

SUSTAINABLE BOAT BUILDING

INDUSTRY RESEARCH REPORT



Over the last years, The Ocean Race has been involved in three workshops on the subject of improving sustainability in boat building. One with Persico in 2016, a Cradle-to-Cradle workshop in Newport 2018 and an Innovation Workshop in Genoa in 2019. All of these events have reported high levels of interest and identified clear actions that can be taken. However, while there is progress, it has not been cohesive and it is not moving as quickly as will be needed to align with 2030 action for the climate.

To prepare for an Innovation Workshop in September 2021 The Ocean Race commissioned research to review previous workshops for trends and to engage with the industry to understand the main barriers to change as well as the solutions that exist or could exist in the near future. The research also aimed to gauge what role The Ocean Race can play to catalyse and accelerate action.

The research is summarised in this report, including the results of an industry survey as well as stakeholder consultation calls with 40 key industry stakeholders. Stakeholder groups represented included teams, classes, design, composites, alternative materials, spars, rigging, electric propulsion, shipyards, marine technology, sails and industry associations. These represent the majority of the offshore racing value chain.

The survey was designed to gather feedback on the main industry barriers and enablers for the transition to a more sustainable and circular model as well as seeking to understand how the industry was progressing in the following areas : LCA, Waste Management, Materials, Energy and Governance. In the survey respondents were allowed to choose more than one option.

Further insight has been collated from the results of previous workshops, published LCA studies, an industry innovation scan and other industry research, notably the Carbon Trust '[Roadmap for the Decarbonisation of the European Recreational Marine Craft Sector](#)'.

KEY FIGURES

55 %

said lack of technical knowledge in alternative materials and processes is the greatest barrier [#1 barrier].

90 %

think the boat building industry is not doing enough to reduce its environmental impacts.

75 %

are interested in being part of a longer term industry working group on the subject. A further 24 % may be interested.

75 %

believe The Ocean Race should use its notice of race to accelerate change.

50 %

felt lack of finance for R&D is the greatest barrier to change [#2 barrier].

97 %

of European recreational craft industry companies are SMEs.

60 %

consider 'increased demand from clients' to be the greatest enabler [#1 enabler].

Previous workshops had identified the common themes of **Life Cycle Analysis [LCA]**, **waste management**, **alternative materials** and **energy consumption** as areas to focus on.

The survey was used to understand how the industry was progressing with these areas as well as other sustainability governance related subjects.

LIFE CYCLE ANALYSIS

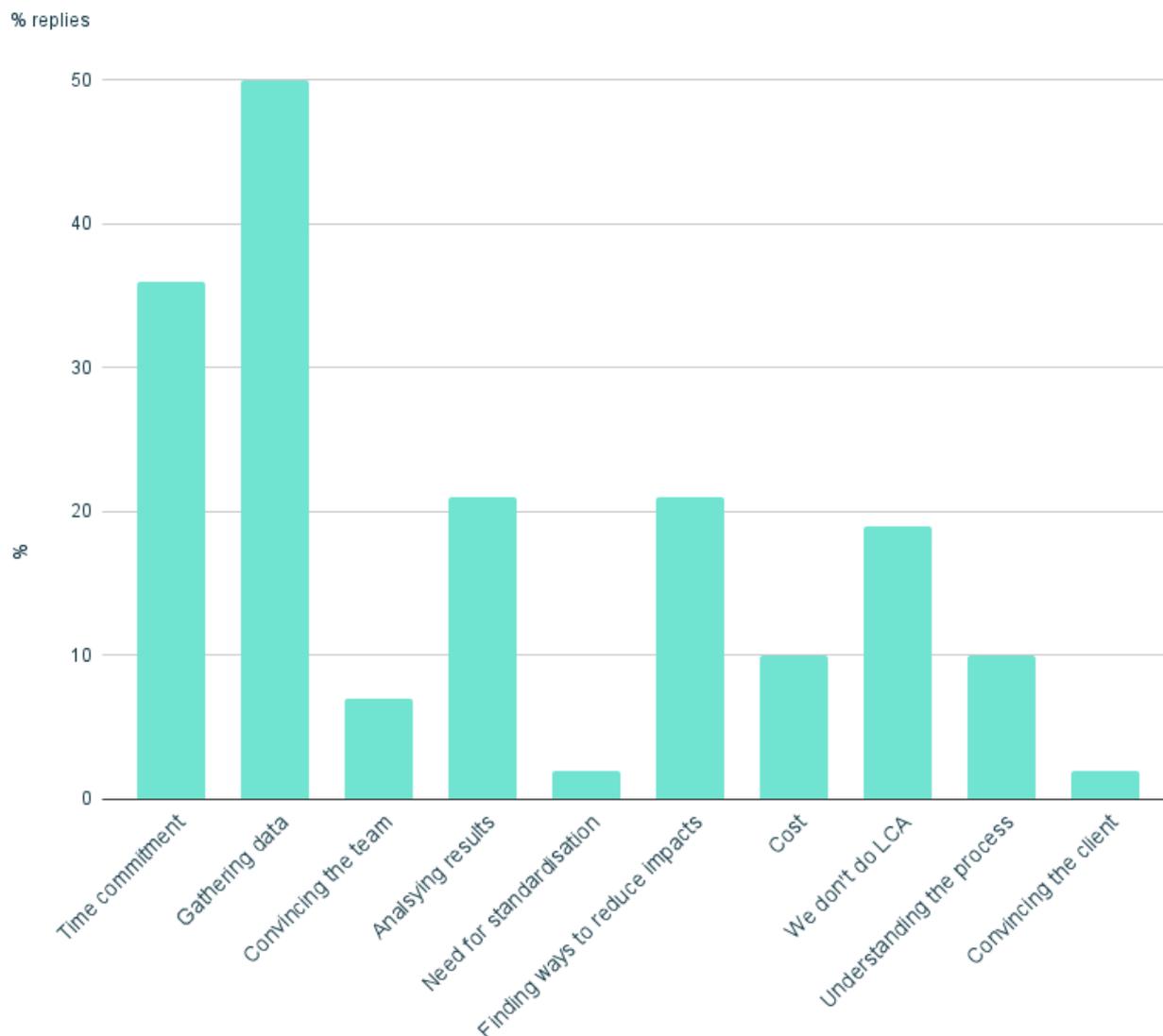
65 %

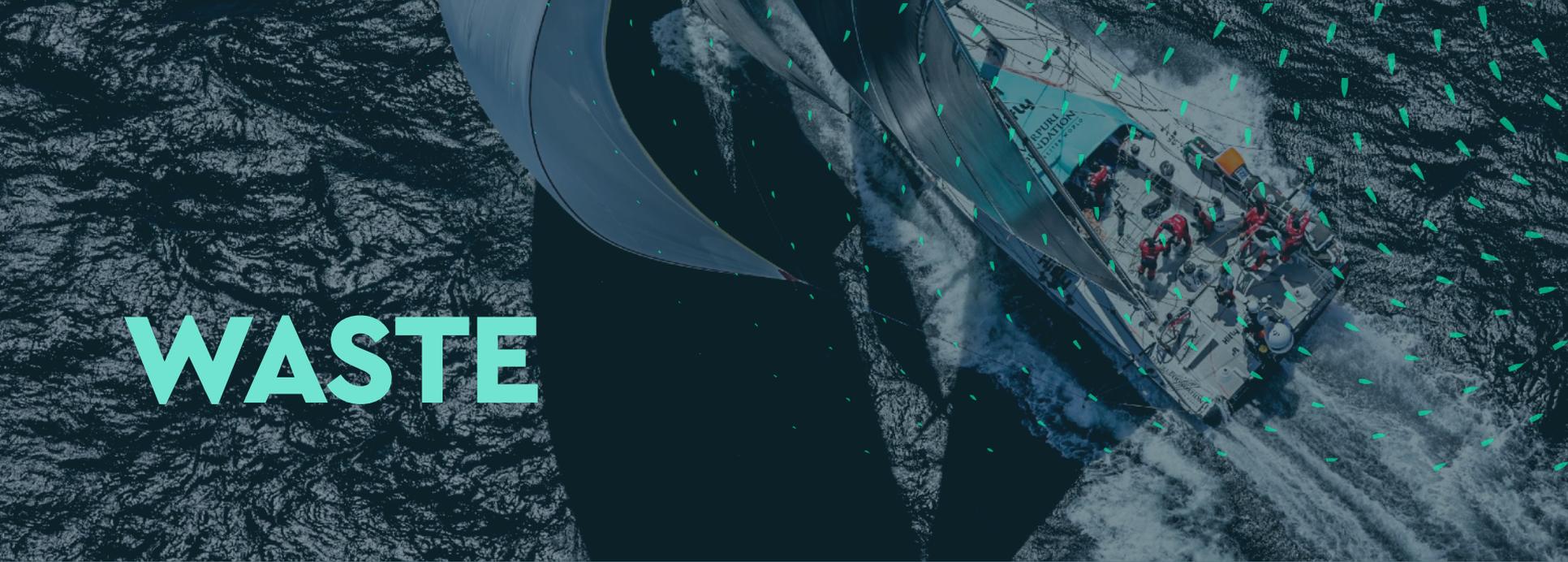
undertake LCA

50 %

gathering the data is the greatest challenge

What has been the greatest challenge to implementing LCA?





WASTE

59 %

measure waste production

53 %

have end of life plans for waste streams

48 %

work with suppliers to reduce packaging waste

Examples of industry solutions

- Carbon fibre recycling through University of Bristol start up project 'Lineat'
- Use of products that have been upcycled from fishing nets collected from India into Net Positive fins, fin box inserts, leash plug
- Recycled packaging material
- 'GiveBox' Lorient, equipment reuse project
- PET recycled into PET core
- Paint recycling programme
- Production planning to minimise waste e.g. compatible products follow each other to enable re-use of washing waste
- Waste from air extraction reused within compatible products or by third parties as a raw material
- Pre-preg backing and vacuum bag recycling
- Cradle to cradle recyclable materials

MATERIALS

70 %

are trying to reduce the use of products toxic for human health

54 %

are using alternative materials for non-structural parts

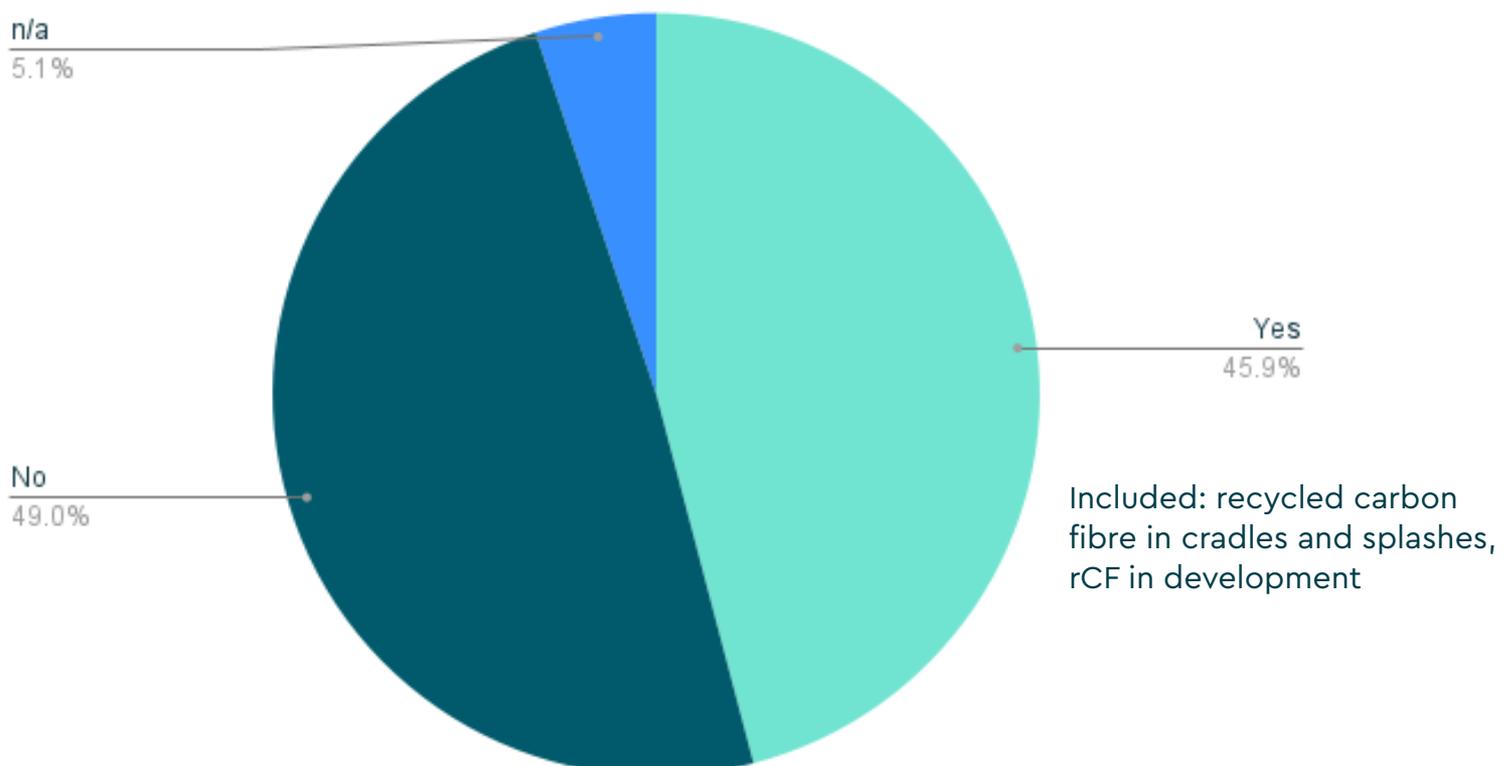
43 %

purchase sustainably sourced timber

39 %

use recycled content materials as a principal input for product or process

Do you use any recycled content materials as a principal input for your product or process?





ENERGY

55 %

have a renewable energy tariff

30 %

implement energy efficiency measures

Examples of energy efficiency measures

- Achieving ISO 50001 certification for Energy Management
- Undertaking an energy audit and implementation of an energy management plan
- Adding energy saving fittings and fixtures and improving insulation
- Prioritising low energy technology
- Using LED lighting



GOVERNANCE

Does the company have a sustainable sourcing policy?

55 % YES

40 % NO

5 % N/A

Does the company have an R&D budget for sustainable innovation?

45 % YES

50 % NO

5 % N/A



BARRIERS TO CHANGE

What is the greatest barrier?

55 %

lack of technical knowledge in alternative materials and processes as the greatest barrier to change

50 %

lack of finance for R&D

48 %

boat speed as the key indicator of performance

The stakeholder consultation largely aligned with these findings but allowed for further investigation into why these barriers existed. They can be broken down into six barrier categories:

- Technical
- Data
- Logistics and supply chain
- Collaboration in a competitive industry
- Finance and support
- Culture and rules



BARRIERS TO CHANGE [CONTD.]

Technical

- **End of Life:** Most construction materials do not have suitable end of life options, a high level of single-use consumables are also used. There is a lack of infrastructure and value chain for recycled materials. Extending the life of race boats was identified as a very efficient way of reducing impact over a life cycle however it was flagged that there could be security issues for updating old boats.
- **Alternative materials:** There is a lack of understanding in the properties of alternative materials and their potential use in boat construction. They are also perceived as more expensive. The use of new materials and processes will require industry up-skilling.
- **Carbon fibre:** No existing materials can meet the structural performance of carbon fibre but this material has a very high environmental impact, a high waste % in manufacturing and poor recycling options.

Data

- **Insufficient for decision making:** There is a lack of understanding about materials, their properties and their sustainability ranking. This includes mechanical properties and LCA data. New materials sometimes aren't presented with the right set of data points and expensive testing is needed to get the right ones. The industry is increasingly using LCA but the process is time consuming and data is hard to collect from the supply chain.
- **Trusting the data:** Many materials haven't been used long enough to develop trust in the industry for their use. They may only have one or two data points and these may be debated by different industry stakeholders.
- **Trusting each other:** There is uncertainty around sharing data in a competitive industry even through a third party LCA tool such as MarineShift360.

Collaboration

- **Value chain communication:** Decisions determining the environmental impact of the build are made by the team & designer without consulting the shipyard or the rest of the value chain. Competitive environment prevents sharing of best practices, data and projects for enhanced sustainability.
- **International impacts:** Industry players outside of 'hubs' can feel isolated. Differences in waste management in different international locations makes it harder to recycle packaging and materials. Supply chains are complex and international. Primary materials are not produced in key industry locations.
- **Sustainability tools:** Need for industry to align on the tools that it will use to measure sustainability progress.



BARRIERS TO CHANGE [CONTD.]

Economic

- **SMEs:** The industry is principally SMEs that don't have large profit margins or R&D budgets. 2020 was a particularly hard year. Funding applications are complicated and many companies aren't aware of what is available to them.
- **Sponsorship:** It's hard to take risks with sponsors' money, this prevents teams trying new things.
- **Path dependency:** The industry doesn't know the solutions and therefore fear the cost and risk to their business. The industry has invested in the equipment, materials and skills needed for the current way of doing things.
- **Commercial model:** People need to sell and clients just want performance, light weight and low cost.

Culture

- **Innovation:** Industry doesn't want to go backwards, strong feeling of the need for innovation and that the sport depends on it.
- **Performance:** Lack of desire to sacrifice performance for increased sustainability. This is at odds with sponsors corporate commitments to sustainability.

Rules

- **Getting ahead:** Rules take a long time to change and, as a democratic purpose, they are dependant on majority buy in. This can be hard in a owner/skipper driven class.
- **Resource requirement:** It's complex to change rules and so it takes time and research, there aren't resources available to do this.
- **Enforcement:** Enforcing the rules could be complicated due to international build locations and complexity of knowing what has been done during a build.



ENABLERS FOR CHANGE

Top enablers:

60 % increased demand from clients

50 % changes to the racing rules

50 % a better selection of sustainable products

The stakeholder consultation identified a broader range of solutions, some of which aligned with the barrier categories:

- Technical
- Data
- Collaboration
- Rules
- Changing the paradigm
- Tackling low hanging fruit
- Influence



ENABLERS FOR CHANGE [CONTD.]

Technical

- **Focus on non-structural and peripheral elements:** The first targets for the use of alternative materials and could be supported in the rules. This approach has started but more could be done to identify where in the boats alternatives can be used. These elements can act as a test bed.
- **Increase technical knowledge and skills:** We need to share experiences with new materials and processes and develop a joint materials strategy for the industry, supported by up-skilling the workforce in their use.
- **Trust innovation:** The market is driving solutions although this is driven by what people are willing to fund. Adding constraints won't hinder innovation, just ensure it goes in the right direction.
- **Simplify:** Increased complexity increases environmental impacts due to more moulds needed, more man hours, more energy etc. Simplifying or standardising designs or parts of boats would offer a big reduction opportunity.

Data

- **Keep measuring:** Keep measuring and encouraging the whole industry to undertake LCA. Building this database and measuring impacts scientifically is the only way to avoid greenwashing and ensure the industry makes the right choices. Using the same measurement tools will increase comparability and efficiency.
- **Build the database:** Increase the diversity and accuracy of the materials database by sharing data. Access funds to develop better data when gaps or inaccuracies are identified. Use 3rd party organisations to manage the data if industry is concerned about data security.

Rules

- **Industry driven:** People are expecting rule changes that enhance sustainability. This is the key piece that will increase client demand and drive innovation in the right direction. Waiting for government policy change will take too long as the industry is too small to be a priority for them.
- **Make them meaningful:** Use measurement tools to design rules that have an important reduction on the environmental impacts. Rules take time to implement, and longer to be reflected in boat builds, so the industry needs to get ahead of the rule changes. The use of LCA could also help enforce the rules as it will require measurement and reporting.
- **Use rules to create a virtuous circle:** The industry is highly competitive and teams will do what they must to win. By creating rules that reward reduced environmental impacts the industry will drive innovation in the right direction and it will remain interesting from an innovation standpoint.



ENABLERS FOR CHANGE [CONTD.]

Collaborate

- **Vision and commitment:** Get leading voices together and align on vision for the industry and global commitment for 2030 and beyond. Agree a set roadmap and ask industry to make a commitment. Ask for more from big industry players and make sure smaller companies are offered support.
- **Mutualise:** Pool funding and resources to tackle common industry challenges and share best practices and learnings. Build clusters and work with other industries that may be more advanced or have better understanding of waste streams. This can help deal with the irregular waste flows of the marine industry. Demonstrating a consortium across the supply chain could attract funding opportunities.
- **Take responsibility together:** The Industry needs to hold itself to account for the environmental impacts of its products. By agreeing a carbon price an industry collaboration could use the funds raised through its application to invest in R&D which will reduce the industry's impacts, this would be a form of insetting. Another option would be the development of an accreditation standard.

Low-hanging fruit

- **Renewable energy:** Changing to a renewable energy provider or installing renewable energy on a facility is a very effective way of reducing manufacturing impacts, it has no effect on performance and it is affordable.
- **Compensate:** During the transition period while new materials and processes are tested the industry could compensate for its impacts. This could support the insetting funding model suggested in Collaboration Enablers or a more standard approach of using a certified process.
- **Carbon fibre:** In choosing to continue using carbon fibre increased efforts need to be made to reuse CF offcuts, of which up to 30% are wasted during the manufacturing process, and to develop a carbon fibre recycling value chain, from collection of waste to driving a secondary market for recycled carbon fibre.



ENABLERS FOR CHANGE [CONTD.]

Key influencers

- **Production boats:** Use designers to bring production boat companies to the table. Use The Ocean Race's media platform to encourage industry commitments. Work with classes that are interested in making the change e.g. optimists.
- **The designers' role:** Engage designers to take a more active role in reducing the impacts of yacht design. For example ask them to commit to reducing the impacts of the boats they design by 10% each time.
- **Teams:** Teams are the glue that brings together different stakeholders. They need to play an active role in ensuring that lines of communication are open between the whole value chain and that the decision making process is taken collaboratively and enough in advance. Teams could work together to challenge the supply chain to offer more sustainable solutions.

Paradigm change

- **Show it can be done:** To build trust in new materials some industry players are committing to building the boats to demonstrate what can be done. This includes a basalt fibre Class 40 for The Race Around, a bamboo mini-650 and the Olympic 32 in Danu Composite.
- **Question the goals of the sport:** This year's Vendee Globe demonstrated the power of the human story in sailing; the success of the race was in the adventure not the speed of the front boat. The time bonus given to some teams also meant that the overall winner wasn't known until the final few hours, this added media drama and attention to the race. While loss of performance is a major barrier to change, this years Vendee Globe demonstrates that it wouldn't necessarily be negative for the sport.
- **Increasing corporate culture of Environmental, Social and Governance [ESG]:** Companies are implementing increasingly stringent ESG standards in business and investments and this can be expected to be reflected in their sponsorship strategies. While sailing currently has a positive environmental image this could change if the sport doesn't address its construction, logistics and end of life issues.



ROLE OF THE OCEAN RACE

75 %

Design rules in the Notice of Race that accelerates change. However, it should be noted that the class IMOCA sets the construction rules and therefore this would have to be a collaborative process.

50 %

Engage the sailing community in the debate about performance and the environment.

50 %

Share industry best practice.

The stakeholder consultation highlighted the influential role of the race and its important international media platform.

This attention can be used to highlight pioneering companies and teams that are innovating and demonstrating best practice.

Everyone was in support of The Ocean Race hosting another Innovation Workshop as well as the need to collaborate more as an industry, increase workshop continuity and share best practice.

There was significant feedback that the race also needs to address its logistics footprint.

PARTICIPATING ORGANISATIONS

11TH HOUR RACING	ENERGY CLUSTER DENMARK	KAIROS	SOUTHERN WIND YACHTS
AKZONOBEL	EUROLARGE INNOVATION	KING MARINE	STARBOARD
AMER YACHTS	ENS RENNES	LORIMA	SUMOTH SUSTAINABLE DESIGN CHALLENGE / FOILING WEEK
ANTHESIS	EUROPEAN BOATING INDUSTRY ASSOCIATION	MACKAY BOATS	SWELL MARINE INNOVATION FUNDING
AUDÉLOR	FEDERATION DES INDUSTRIES NAUTIQUES	MARINESHIFT360	11TH HOUR RACING TEAM / 1 DEGREE
AVE-CHIMERA	FUTURE FIBRES	MISSION FOR THE FUTURE	TEAM AKZONOBEL
BASS PRO SHOPS	GOTTIFREDI MAFFIOLI	MULTIPLAST	TEAM MALIZIA
BCOMP	GREENBOATS	NATIONAL COMPOSITES CENTRE UK	THE CARBON TRUST
BK YACHT DESIGN	GS4C	NAVICO	THE OCEAN RACE
BRISTOL UNIVERSITY	GSEA DESIGN	NORTH SAILS	TRANSAT JACQUES VABRE
BRUNSWICK CORPORATION	GURIT	OCEANSLAB	ULTIMATE BOAT COMPANY
CARRINGTON BOATS	GUILLAUME VERDIER ARCHITECTURE NAVALE	OFFSHORE RIGGING SERVICES	UNIVERSITÉ DE NANTES
CDK TECHNOLOGIES	HARKEN	OUTREMER CATAMARANS	WESSEX RESINS
COMPOSITES EVOLUTION	ICOMIA	OVINGTON BOATS	WORLD SAILING
COMPPAIR TECHNOLOGIES	IMOCA	PERMARE SRL / AMERYACHTS	VPLP
DÉFI AZIMUT	INTERNATIONAL OPTIMIST DINGHY ASSOCIATION	ROYAL YACHTING ASSOCIATION	
DMG MORI SAILING TEAM	INNER LOOP SOLUTIONS	RIMTA	
DSM	JULIAN BETHWAITE	SCHÜTZ COMPOSITES	

PREMIER PARTNERS



OFFICIAL PARTNERS

