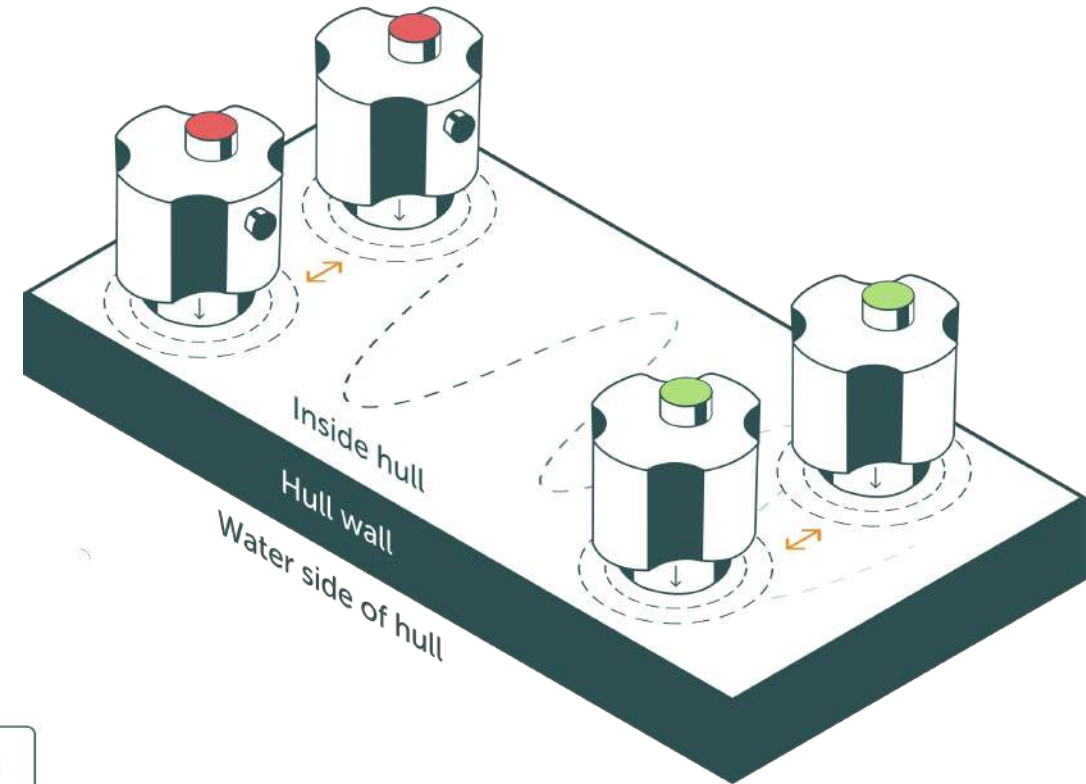
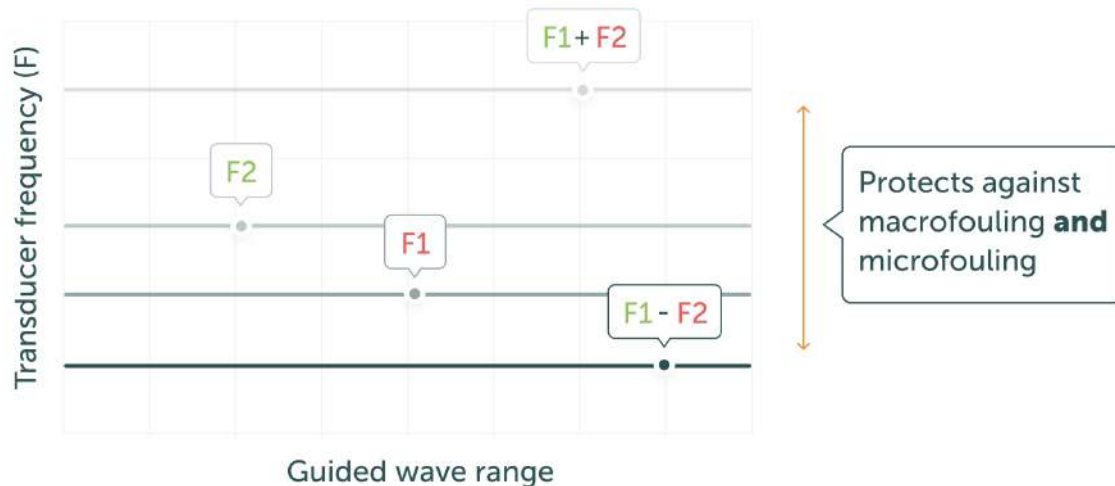
# Our patented solutions for better performance

## Heterodyning principle

- Heterodyning is a technique in signal processing where **two signals at different frequencies are mixed to produce new frequencies**, specifically the sum and difference of the original frequencies

### How it is applied in our system:

Our system uses two additional transducers operating at different frequencies at each location, in addition to the guided wave transducers. These transducers generate new frequencies, enhancing the overall effectiveness of the system.



With more ultrasonic frequencies a **broader range of fouling** can be treated more effectively

# USP DragGone™ provides enhanced ultrasonic protection against hull fouling

- Targets a wider spectrum of fouling organisms, enhancing protection against species attachment
- Prevents biofouling in various marine conditions, maintaining clean hulls and improving vessel performance
- Reduces drag and fuel consumption, leading to up to 13% savings on fuel
- Provides enhanced range of protection over greater distances, ensuring effective biofouling disruption
- Needs up to 60% fewer transducers for complete protection

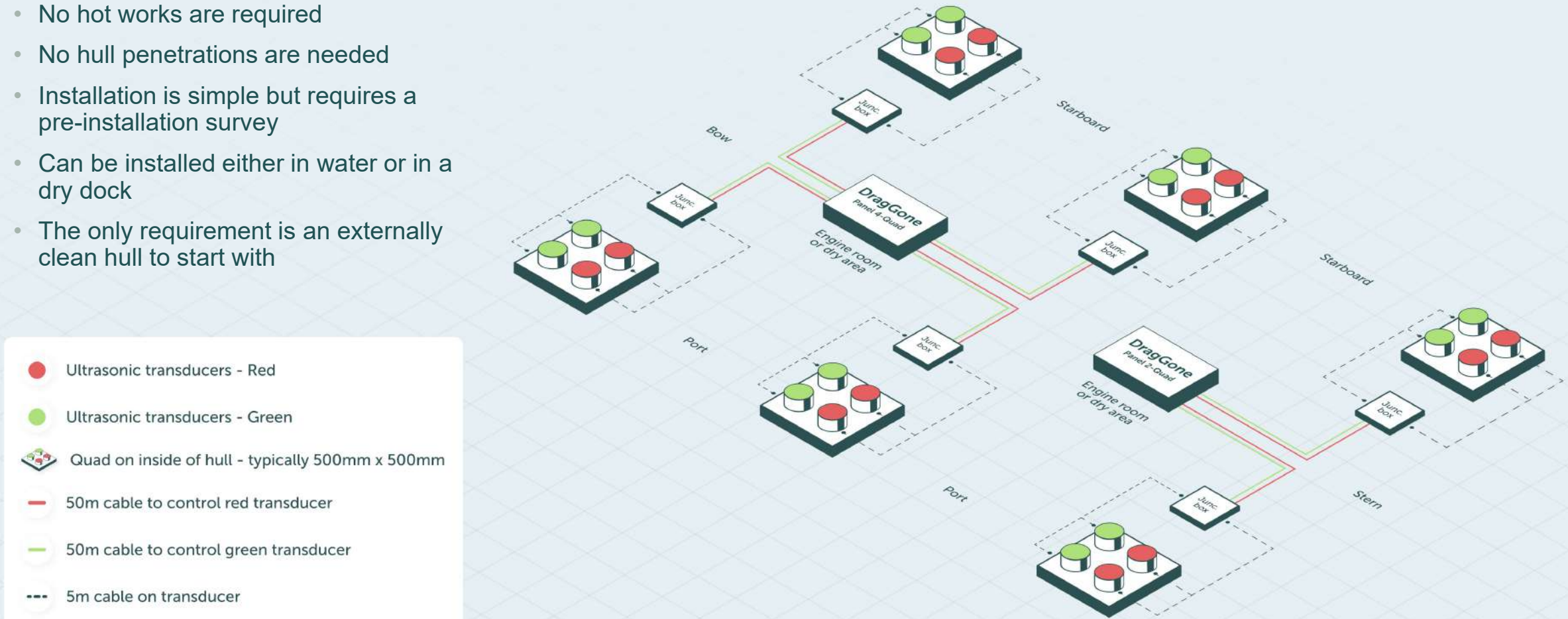


# Example of installation

## System installation notes

- Prepare the surface by removing paint from the inside
- No hot works are required
- No hull penetrations are needed
- Installation is simple but requires a pre-installation survey
- Can be installed either in water or in a dry dock
- The only requirement is an externally clean hull to start with

For indication only, the visualization shows installation for a 100–150-meter vessel

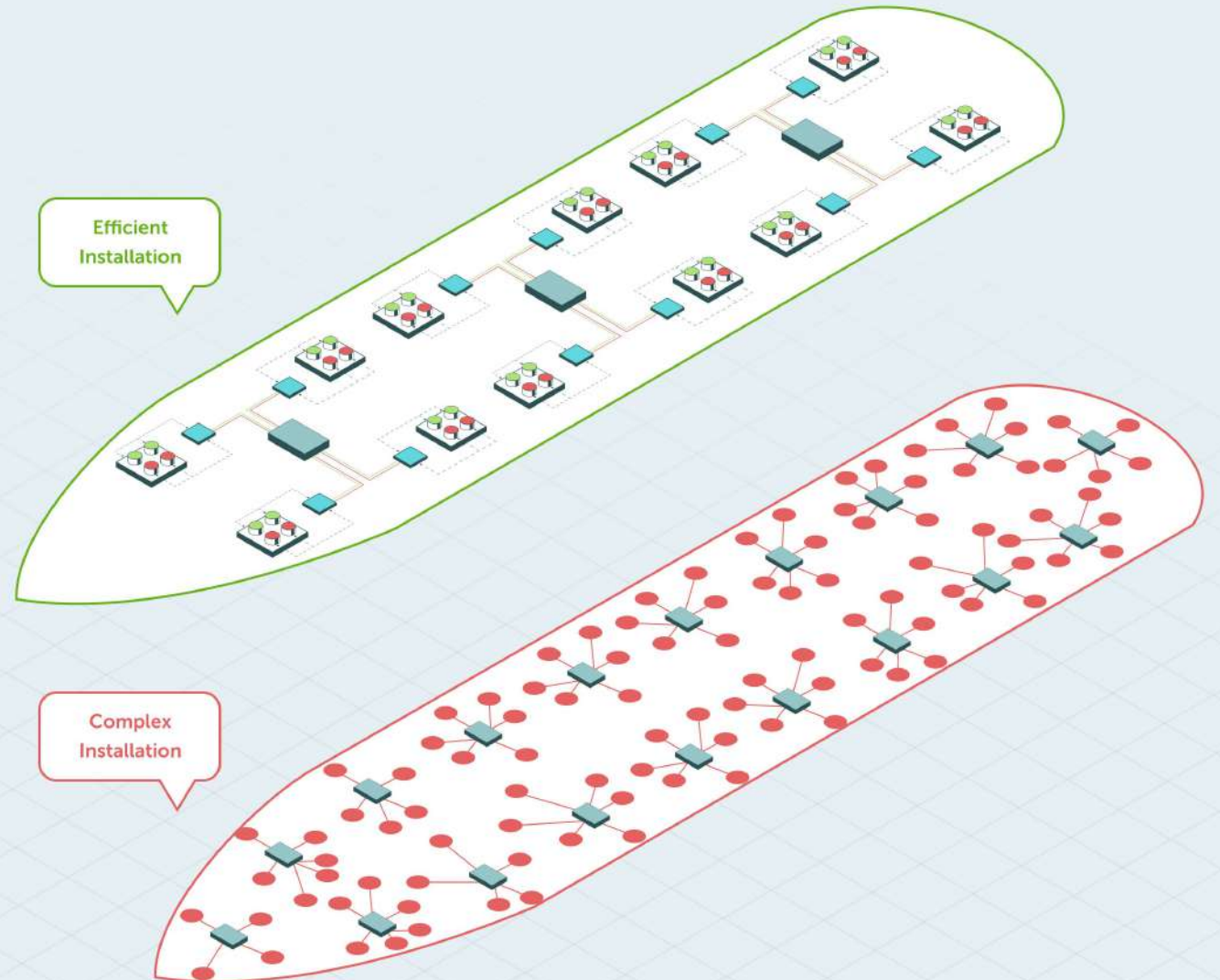
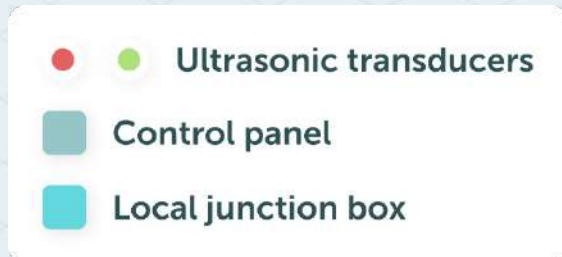


# How do we compare?

## USP DragGone™

Visualisation of configuration for 250-meter vessel

	Cathelco USP DragGone™	Traditional Ultrasonic Antifouling System
Control panels	● 3	● 18
Transducer locations	● 10	● 96
Cable runs	● 10	● 96
Number of transducers	● 40	● 96





# Reference cases & 3<sup>rd</sup> party testing

# Reference cases

## Narrowboat

- Two narrowboats, one with a Cathelco USP DragGone™ system and one without a system installed as a control vessel
- USP DragGone™ system ensured a clean hull



USP DragGone™ system installed  
**ensured a clean hull**



Narrowboat without USP  
DragGone™ system  
**experienced hull fouling**

# Reference cases

## Superyacht N2H

- Clean hull after 5 years of operation on 50-meter yacht
- USP DragGone™ system ensured a clean hull



Since I joined the yacht crew two years ago, **the USP DragGone™ system has kept the hull in perfect condition—no slime, no grass**. I've worked offshore and seen other ultrasonic systems fail, but this is the first time I've witnessed a technology that truly works against hull fouling.

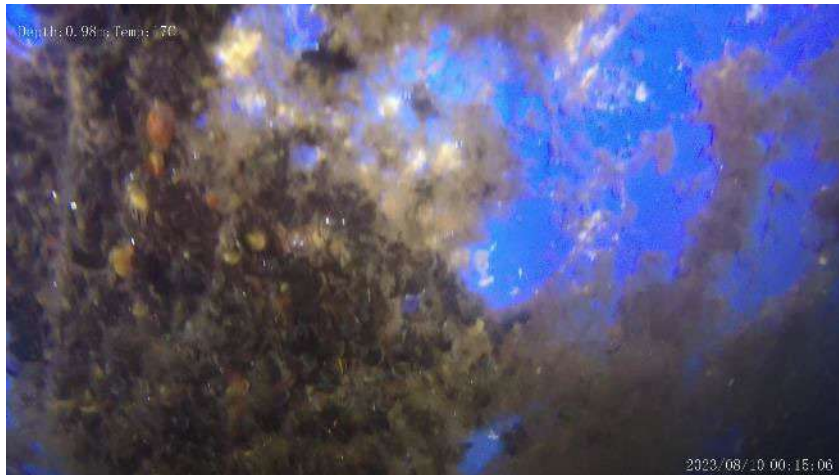
- *Rotating Chief Engineer, Superyacht N2H*



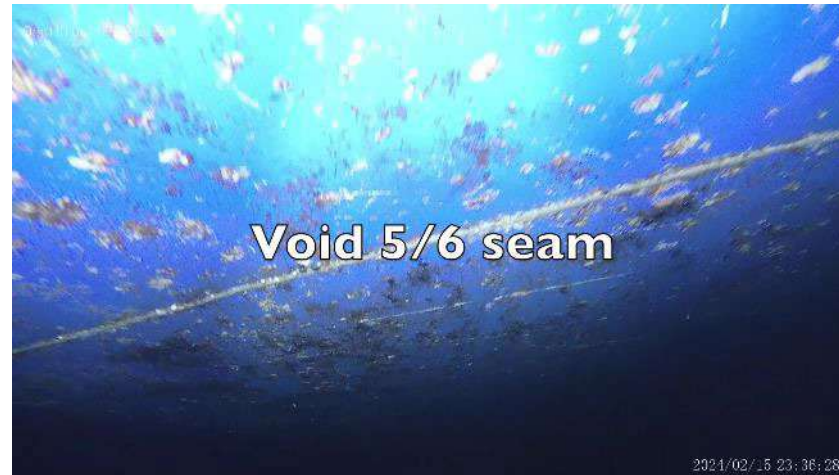
# Reference cases

## Cable ferry

- Baynes Sound Connector at Vancouver Island, Buckley Bay
- USP DragGone™ system ensured a clean hull



**August 2023**  
**Significant hard fouling**



**February 2024**  
Hull cleaned January 2024 – **Detected coating damage due to manual cleaning**



**May 2024**  
5 months service – **No mussel settlement or hard fouling**

# 3<sup>rd</sup> party testing

## DHI Maritime Technology Evaluation Facility\*

### Two tanks filled with sea water

- Control tank and a test tank
- Cathelco USP DragGone™ was installed on the exterior of the test tank
- To increase the biofouling, additional organisms in equal volumes were added to both tanks
- After 43 days the tanks were emptied, and visual inspections were made.

### Findings:

The test tank had **a lower density of the colonial algae** compared to the control tank.

The test tank **sustained no barnacles on the tank sides** or on the niche areas whereas in the control tank, barnacles were observed on the tank sides and on niche areas.

**Results: Cathelco USP DragGone™ provided protection**

\*IMO recommendation



Cathelco®



# 3<sup>rd</sup> party testing

## DHI Maritime Technology Evaluation Facility\*

Estimation of impact zones/ranges for marine mammals using computer modelling to test for:

- Hearing impairment
- Behavioral reaction

### Estimations for representative groups:

- Low frequency cetaceans (whales)
- Mid frequency cetaceans (some dolphins and small-mid sized toothed whales, e.g. killer whales)
- High frequency cetaceans (for example harbor porpoises)

**Results: Suggests no significant impact on sea mammals**



## Working with Cathelco can ensure:

- Marine fouling is under control
- Fuel consumption and CO<sub>2</sub> emissions are reduced
- Prevention of the transfer of invasive species



<https://www.globalgoals.org/goals/>

## Why Cathelco?

### Total solution provider for vessel protection

- Comprehensive biofouling management with advanced **ultrasonic antifouling** systems
- Corrosion protection through impressed current cathodic protection (**ICCP**) systems
- Marine growth prevention systems (**MGPS**) for seawater piping and sea chests
- **Global service and distribution network** ensuring immediate support and service
- Solutions designed to maintain vessel performance and operational efficiency

# Cathelco antifouling solutions

## Cathelco MGPS for volume treatment

- Sea Chests
- Internal Pipework
- Box Coolers

## Cathelco USP DragGone™ for surface treatment

- Hull (available 2024)
- Box Coolers\* (TBC)
- Propeller\* (TBC)
- Rudder\* (TBC)
- Thruster tunnels\* (TBC)

\*Testing expected to start late 2024





**Cathelco**<sup>®</sup>  
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# Appendix

# References and patents

Link	Reference
<a href="https://www.globalgoals.org/goals/">https://www.globalgoals.org/goals/</a>	In 2015 the world leaders agreed 17 global goals. 13: Climate action 14: Life below water
<a href="https://www.imo.org/en/MediaCentre/HotTopics/Pages/EEI-CII-FAQ.aspx">https://www.imo.org/en/MediaCentre/HotTopics/Pages/EEI-CII-FAQ.aspx</a>	IMO Strategy on Reduction of GHG Emissions from Ships
<a href="#">Prevention and detection of fouling on ship hulls   CLEANSHIP   Project   Fact sheet   FP7   CORDIS   European Commission (europa.eu)</a>	Clean Ship Project Report “Prevention and detection of fouling on ship hulls”
<a href="#">View of AN ACOUSTIC ANTIFOULING STUDY IN SEA ENVIRONMENT FOR SHIP HULLS USING ULTRASONIC GUIDED WAVES (granthaalayahpublication.org)</a>	Published paper from the Clean Ship Project “An acoustic antifouling study in sea environment for ship hulls using ultrasonic guided waves”
<a href="#">Analysing the Impact of Marine Biofouling on the Energy Efficiency of Ships and the GHG Abatement Potential of Biofouling Management Measures (imo.org)</a>	2022 paper from the GloFouling partnerships (IMO) “Analysing the Impact of Marine Biofouling on the Energy Efficiency of Ships and the GHG Abatement Potential of Biofouling Management Measures”
<a href="#">GloFouling Partnerships Project (imo.org)</a>	The GloFouling Partnerships is a project to address the transfer of harmful aquatic species through biofouling in some of the developing regions of the world.
Country/Region	Patent Number
México	+ 52 1 3334828401



IMPROVING THE OPERATIONAL PERFORMANCE OF EXISTING SHIPS



# Carbon Intensity Indicator

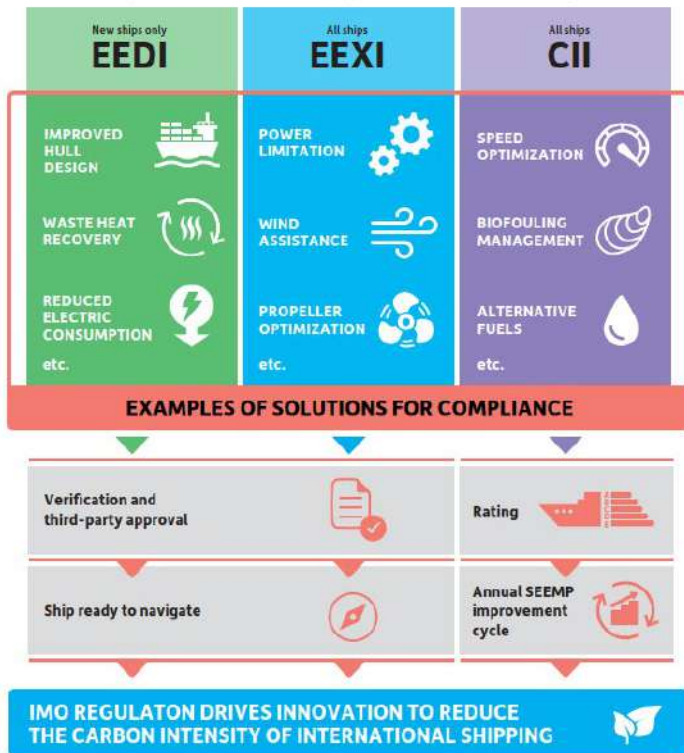
**CII is mandatory for ships of 5,000 gross tonnage and above**

- All ships > 400 GT are required to calculate their attained Energy Efficiency Existing Ship Index (EEXI)



**IMO identifies Biofouling Management as requirement for reducing GHG emissions**

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