MARINE ECO ENGINEERING NEWS

SEPTEMBER 2022

EXO Engineering

EDITORS NOTE:

Marine Eco Engineering news is formulated for Exo Engineering partnerships and collaborations. We view this publication as an opportunity to hear from our partners, associates, and researchers, to forge new collaboration opportunities and strengthen existing connections.

In this second issue summer 2022 we'll introduce more of the Exo Engineering team, and some partners that Exo Engineering are working with on current projects. This issue also shares some of the latest research from within the field of marine eco engineering.

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CONTENTS:

AN INTRODUCTION TO THE TEAM

The team at Exo Engineering boasts a wealth of experience in ecological engineering design innovation, concrete chemistry, and environmental research. We asked each team member about their role, what they are most excited about for the future of Exo Engineering, and what they see as the opportunities and challenges ahead. In the previous issue, we introduced William Coulet and David Miko. This issue features more members of the team.

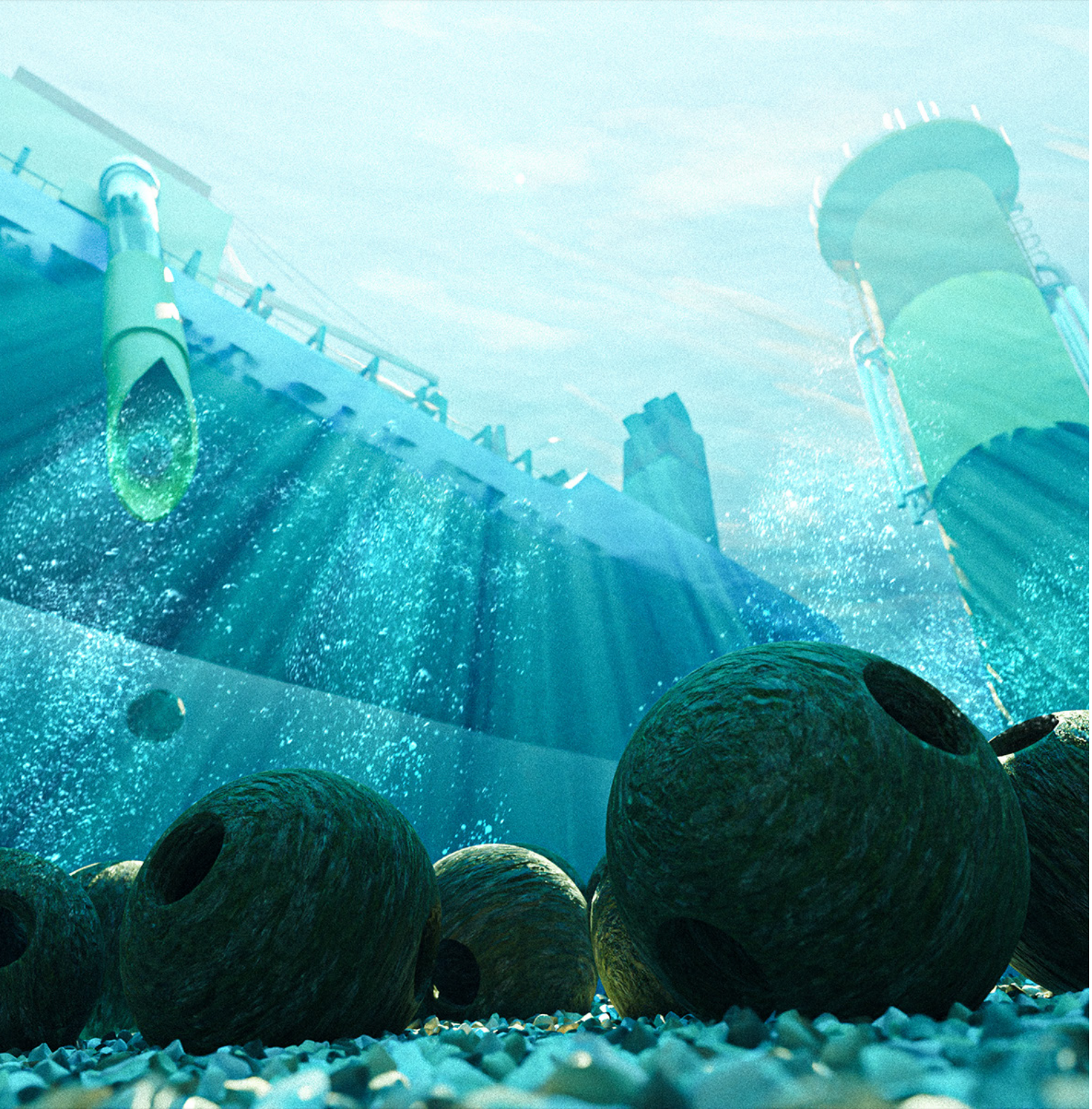
WILL MELHUISH

Will Has an Environmental Sciences (BSc) degree from the University of East Anglia and a Master's degree in Marine Environmental Protection (MSc) from Bangor university. With his background researching coastal habitat provision, he is responsible for developing products that enhance habitat provision for marine and coastal species, as well as establishing routes to market for these products. Will understands that there can be challenges in proving the effectiveness of design concepts to key stakeholders and decision makers but feels that with collaboration this can be overcome. "**It is only by bringing stakeholders together that the interests of all parties can be addressed.** In this way, projects can work to the benefit of local communities, the environment and policy makers".

NELLY SIRRI

Nelly has just joined the team and has an Environmental Sciences (BSc) degree from the University of Buea, Cameroon, and a Master's degree (MSc) in Environmental Assessment and Management from the University of East Anglia.

With her experience in land and water process management, climate change adaptation, and mitigation she will be responsible for engaging stakeholders and will be involved in a range of project pilot studies. "**Marine environments have high biological diversity potential. With the drive towards clean energy like wind, there is a need to cost-effectively manage trade-offs between different users**. I am excited to see how collaborative work between different stakeholders can influence policy and achieve both clean energy and biological diversity in the marine environment."



SCALING UP ECO-FRIENDLY SCOUR PROTECTION IN OFFSHORE WINDFARMS

A new two year project, running from 2022 to 2024 will investigate the potential for ecologically enhanced scour protection to be deployed on a large scale at offshore wind sites. **The Living Windfarms Project aims to demonstrate how Eco Reef units can be mass manufactured and deployed by using, or adapting existing conventional deployment methods.** The project will see a pilot Eco Reef mass deployment at offshore wind infrastructure in the North Sea in early 2023. This will be followed by a biodiversity monitoring programme aiming to quantify the impact on marine life. The Living Windfarms Project is a collaboration between Exo Engineering, Jan De Nul Group and The Rich North Sea. The Offshore Wind and Growth Partnership (OWGP) is co-financing the project.

The project will include quarterly workshops in which we will provide updates as the project progresses and invite guest speakers from within the industry and relevant stakeholders. The aim is to use these workshops as an opportunity for networking and knowledge sharing to bring eco scour protection solutions into the mainstream. The first workshop will be held on the 23rd of November 2022. For more information click **here** to visit the website.

NOVEMBER WORKSHOP!

The event will take place on the 23rd of November at the University of Essex and will be accessable online to stream live as a webinar if you can't attend in person.

Time	Activities
12:00	Workshop opens – Lunch and Networking
12:30	Workshop Introductory Presentation
13:30	Session 1: Scour protection and marine biodiversity in the North Sea. Presentation and discussion topics: • Importance of hard substrate habitat types. • Opportunities for scour protection to enhance biodiversity. • Current knowledge gaps. • Barriers to the uptake of nature based solutions.
14:30	Break
14:45	Session 2: Benthic and demersal marine ecology. Presentation and discussion topics: • Impact of environmental conditions on community assemblages. • Biodiversity monitoring; importance and best practice.
15:45	Break
16:00	Session 3: Technical Eco Reef requirements for loading and deployment at scale. Presentation and discussion topics: • Current scour protection loading and deployment practices. • Eco Sphere deployment methods; challenges and opportunities. • Introduction to Brightlingsea strength test demonstration.
16:30	Open Discussion and Networking
17:00	End of Workshop

RESEARCHING COASTAL AND MARINE ECO ENGINEERING

In June, Will Melhuish attended the final Ecostructure conference in Aberystwyth. Ecostructure brings together five leading universities in Wales and Ireland to research and raise awareness of eco-engineering solutions to the challenge of coastal adaptation to climate change (Aberystwyth University, Bangor University, University College Dublin, University College Cork, and Swansea University). **Ecostructure aims to promote the incorporation of secondary ecological and societal benefits into coastal defence and renewable energy structures,** with benefits to the environment, to coastal communities, and to the blue and green sectors of the Irish and Welsh economies.

The conference provided a perfect opportunity to learn about the latest research in the field of marine eco engineering and meet the people behind this research.

ECOSTRUCTURE
Climate Change Adaptation through Ecologically-Sensitive Coastal Infrastructure

ENHANCING THE BIODIVERSITY OF MARINE ARTIFICIAL STRUCTURES

The following article has kindly been contributed by Professor Pip Moore of Newcastle University. she is a marine community ecologist who is interested in all aspects of marine ecology and more specifically on how algal-dominated near-shore ecosystems are structured and function. She has conducted research in the field of ecological engineering and has played a key role in the Ecostructure project

Artificial structures are proliferating in the marine environment as coastal populations increase and in order to produce renewable energy to mitigate climate change. This has been termed coastal sprawl. Research around the globe has shown that many of these artificial structures support communities of plants and animals that are dissimilar and depauperate compared to natural rocky reefs, in part because they lack the range of different habitats (e.g. overhangs, crevices, rock pools) found on natural reefs. In response, the field of marine eco-engineering (also termed blue/green engineering) has emerged.

Eco-engineering seeks to develop interventions, from the micro (sub mm) to macro (>1m) scale, that mimic some of these missing habitats and which can be incorporated into marine engineering projects or retrofitted on to existing structures. **Such interventions aim to increase the biodiversity (and ecosystem functioning) of marine engineered structures** in order for them to support plants and animals more analogous to natural rocky reefs. Unfortunately there is a perceived lack of evidence for the efficacy of such interventions amongst stakeholder communities, in part, because much of the evidence has been hidden behind academic publication paywalls.

In order to break this evidence barrier the Ecostructure Project, working with Conservation Evidence, created a **freely available synopsis of the evidence underpinning the efficacy of marine eco-engineering interventions** entitled 'Enhancing the biodiversity of marine artificial structures'. **The review identified 43 interventions across 176 separate studies for enhancing the biodiversity of marine artificial structures from studies undertaken across the globe.**

The Conservation Evidence approach is rigorous and involves a steering committee of stakeholders from government agencies, industry and academia who are experts in the field and who oversee the process from start to finish. The resulting product therefore provides the best most robust evidence underpinning the value of these conservation interventions. We already know that this resource is being used by practitioners and regulators to aid in their decision making of when, where and how to incorporate eco-engineering into existing and new developments.

Citation:

*https://www.ecostructureproject.eu

*https://www.conservationevidence.com

*https://www.conservationevidence.com/data/index?synopsis_id%5B%5D=44

ECOSTRUCTURE
Climate Change Adaptation through Ecologically-Sensitive Coastal Infrastructure

THE CULTURAL SIGNIFICANCE OF COASTAL PLACES

The following article has been kindly provided by Dr. Tomas Buitendijk, a Postdoctoral Research Fellow at the Earth Institute, University College Dublin, Ireland. He is involved with the Ecostructure project, which aims to incorporate ecological and social benefits in the design of novel coastal eco-engineering solutions. Ecostructure is part-funded by the European Regional Development Fund (ERDF) through the Ireland-Wales Cooperation programme 2014-2020.

For my work with the Ecostructure project, I study the impact of coastal eco-engineering interventions on the local community. I have a particular interest in the cultural significance of coastal places, both natural and constructed: what do these sites mean to local residents, and how do they engage with them? This is a largely under-explored, but very important area of interest. **Developing an understanding of the cultural connections between people and coastal places allows us to identify what aspects of the landscape matter most to residents, and how we might be able to safeguard these values during periods of change.**

For example, I recently worked with a team of researchers from University College Dublin and Bangor University to study people-place relationships in south Co. Wicklow, Ireland. Our research revealed that connections to coastal places are not necessarily informed by factors like age, gender, or the natural or artificial character of a site. Instead, **people have more complex cultural relationships with places,** for example based on their capacity to provide mental and physical health benefits, foster a sense of community, and allow interactions with wildlife and the landscape.

This means that community-based analysis of people-place connections is very important to minimise the loss of cultural function of coastal places when developers are changing the landscape (for instance by introducing necessary sea defences or infrastructure). At the same time, we can use this knowledge to enhance developments and strengthen existing cultural benefits, leading to a win-win situation.

GOING INTERNATIONAL

William Coulet from Exo Engineering Int. visited Halifax Nova Scotia in mid-June 2022 for a full week to explore opportunities for collaboration during the H20 conference.

With the support from the Global Business Innovation Programme (GBIP) we sought opportunities for strategic co-operation and partnerships for innovative projects, to catalyse the uptake of ecologically enhanced scour & erosion protection and aquaculture opportunities. We have a strong track record for collaboration in the UK and Europe and we aim to expand our markets to exciting places such as Nova Scotia, find out how our visit went:

We aimed to form R&D collaborations, with the view to establish pilot projects to test and improve the applicability of our eco-reef products for the Canadian aquaculture and marine infrastructure. The harsh Atlantic conditions that marine infrastructure and urban areas face in Nova scotia require specific considerations when it comes to Marine Eco-Engineering.

As part of collaborative pilot studies, we aim to understand these conditions and the functioning of our sustainable and biodiversity enhancing products. Furthermore, **the Canadian Blue Economy Strategy highlights the expansion of offshore wind power as a means to meet Canadian targets for carbon net zero by 2050,** it is our intention to be fully part of this expansion.

With long term plans to introduce our products to the wider North American market with the support of the Nova Scotia powerhouse. Continuous product development also requires end user input, and we wish to ensure a focus to meet Canadian end user specification and conventional deployment methods.

We've had a very productive three days at the H20 Conference filled with no less than 14 B2B meetings, introductions, and discussions to explore the Canadian business climate. **Being part of the GBIP delegation special arrangements were made for us to ensure that no opportunities were missed.**

We furthermore enjoyed site visits to Dalhousie University and the Ocean Frontier Institute on Monday, the COVE (Centre for Ocean Ventures and Entrepreneurship) on Thursday and the Port of Halifax and Centre for Port Innovation (PIER) on Friday, before returning to the airport early on Saturday morning.

UKRI Innovate UK

MAKING WAVES FOR NORFOLK

Exo Engineering sponsored the local "Making Waves for Norfolk" Conference held by the Marine Conservation Norfolk Action Group (MCNAG) in partnership with the Norfolk Wildlife Trust. The event included talks and discussions on some of the major threats to marine and coastal ecosystems, as well as opportunities to tackle these threats. This was an excellent opportunity to learn about groups actively working to improve the coastal and marine environment locally in Norfolk and across the UK. Rob Spray, chair of MCNAG has contributed the following:

Almost marking a year of activity, **the first in-person MCNAG conference was a chance to take stock of the progress we've made as a volunteer body -** and I was so proud. We were hopeful we could gain some ground, but to have become the coordinating force for marine conservation in a year has been amazing.

Marine Conservation for Norfolk Action Group - now affectionately known as MCNAG – has been very busy in the last year. Volunteers have made strides in recording, cooperating, and innovating to better understand the threats to the coast and carried that agenda to the event at Cley Marshes. With last year's online conference, we opened the debate and tried to start a local discussion, **this year we drew in contributions from important bodies large and small, local and national - including RSPB, RSPCA, EIFCA, Wash Waders Group, Friends of Horsey Seals and Seasearch East, as well as individuals who have dedicated themselves to the coast.** We even had a surprise fisherman who perhaps unexpectedly seemed shaken by the effect of their industrial litter on the coast and professed regret that fishing wasn't matching the effort of volunteers. Our closing session of forward looking innovations showing that we can do better!

We highlight our gratitude to a small team of volunteers, their **dedication was a measure of how valuable we all felt to speak on behalf of the coast at such a high level.** Everyone worked until the last minute to make it happen, coaxing reluctant speakers, battling technical challenges and crossing fingers but making an impact and bringing home the responsibility we all have to the future made it all worthwhile.

We have to thank Exo Engineering for stepping in at a crucial point with their sponsorship, the event was being run on a shoestring and they ensured it could happen. We are very grateful!

Find out more about MCNAG **here .**

MARINE CONSERVATION NORFOLK ACTION GROUP

SOUTHEND CLIMATE HUB

At the end of July Exo Engineering paid a visit to the Community Climate Hub in Southend-on-Sea. The first ever Climate Hub in Southend-on-Sea aims to support the council's ambition of reaching net zero carbon emissions by 2030. The hub provides a physical space for education and engagement by uniting residents, businesses, schools, universities, and faith groups to embrace the challenges of the Climate Emergency Declaration made in 2019.

During our visit to the climate hub we discussed Hybrid Nature-Based Solutions (HNBS), an approach to integrate nature inclusive designs into the hard infrastructure required to protect our coastal cities. **Coastal cities are becoming increasingly vulnerable to rising sea levels as well as erosion and storm events due to climate change.** However, conventional hard engineering solutions result in coastlines with a deprived range of biodiversity. Through using HNBS, biodiversity along urbanised coastlines can be enhanced whilst providing the protection that coastal cities and towns require.

The research and pilots of HNBS in Southend-on-Sea is supported by the SARCC project (Sustainable and Resilient Coastal Cities) in which Exo are also partners. **The SARRC project final conference is taking place on the 6th-8th of December,** 2022 in Southend-on-Sea, England, you are all invited to participate in celebrating the achievements of SARCC and it's project partners, whether that be in person or watching our live-stream online.

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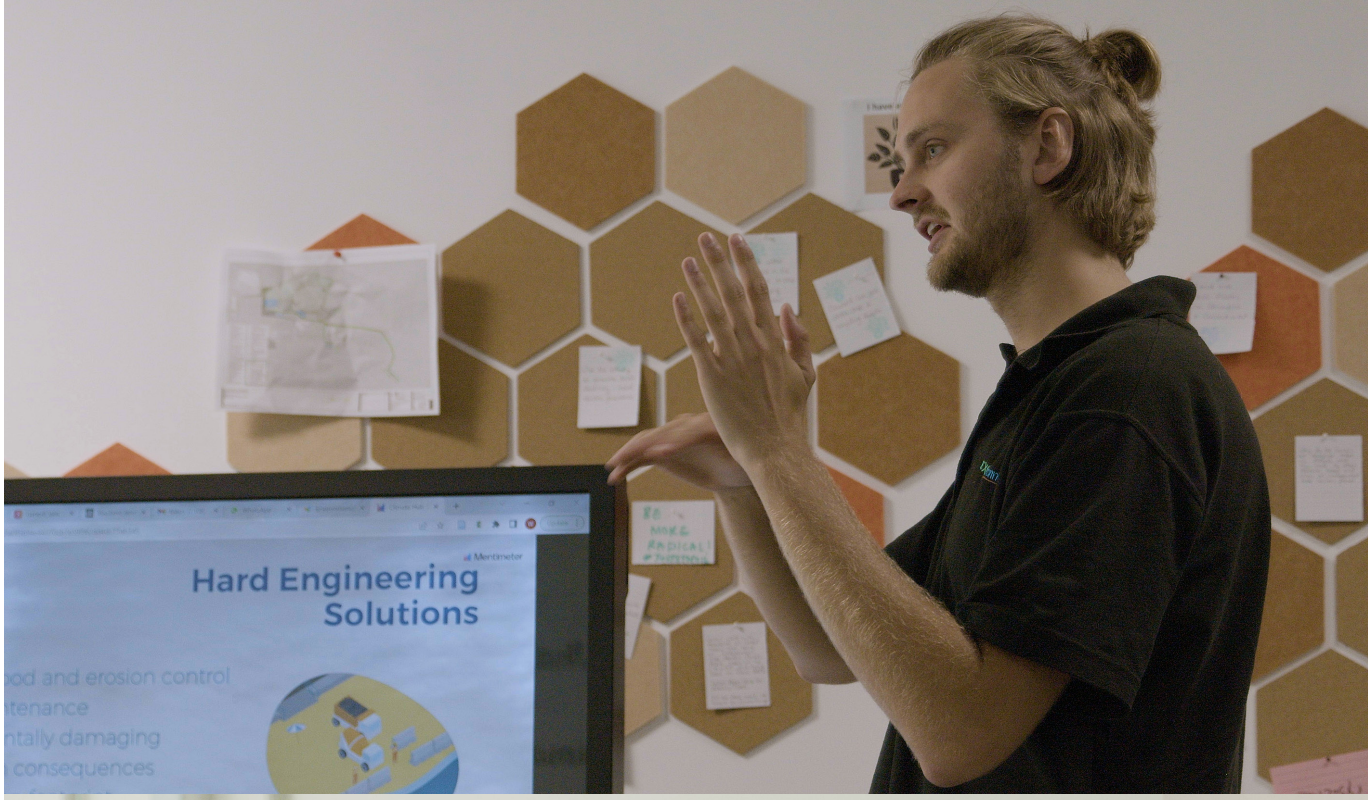


PILING HABITAT - NEW TRIALS

Exo Engineering's Piling Habitats can be fitted to vertical seawalls and sheet piling, using Greening the Grey technology ® to increase habitat provision on these artificial structures. **The vertical provision of intertidal habitat helps to offset the loss of natural intertidal habitat caused by climate change induced sea level rise.**

Currently four Piling Habitat units are deployed at Brightlingsea Harbour in Essex where they have supported biocolonisation and growth of benthic faunal species such as polychaete bristle worms. Following this success 12 units have recently been deployed in the Hamble Harbour, Southampton. The bio-colonisation of these units will be monitored over the course of a year. In addition, Piling Habitats are being deployed in Southend-on-Sea.

Exo Engineering's piling habitats are easy to install and can be used as a simple measure to improve biodiversity on waterfront infrastructure, they can therefore be used to work towards biodiversity net gain on seafront projects.

WHAT'S NEXT?

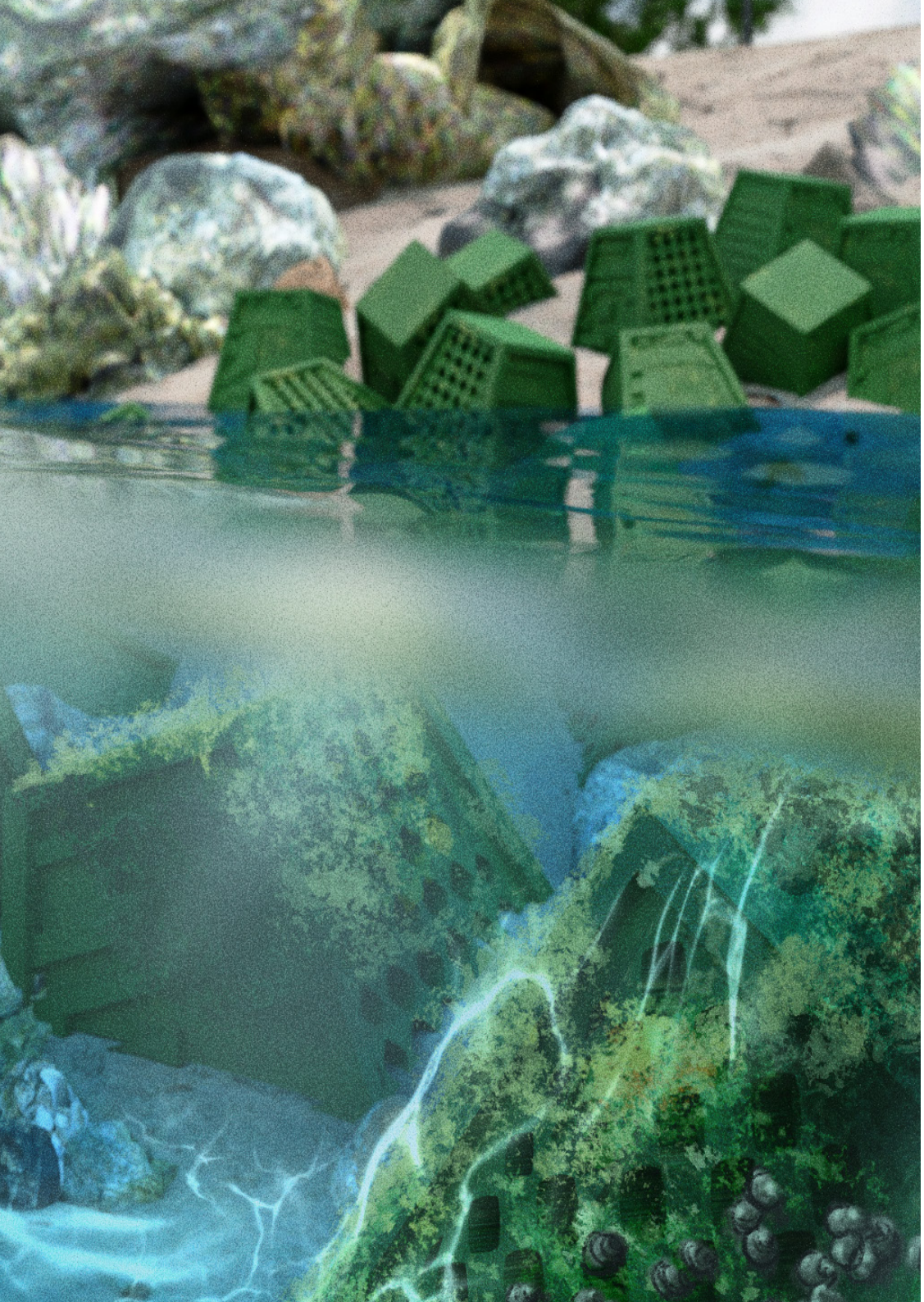
Now the Living Windfarms Project has commenced, we will be providing regular online workshops with project updates and networking opportunities with key players in the offshore wind industry. To find out more click **here**.

A large scale deployment of 5 tonne Eco Rock Armour units is on the horizon. Watch out for updates in the coming months.

The SARCC project is officially coming to an end! With the closing conference taking place on the 6th-8th of December, 2022 in Southend on Sea, England, you are all invited to participate in celebrating the achievements of SARCC and its project partners. In addition, there will be a range of guest speakers including Professor Pip Moore. Whether that be in person or watching our live-stream online. Book your place **here**.

A NOTE OF THANKS TO OUR PARTNERS AND COLLABORATORS

There are exciting times ahead for Exo Engineering. We recognise the important role of all past and current collaborators, partners and clients who have helped us get to where we are today. We are extremely grateful for all these contributions and look forward to forging stronger relationships with new and existing partners in the future as Exo Engineering grows. If you have any ideas for collaborations or contributions to make regarding the future of Exo Engineering, please do not hesitate to get in contact with us.



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