

NATURE+ CONFERENCE THE HAGUE 30 SEPTEMBER 2025

SUMMARY AND FUTURE OUTLOOK



CURRENT STATE OF OUR OCEAN

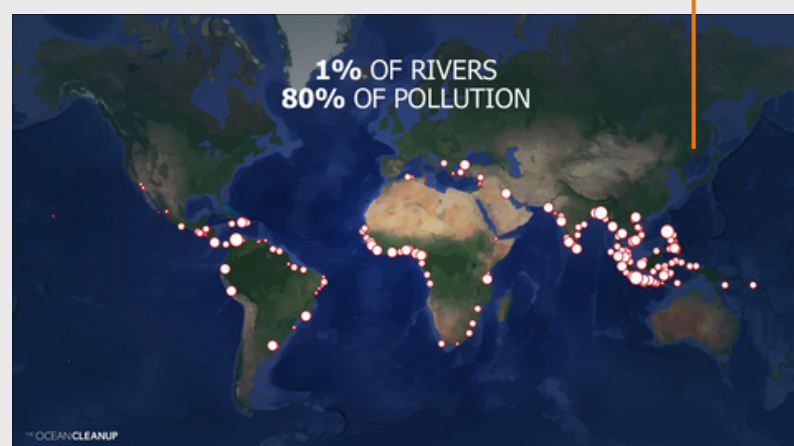
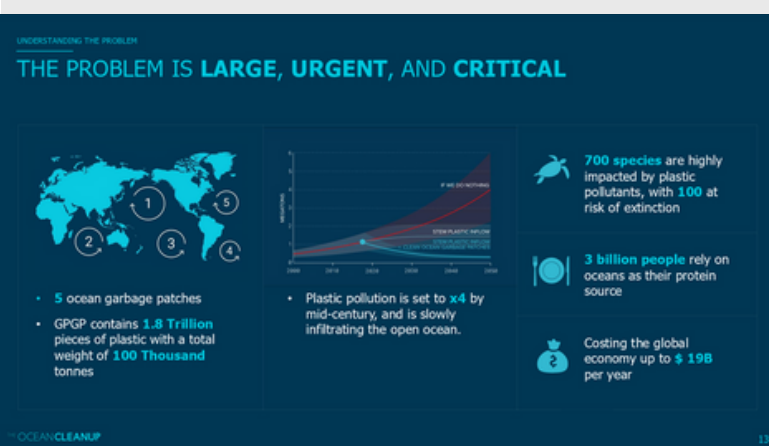


KEYNOTE SPEAKER: BAS MAASE, THE OCEAN CLEANUP

SESSION OVERVIEW

Everyone has once heard of **The Ocean Cleanup** - the sector's leading NGO executing large scale clean up at sea to rid our ocean of plastics - a cause familiar to much of its audience. Starting the day Bas set the scene on what has been done, what is the current state of our ocean, and what needs to be achieved in the coming periods.

Within the past 10 years since they started, The Ocean Cleanup calculated that from the **annual total of 400M, 1 to 3 million metric tons** of plastic enters the ocean.



Most of this is fed into ocean systems via rivers, so with the help of **interceptors deployed** in **some** of the **world's most polluting rivers**, The Ocean Cleanup has removed **36M kilograms of plastics**.

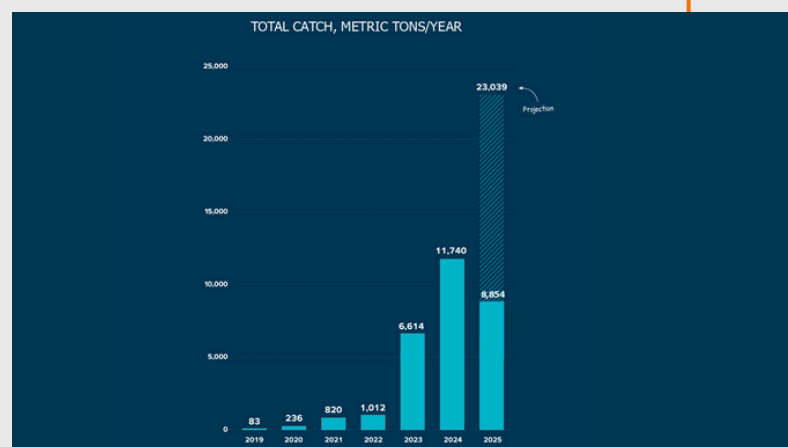
CURRENT STATE OF OUR OCEAN



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SESSION OVERVIEW

A significant portion (**60-80%**) of the **Great Pacific Garbage Patch** originates from the **fishing industry**. In order to collect this floating plastic, they **deploy large 2.4km floating systems**. Eventually this plastic, from either Guatemalan rivers or the Pacific Ocean, ends up being **repurposed** by partners such as **Kia - for car accessories** and **Coldplay - for their records**. This is one of the few manners through which The Ocean Cleanup gets its funding, besides philanthropic donations.



Offshore operations are currently **on hold**, as their focus lies on enhancing efficiency through predictive data and drone technology to pinpoint plastic hotspots. **Looking towards the future**, the organisation aims to expand their impactful campaigns with the '30 Cities Program', continuing their contribution for a sustainable and resilient ocean.

OVERVIEW NATURE+ SECTOR



SPEAKER: YUKI ESSER, DMEC

SESSION OVERVIEW

Prior to diving deeper into the **ecosystem impacts** and the possible **mitigation strategies**, it is important to take in a broader perspective to **understand our environment** - take the North Sea as a close-to-home example.

The North Sea, as we all know, is a **packed sea-space** thanks to the **endless trade possibilities** it offers. However, it is also known as a **challenging natural ecosystem**. With its **complex circulation system**, putting structures in it will disrupt primary production. The North Sea is a **highway for migration**, yet animal's migration might be **affected by** all other commercial and innovation activities, for example **artificial lights, structures**, offshore wind farms, and environmental monitoring.

At the current stage, offshore renewable energy innovations are deployed in an environment where there are existing pressures. Therefore, it is of the utmost importance to **define** what is the **baseline**, what **regulations** are needed as they are vital drives, and a need for **long-term monitoring** to understand while keeping up with the change.

DATA GAPS & CHALLENGES



SPEAKERS: SARAH KLUGE - DMEC; LISA SCHNEIDER - DELTARES; JOOP COOLEN - WAGENINGEN UNIVERSITY & RESEARCH

SESSION OVERVIEW

This panel explored the **ecological impacts** of **offshore infrastructure** and the challenges of **translating scientific data into effective policy**. As an experienced diver with a first-hand account, Joop Coolen's focus on **benthic ecology** and the "**artificial reef effect**" kickstarted the session describing the current reality.

North Sea artificial objects

Mainly sand bottom

Add objects:

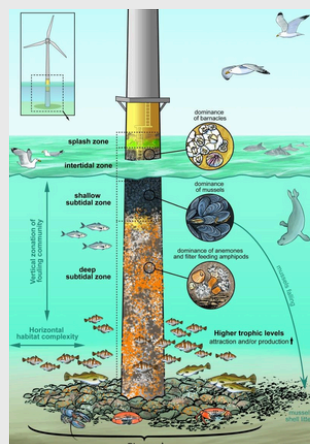
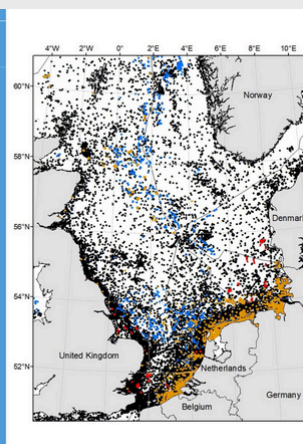
Wrecks (~25.000)

O&G installations (~ 1,300)

Wind turbines (>> 3,500)

Buoys (many thousands)

+ other ORE



Artificial reef effect

- Artificial structures are rapidly colonised by biofouling species
- Biofouling influences the surrounding environment, e.g. by
 - Particle removal from water
 - Excrements exported to sea floor
 - Increasing local biomass & species
- Biofouling can be consumed by larger organisms

DeGraer, S., Carey, D., Coolen, J. W. P., Hutchison, Z., Kerckhof, F., Rumes, B., & Vanaverbeke, J. (2020). Offshore Wind Farm Artificial Reefs Affect Ecosystem Structure and Functioning: A Synthesis. *Oceanography*, 33(4), 48–51. <https://doi.org/10.5670/oceanog.2020.253>

In a nutshell, the North Sea's **natural state** has already been **altered** (the "**shifting baseline**"), with historical **oyster reefs** being **replaced** by soft **sediment**. Additionally, the **seabed** is occupied by **artificial objects** (wrecks, O&G installations, wind farms, buoys).

DATA GAPS & CHALLENGES

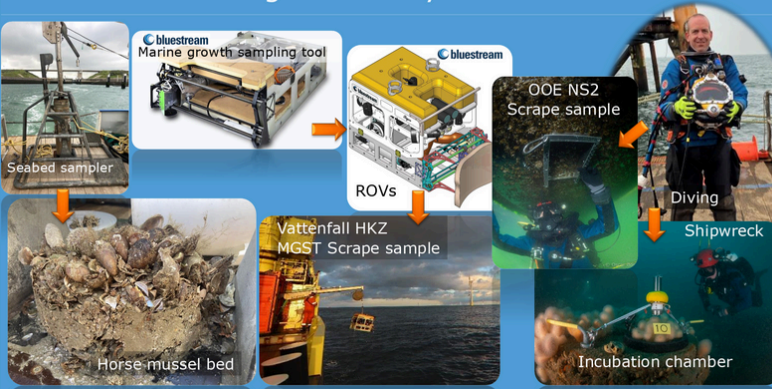


SPEAKERS: SARAH KLUGE - DMEC; LISA SCHNEIDER - DELTARES; JOOP COOLEN - WAGENINGEN UNIVERSITY & RESEARCH

SESSION OVERVIEW

These objects **introduce hard substrates** into the soft seabed, which consequently get **colonized** and thereby create **new habitats** for species like **mussels** and **anemones**. These structures significantly **increase** local **biomass** production, up to **35 times** more on the structure itself, with **effects** extending up to **150 meters** onto the seabed..

Methods & challenges to study benthos in ORE farms



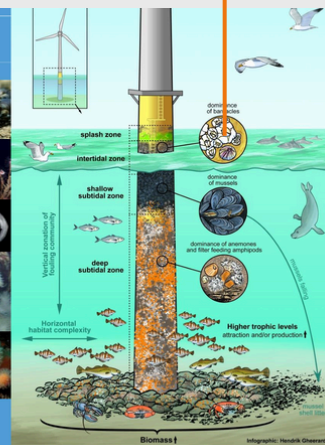
Results: Vertical zonation

Shallow: Blue mussels

Intermediate: Hydroids & Gammarids

'Deep': Anemones & soft corals

egraer, S., Carey, D., Coolen, J. W. P., Hutchison, Z., Kerckhof, F., Rumes, B., & Vanaverbeke, J. (2020). Offshore Wind Farm Artificial Reefs Affect Ecosystem Structure and Functioning: A synthesis. *Oceanography*, 33(4), 48-57. <https://doi.org/10.1016/j.oceano.2020.1019>
foto credits: Inductiveload, Bernard Picton, Hans Hillewaert, André-Philippe D. Picard, Bengt Littorin



Concluding his presentation, Joop made a compelling call for **increased collaboration** between **researchers** and **industry** to **improve data collection**, a goal that directly supports DMEC's mission to unite science and industry for a sustainable energy future.

DATA GAPS & CHALLENGES

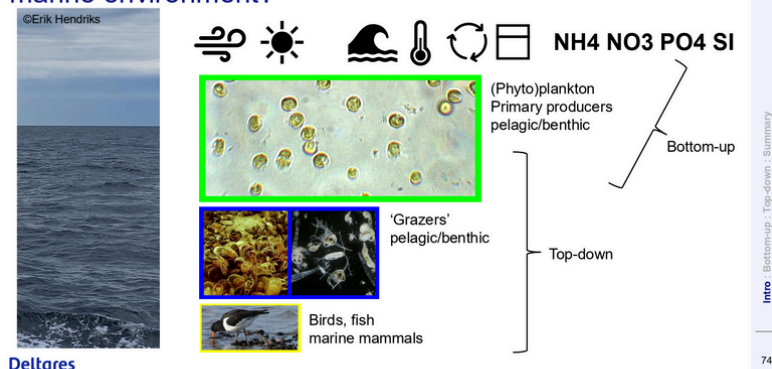


**SPEAKERS: SARAH KLUGE - DMEC; LISA SCHNEIDER - DELTARES;
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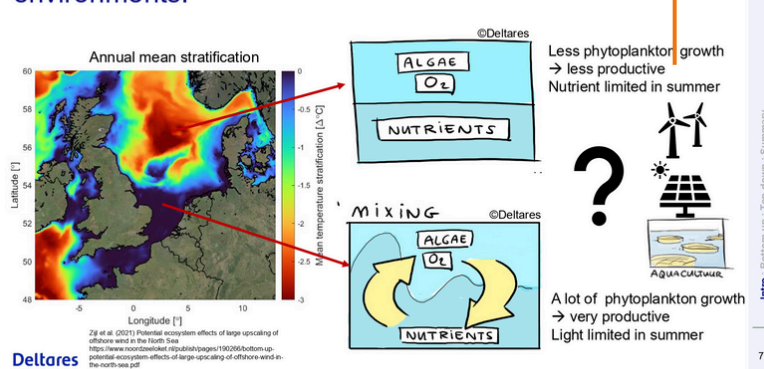
SESSION OVERVIEW

Building on Joop's presentation, Lisa Schneider from Deltares explains how the natural underwater environment is a **dynamic system** where **atmospheric forces**, like **wind** and **solar radiation**, drive **water temperature** and **circulation** which in turn dictates the **movement of nutrients** essential for marine life.

But what is actually happening underwater in a natural marine environment?

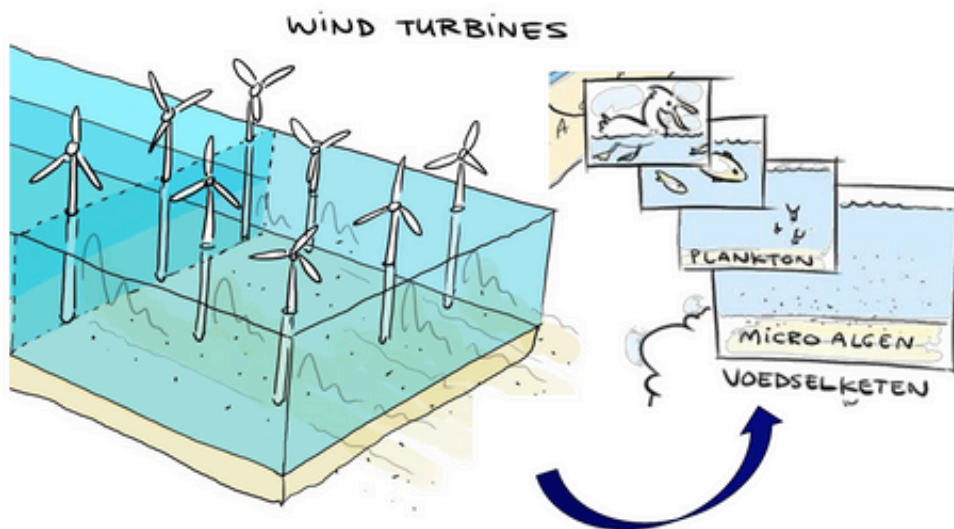


The North Sea can be divided roughly into two environments.



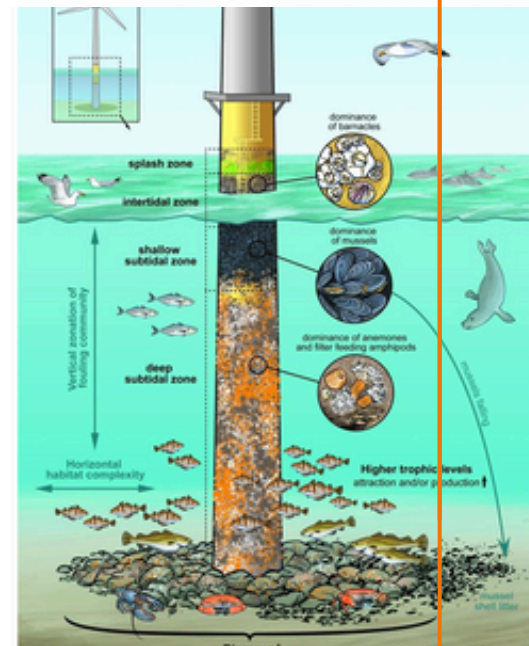
Offshore wind farms (OWFs) directly **interfere** with these processes through both **"bottom-up"** and **"top-down"** pathways. The turbines' physical presence **alters local hydrodynamics**, creating **turbulence** that can change **water stratification** and directly **affect** the foundation of the food web: **primary production**.

DATA GAPS & CHALLENGES



Zij et al. (2023) Scenario studies on potential ecosystem effects in future offshore wind farms in the North Sea
<https://www.noordzeeloket.nl/public/pages/222532/scenario-studies-on-potential-ecosystem-effects-in-future-offshore-wind-farms-in-the-north-sea.pdf>

Degraer et al. 2020. OFFSHORE WIND FARM ARTIFICIAL REEFS AFFECT ECOSYSTEM STRUCTURE AND FUNCTIONING: A Synthesis. Oceanography. <https://www.jstor.org/stable/26965749>

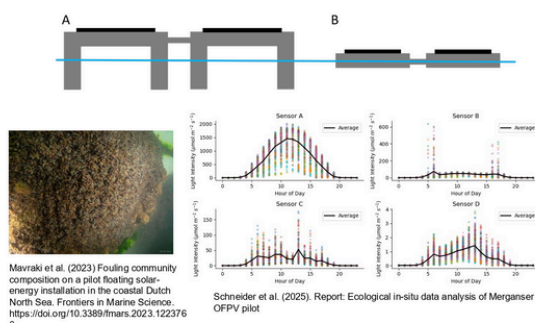


SPEAKERS: SARAH KLUGE - DMEC; LISA SCHNEIDER - DELTARES; JOOP COOLEN - WAGENINGEN UNIVERSITY & RESEARCH

SESSION OVERVIEW

This impact is **compounded** by the trend toward **multi-use platforms**, where several activities including offshore renewable energy (ORE) technologies are co-located. For example, **aquaculture** can extract nutrients from the ecosystem, potentially **reducing primary production**, while offshore floating photovoltaics (OFPV) present their own unique challenges- they experience **significant biofouling** on their undersides and cause a stark **reduction in sunlight** reaching the water below. To produce **one gigawatt** of energy, OFPV adds approximately **50% more substrate** to the marine environment **than offshore wind**, making biofouling a critical consideration as the technology scales up.

Multi-use (aquaculture and other ORE) will also affect the marine ecosystem.

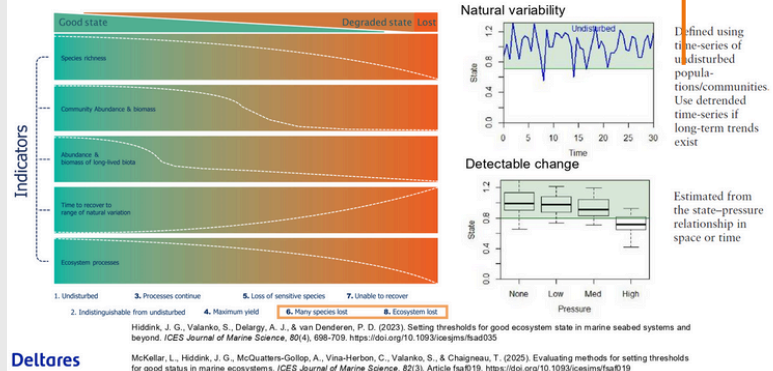


Mavriki et al. (2023) Fouling community composition on a pilot floating solar-energy installation in the coastal Dutch North Sea. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2023.122376>

Schneider et al. (2025). Report: Ecological in-situ data analysis of Merganser OFPV pilot

50 x more substrate than OFW

Recent studies focus on how to set thresholds for good ecosystem state.



Deltares

These complex environmental effects highlight **significant knowledge gaps**, particularly in **translating scientific data into effective policy measures**. While researchers are actively working to quantify and define thresholds for a "good ecosystem state," especially in the pelagic environment, the central question remains: **how much change from these artificial structures is ultimately acceptable?**

DATA GAPS & CHALLENGES



**SPEAKERS: SARAH KLUGE - DMEC; LISA SCHNEIDER - DELTARES;
JOOP COOLEN - WAGENINGEN UNIVERSITY & RESEARCH**

KEY TAKEAWAYS

The Q&A session crystallized key challenges in monitoring and managing the large-scale effects of offshore renewables.



Accounting for cumulative impacts

Panelists **advocated** for **internationally standardized data** and a **government-led approach** combining predictive models with consistent in-situ data collection before and after projects are installed.



Supercharging cross-basin dispersion

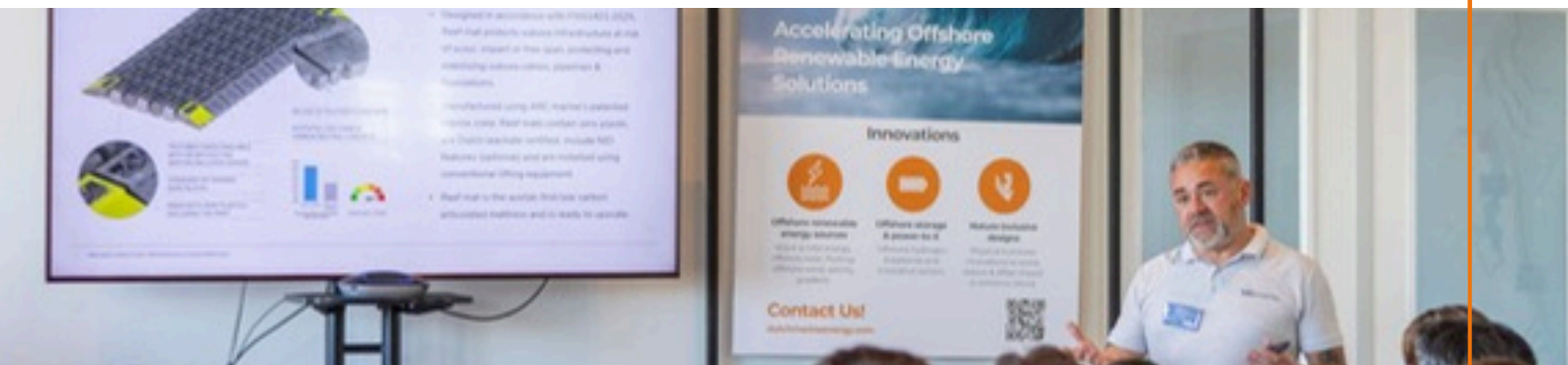
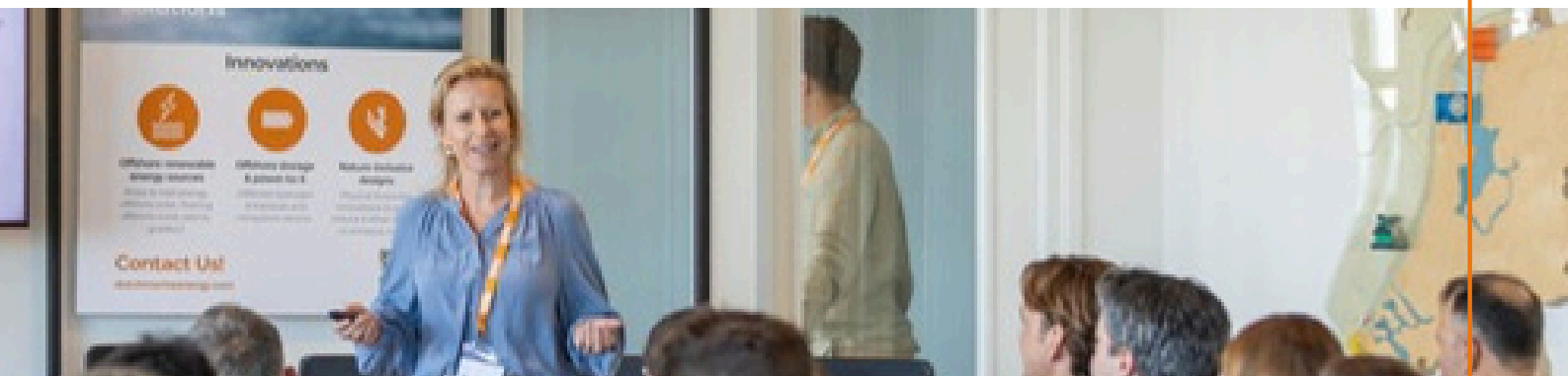
The discussion confirmed that these installations have **basin-wide effects**, creating a "**stepping stone**" network that allows **species** to **spread** across **greater distances**.



Progress is hampered by significant barriers

A **lack of international coordination** on **data standards** and **piecemeal research funding** prevents long-term planning. Looking ahead, the panel agreed that emerging technologies like floating wind will introduce new, still unquantified impacts, particularly from their extensive anchoring systems.

NATURE+ INNOVATION LANDSCAPE

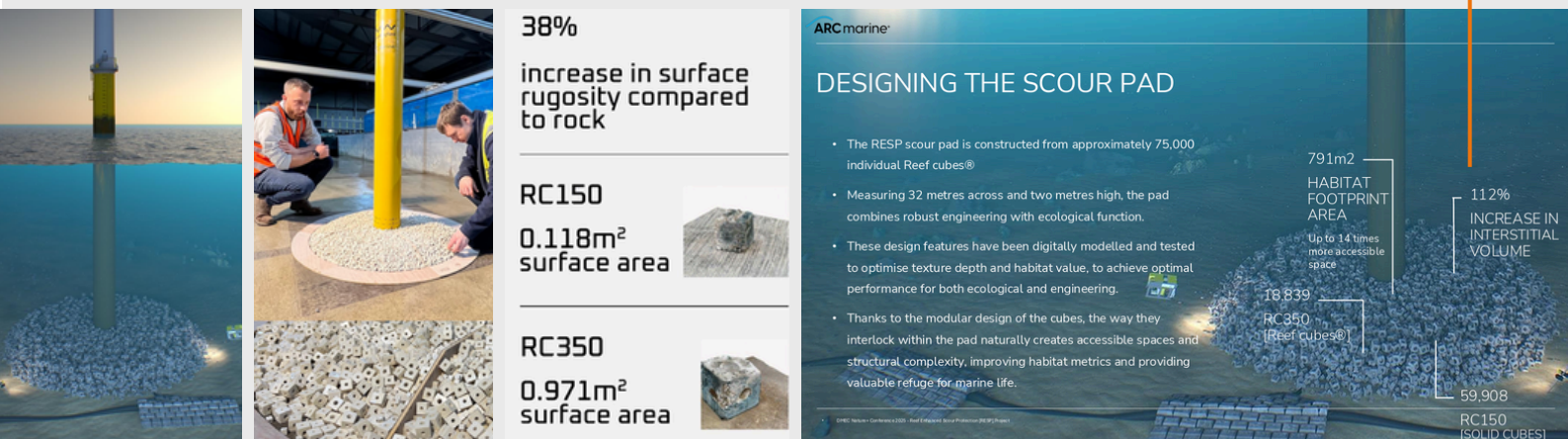


SPEAKERS: ASTRID GROOT - DMEC; FEDOR ESTER - DEMCON UNMANNED SYSTEMS, DAVID BLAKE - ARC MARINE; GWENAEL DESSE - GREENOV

SESSION OVERVIEW

In this session, we explored the **Nature+ innovation landscape**, highlighting **innovations** showcased by ARC Marine, Greenov and DEMCON.

David Blake of ARC Marine detailed their "**scour protection story**," which began in 2017. Their products, focused on the offshore wind sector, aim to enhance marine ecosystems while protecting infrastructure.



A key project, "**Reef Enhancement for Scour Protection**" is being conducted in **partnership** with early adopter **RWE**. This large-scale **deployment** will see **75,000** of their **Reef Cubes** installed around a **monopile** in **October 2025**, following a collaborative design process and baseline ecological assessments.

The cubes are produced using **low-carbon, zero-plastic** materials to protect subsea infrastructure sustainably.

NATURE+ INNOVATION LANDSCAPE



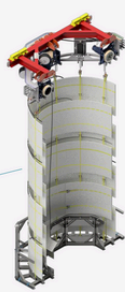
SPEAKERS: ASTRID GROOT - DMCC; DAVID BLAKE - ARC MARINE; FEDOR GWENAEL DESSE - GREENOV ; ESTER - DEMCON UNMANNED SYSTEMS

GWENAEL DESSE - GREENOV

Gwenael Desse from Greenov introduced their main mission: **reducing underwater noise**. He identified noise from **pile driving** as one of the **worst** forms of marine **pollution**, an issue now **legally recognized** by most countries. Their **innovation**, the membrane-based "**Subsea Quieter**", offers a modular and robust solution that is **8 times more efficient** than traditional methods such as bubble curtains. a new company, **SEALENCE**, and is actively **seeking investment**.

SUBSEA QUIETER (SSQ)

An innovative Noise Abatement System to comply with regulation and marine environment protection



- › The main component of our system is an **innovative membrane** that is inflated with air thanks to an **Air Management System**
- › The system is **integrated under the Pile Gripper or the Hammer** to isolate the pile during the entire pile driving operations.
- › High level of attenuation for the entire height of the water column: **8 times more effective than a bubble curtain**.



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BUSINESS LINES

A range of SubSea Quieter® to reduce noise pollution generated by all types of offshore works

SSQ Monopile

- Monopile diameter: 8 to 12 m
- Depth targeted: 30 to 70 m
- Fixed under Gripper
- System weight: 200 tons



Achieves **>95%** reduction in sound pressure levels across critical low- and mid-frequency ranges for marine fauna. Between 12dB and 15 dB in SEL.

SSQ Jacket

- Pin Pile diameter: 2 to 4 m
- Depth targeted: 30 to 70 m
- Fixed around piling Hammer
- System weight: 30 to 60 tons



Reduced overall costs for equipment, deployment, and operation compared to current solutions, translating into multi-million-euro savings per wind farm.

SSQ Pile Anchoring

- Pile diameter: 2 to 4 m
- Depth targeted: 40 to more than 300 m
- Fixed around piling Hammer
- System weight: 30 to 60 tons



Compact, modular design enabling faster installation and removal, without requiring additional vessels or heavy equipment.

Monopile, Jacket and Pile Anchor compatibility, ease of design adaptation between projects and offshore site conditions.

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Greenov is developing a range of **systems** for **monopiles**, **jackets**, and **pile anchoring**. The **monopile** system is currently at **TRL6**, while the **jacket** version is at **TRL5** with a demonstration planned for **2030**. To finalize production, Greenov has launched a new company, **SEALENCE**, and is actively **seeking investment**.

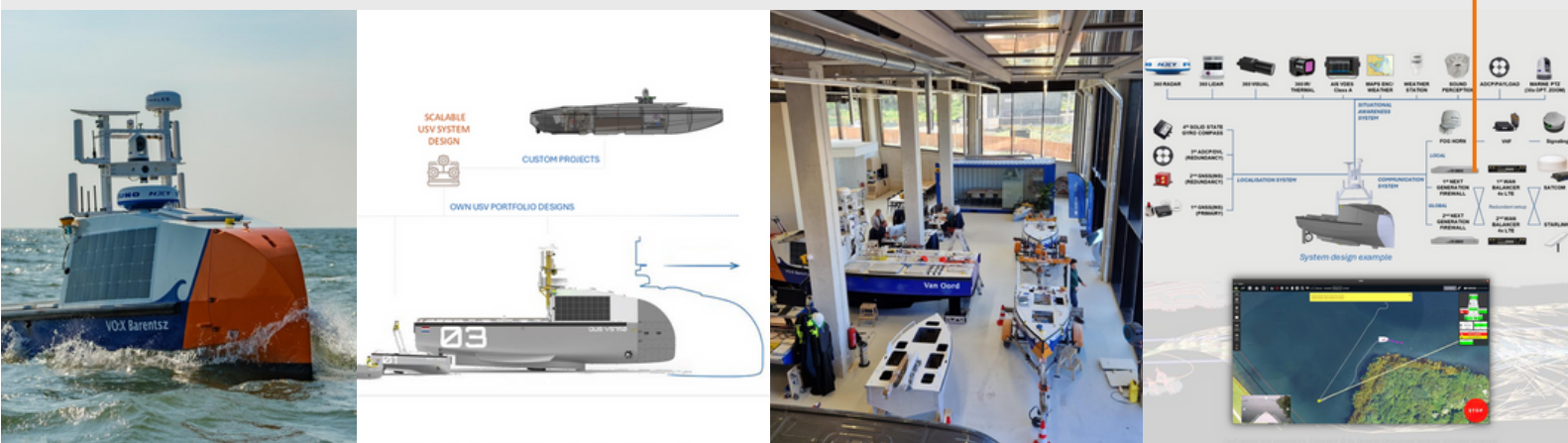
NATURE+ INNOVATION LANDSCAPE



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FEDOR ESTER - DEMCON UNMANNED SYSTEMS

Finally, Fedor Ester from DEMCON explained their work in building **Uncrewed Surface Vessels (USVs)** entirely in-house. These **remotely managed** vessels improve safety by keeping **personnel onshore**. A primary challenge is the **complex** and evolving **legislative framework**, with both the IMO and national bodies **still developing regulations**.



DEMCON chose its **Scheveningen** location because of the **offshore field lab**, which **provides** easy **access** for **testing**. A key use case is their **biofuel-powered vessel** for Van Oord, which is the **first class-certified USV** to fly the **Dutch flag**. Their R&D focuses on **autonomous navigation**, **remote operation technology**, and the **USV platform** itself, including a recently confirmed **RVO project** integrating **USVs with underwater vehicles**.

NATURE+ INNOVATION LANDSCAPE



SPEAKERS: ASTRID GROOT - DMEC; FEDOR ESTER - DEMCON UNMANNED SYSTEMS, DAVID BLAKE - ARC MARINE; GWENAEL DESSE - GREENOV

KEY TAKEAWAYS

The innovator Q&A session prompted a practical discussion on the real-world application of these new technologies.



Nature-inclusive designs are built for permanence.

ARC Marine's **Reef Cubes** are as **durable as concrete** and are intended to be **left in place permanently**, evolving into natural reefs and eliminating the need for future decommissioning.



Remote vessel operation requires fully qualified personnel.

The **onshore operators** for DEMCON's uncrewed vessels must be **licensed captains**, a requirement that **attracts a skilled labor force**.



New technologies can be adapted for multiple uses.

DEMCON's uncrewed vessel is a **flexible platform** that can be equipped with **any type of sensor**, making it adaptable for various **data collection missions**.

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES



SPEAKERS: PABLO BRIGGS - DMEC; DINDA MAZEDA - BOSKALIS; ROSANNE VAN HOUWELINGEN - NMT-IRO; JEROEN RONDEEL - TREE COMPOSITES

SESSION OVERVIEW

This session explored the **critical role** of the **circular economy** in the future of **offshore energy**. Speakers addressed the challenges of **material scarcity** and **spatial constraints** by focusing on three core principles: **lifecycle thinking**, **material efficiency**, and **creating synergies** for multi-use platforms.

The Problem

EU wind targets (300GW in 2050) cannot be met by wind developers on time for a competitive price by EU manufacturing yards.

Foundations

Current EU capacity
300 units/year

Capacity needed
1200 units/year

x4

Monopile Jacket

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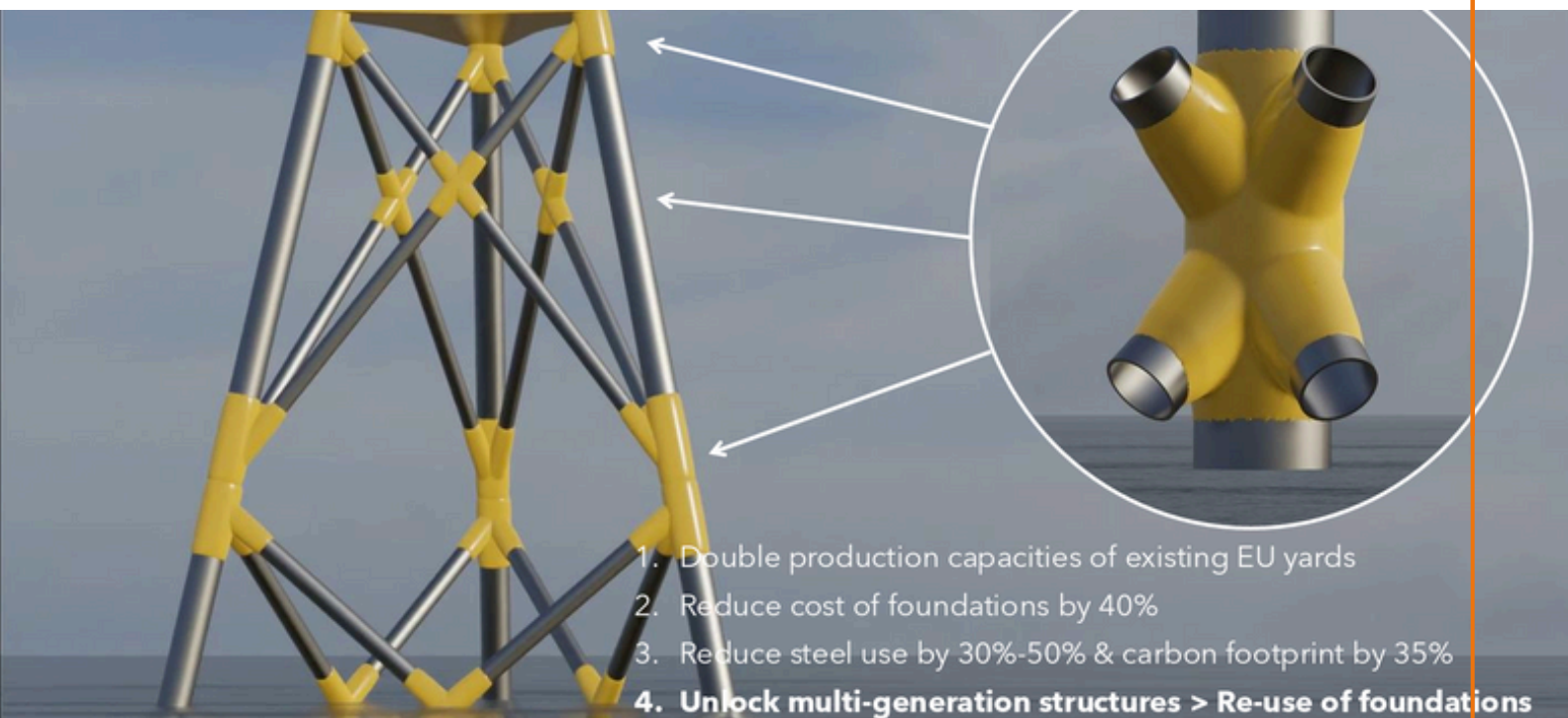
Current situation

- Offshore lattice structures have long lead times for fabrication
- Large number of welding hours with highly skilled labour required
- Complex welds are fatigue prone resulting in heavy structures
 - "Best weld is no weld at all"
- Result is that lattice structures are expensive.

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Jeroen Rondeel of **Tree Composites** presented a "**composite revolution**" that uses a **resin** and **glass fiber wrap** instead of welding to connect steel tubes. This innovation tackles the **urgent need** for **increased manufacturing** capacity as the industry expands. The **current** EU-wide **capacity** is **300 units per year**, a far cry from the **1200** annual units **needed** to facilitate any **expansion** into **deeper waters**.

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES



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JEROEN ROONDEEL - TREE COMPOSITES

This **technology** significantly **boosts production** by nearly **doubling capacity**, **cuts costs** for **foundations** by nearly **40%**, and its **superior durability** (1.8M composite vs. 26K welded cycles) **extends foundation lifespans**, enabling **multi-generational reuse**, consequently **reducing steel** use by **30-50%** and reducing the **carbon footprint** by **35%**. By utilizing **silent installation techniques** with **suction buckets** and removing decommissioning and new installations from the process altogether, Tree Composites ensures that their innovation is an **enhancement** to the natural **environment**.



Rondeel concluded by **advocating** for **another delta plan** for **energy generation** (particularly for **offshore wind**), akin to the Dutch government's "energy delta plan" to prevent repeats of the 1993 flood disaster, to **support innovations**.

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES



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DINDA MAZEDA - BOSKALIS

Next up **Dinda Mazeda** from **Boskalis** presented on "**Circularity Consideration for Artificial Reefs as Secondary Scour Protection**," highlighting the company's biodiversity program, which encompasses **nature-based solutions** and addresses issues like **priority habitats, species, turbidity, and invasive species**.

BOSKALIS BIODIVERSITY PROGRAM



Nature-based Solutions

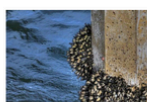
- Artificial Reef Program
- Building with Nature (EcoShape)



Priority Habitat & Species



Turbidity



Invasive Species



Underwater Noise



Pollution (Oil Spills)

BOSKALIS ARTIFICIAL REEF PROGRAM

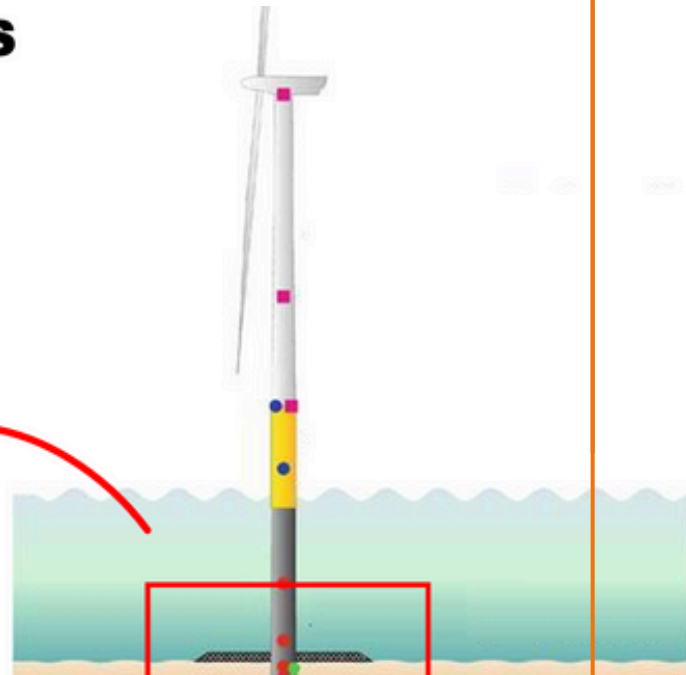
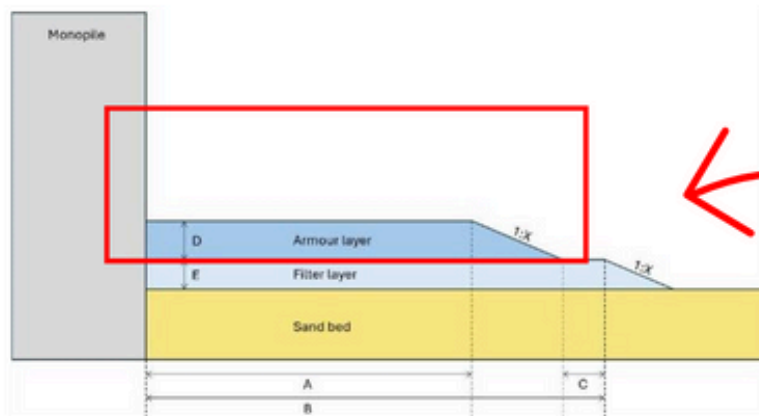


Boskalis's artificial reef program began in 2016 with the "ReefVival Monaco Pilot", a 3D printing coastal application, and is set to launch its **first modular offshore application** in 2025 as part of the Joint Industry Project "**SPREE**" (Scour Protection for Ecological Enhancement). This project assesses engineered reef units (**ERUS**) used for **scour protection**, focusing specifically on the **top armour layer**. SPREE is structured into four work packages: **installation assessment, stability testing, life cycle assessment (LCA)**, and **ecosystem enhancement** assessment. The **assessments** rely on previous **studies, laboratory research, and expert judgments**.

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES

ERUS AS SCOUR PROTECTIONS

Engineered Reef Units (ERUS)



SPEAKERS: PABLO BRIGGS - DMEC; DINDA MAZEDA - BOSKALIS; ROSANNE VAN HOUWELINGEN - NMT-IRO; JEROEN RONDEEL - TREE COMPOSITES

DINDA MAZEDA - BOSKALIS

The **LCA** has a **system boundary** that covers the process from **raw material extraction** through **transportation**, **production**, and **final installation**. **Installation methods** are based on **industry experience**, including **fall pipe vessel usage** and **falling behavior testing**, with **stability tests** conducted at Deltare's laboratories. The **research boundary** for the LCA includes **raw materials** sourced from **the Netherlands, Norway, and Canada**, and various **production methods** like **3D printing** and **precast concrete** using different cement types and local materials. However, the assessment **excludes alternative fuels, electrification, innovative loading methods, and various industrial by-products**.

JIP SPREE – WORK PACKAGES

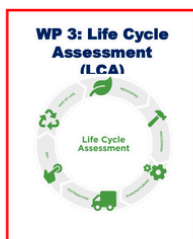
WP 1: Installation assessment



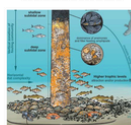
WP 2: Stability testing



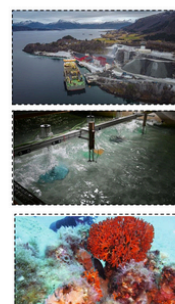
WP 3: Life Cycle Assessment (LCA)



WP 4: Ecosystem enhancement assessment



INTERACTION OF WORK PACKAGES AS INPUT FOR LCA



WP1 Installation
Expert judgement on the fall-pipe vessel installation methods, falling behaviour testing

WP2 Stability
Hydraulic stability testing using scale models of the different ERUS design

WP4 Ecosystem Functioning
Literature study, expert interview, & decommissioning workshop

WP3 Life Cycle Assessment

Raw material extraction
↓
Transportation
↓
Production
↓
Transportation
↓
Installation
↓
Use
↓
End of life

The **assessment of ecosystem functioning** is still based on **literature reviews** and **expert analysis**. Mazeda concluded by posing a **critical question** for the industry: **how can the qualitative benefits of ecosystem enhancement be effectively linked to quantitative Life Cycle Assessments?**

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES

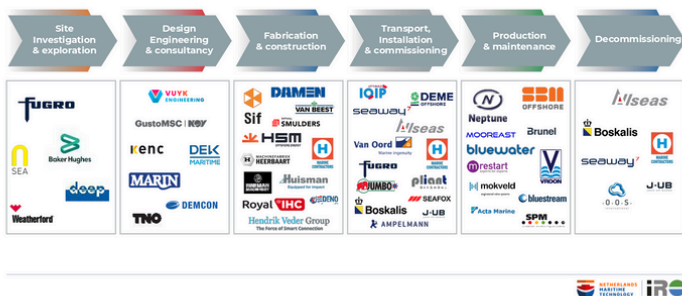


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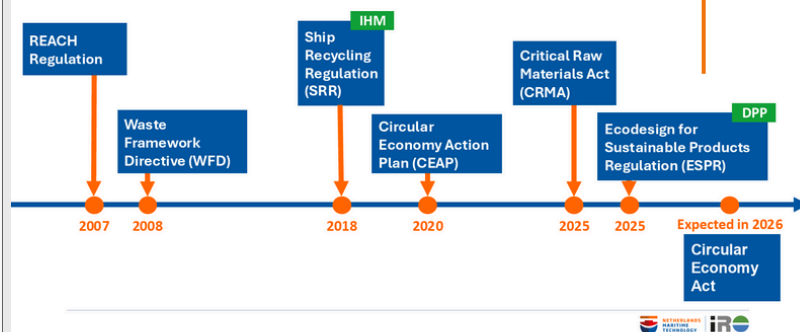
ROSANNE VAN HOUWELINGEN - NMT IRO

According to Rosanne van Houwelingen from NMT-IRO, **circularity** in the **maritime** and **offshore sector** extends across the entire **value chain**, from **site investigation** to **decommissioning**, demanding systemic integration of sustainable practices. This transition is further accelerated by EU legislation, including the 2007 **REACH regulation** (governing chemical safety), the 2018 **Ship Recycling Regulation (SRR)**, and two forthcoming 2025 policies: the **Critical Raw Materials Act (CRMA)**, which secures supply chain resilience for essential materials, and the **Digital Product Passport (DPP)** under the **Ecodesign for Sustainable Products Regulation (ESPR)**, mandating **full lifecycle transparency** for materials.

Maritime and offshore supply chain

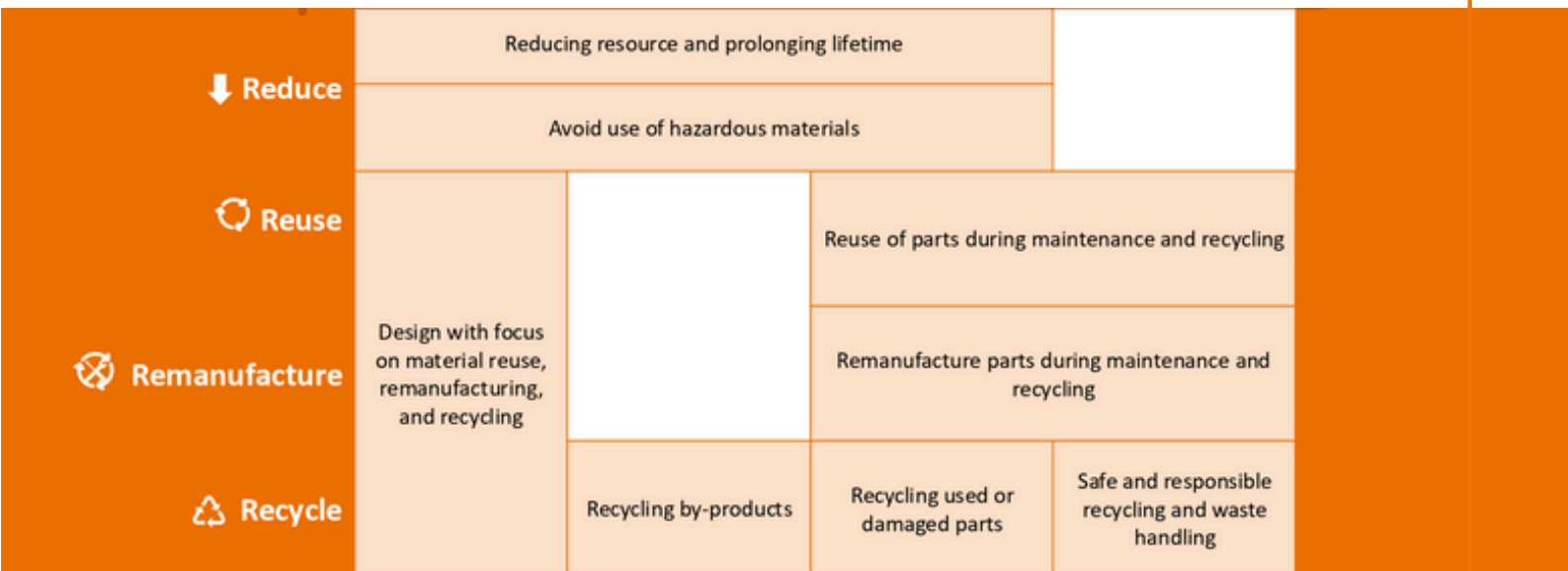


Legislation and regulation EU



The **Circular Economy Action Plan (CEA)** underscores three key EU-level **priorities**: new **circular business models**, the **expansion** of **second-hand markets** for **materials** and **equipment**, and **intra-industry reuse** within **shipping**. Best practices align with the four circular principles, **Design, Build, Operation, and Dismantling (D-B-O-D)**, each offering targeted strategies for resource efficiency.

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES



SPEAKERS: PABLO BRIGGS - DMEC; DINDA MAZEDA - BOSKALIS; ROSANNE VAN HOUWELINGEN - NMT-IRO; JEROEN RONDEEL - TREE COMPOSITES

ROSANNE VAN HOUWELINGEN - NMT IRO

In the Design and Build phases, reduction is achieved through innovations like **cable-minimizing system integration**, directly **cutting material demand**. Reuse is advanced via initiatives such as **DEME's Ship Lifecycle Passport**, which **standardizes component tracking** to **optimize material recovery**; though data standardization remains a critical gap. Remanufacturing delivers transformative gains: AEGIR Marine, for example, achieves **60–80% CO₂ reductions** and up to **90% energy/material savings** by **refurbishing components**. Finally, recycling demands **reverse supply chain integration**, as demonstrated by **IHC's** efforts to **loop materials back** into **primary production**.

Re-Quip Foundation

A non-profit organization and initiative to improve sustainability and transparency through collaboration.

Re-Quip's mission is to engage industry partners in:

- The implementation of sustainable and **circular design practices**
- The **use and reuse of equipment** for the energy market



Round up!



Collaborative platforms like **Re-Quip** exemplify this shift, driving **circular design adoption** and **equipment reuse** across the **energy sector**. By embedding these principles, reduce, reuse, remanufacture, recycle, into maritime operations, the industry can transition from linear extraction to a regenerative, closed-loop system._

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KEY TAKEAWAYS

The innovator Q&A session prompted a practical discussion on the real-world application of these new technologies.



Innovative materials are critical for enabling reuse.

Technologies like **composite connections** can **extend** the **lifespan** of offshore foundations from **25 to over 75 years**, making multi-generational reuse a practical circular strategy.



EU legislation is a powerful driver for change.

Upcoming regulations, particularly the **Digital Product Passport (DPP)**, will **enforce material traceability** throughout a product's lifecycle, creating the transparency needed for a functioning circular economy.



Quantifying the value of nature is a major hurdle.

A key **challenge** for the industry is developing a clear **methodology** to link the **qualitative benefits** of nature-inclusive designs (like artificial reefs) to **quantitative frameworks** like Life Cycle Assessments (LCA).



Collaboration is needed to build circular markets.

Initiatives like the Re-quip Foundation are creating **marketplaces** for used **offshore equipment**, demonstrating that a collaborative approach is essential to establish a **second-hand market** and a **reverse supply chain**.

DESIGNING CIRCULARITY IN OFFSHORE RENEWABLES



WORKSHOP OUTCOME

Picking their brains on this topic we had some workshops on Circularity where 5 groups (+1 online) presented about:



A **nature-inclusive, piling-free concrete foundation** for **bottom-fixed turbines**. It would be placed directly on the seabed to create an artificial reef, with the main structure refloated at decommissioning while leaving the reef base behind.



Floating wind concept with a **six-point anchoring system** for Southern Europe. To prevent seabed damage, it uses biodiversity-enhancing "clam points" for stability. For decommissioning, the chains would be cut, leaving the anchors and their established marine growth in place.



The "**Fairship**," a **modular vessel** designed for **easy repair** and **dismantling** to reduce downtime. Its interchangeable components would allow the ship to be adapted for different tasks without returning to shore.



Circular offshore **support vessel** featuring a **modular deck** for **inter-changeable tools** and an **onboard ocean cleanup system**. To simplify decommissioning, it would use composite connections instead of welding. The group also noted that a short-term "project mindset" is a key barrier to circularity.



Multi-use floating island that **generates power** from both **solar** (surface) and **tidal** (subsea) energy. The structure would also feature onboard battery storage to serve as an offshore charging station for electric vessels.



Focused on a **multi-use hub** co-locating **floating wind** with **oyster aquaculture**. Their concept integrates oyster beds directly with the floating structures, raising the key question of whether the goal is biodiversity or food production and what the local environmental effects would be.

EFFICIENT SOLUTIONS TO SCALE UP NATURE+ SECTOR



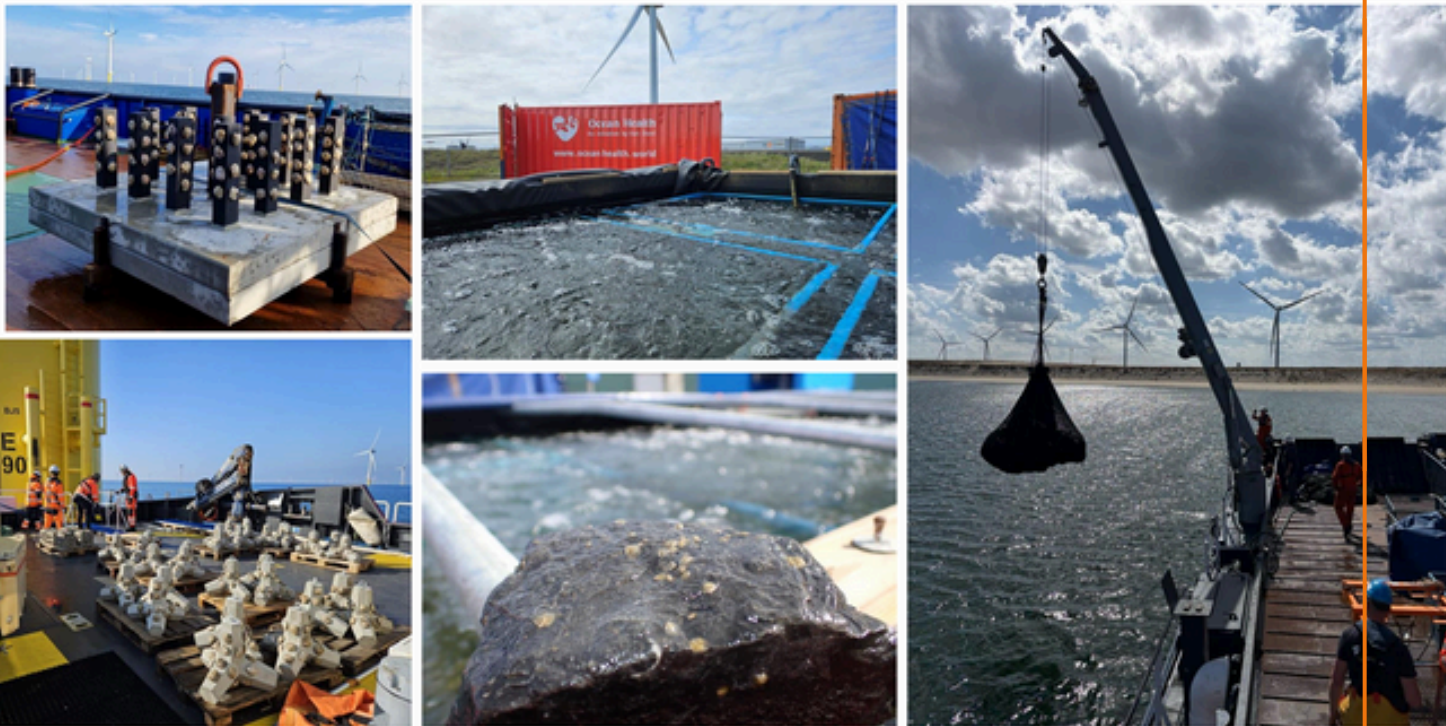
SPEAKERS: YUKI ESSER & SANDER DES TOMBE - DMEC; NIENKE OOSTENBRINK - VAN OORD OCEAN HEALTH; DENI BELLAMY - RENEWABLES GRID INITIATIVE; ROGER ESPEJO - WEDGE GLOBAL

SESSION OVERVIEW

The final session of the day brought together a panel of industry experts to tackle the critical and complex challenge of **scaling up Nature+ innovations** from **pilot projects** to **industry standards**. The discussion, moderated by Yuki and Sander, featured insights from Nienke Oostenbrink of Van Oord, Deni Aguilar Bellamy of the Renewables Grid Initiative, and Roger Espejo of Ecowende.

Discussions highlighted **lessons** learned, collaboration **challenges**, regional **differences**, and the urgent need for a **mindset shift** to embed ecological enhancement as a core requirement, **not an optional add-on**, in offshore development.

EFFICIENT SOLUTIONS TO SCALE UP NATURE+ SECTOR



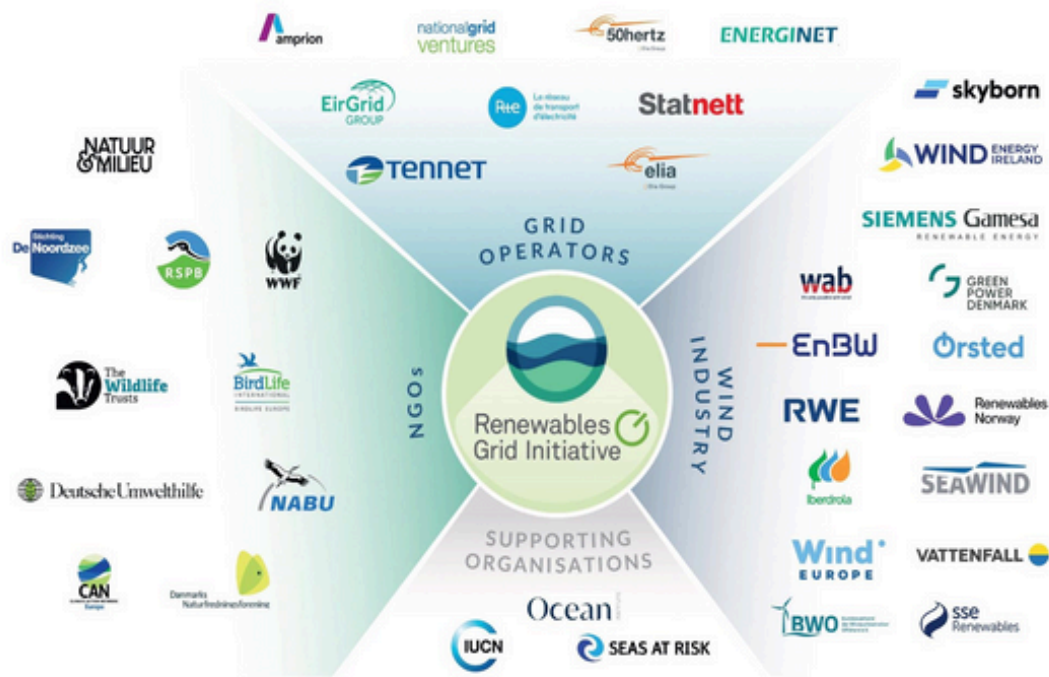
KEY PROJECTS & INNOVATIONS

Nienke from **Van Oord** emphasized the **North Sea's potential for oyster restoration**, while also noting Van Oord's global work in tropical ecosystems, including mangrove and coral reef restoration. A standout innovation was their **remote settling technique**, where **oysters or corals** are cultivated in **controlled container environments** before **transplantation**, improving survival rates and reducing the costs to a level required for scaling up.



Deni from **OCEAN Coalition** highlighted tangible progress over the past year, including a **new report** on **mitigation actions** and **growing collaboration** among coalition members. Meanwhile, Roger Espejo from **Ecowende** shared **lessons** from their involvement as an innovator within a larger **commercial project**, in which they provide a **wave energy-powered autonomous offshore radar system** for **bird monitoring** and **environmental scanning**.

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LESSONS LEARNED: CHALLENGES AND MINDSET SHIFTS

A recurring theme was the **difficulty of predicting outcomes in uncharted territory**. Not only in the pilot phase, but also when scaling up your Nature+ innovation. Nienke noted that "when you've never done something before at a larger scale, you don't know the full scope, so expectations often misalign with reality." Deni agreed, adding that the industry faces heightened scrutiny amid economic pressures, making innovation harder to justify when it's not yet mandatory.

Roger stressed the need for a **fundamental shift in perspective: "Nature+ shouldn't be a 'nice-to-have'; it must be a 'must-have'.**" He pointed out that cost sensitivity has intensified over the past five years, with innovators facing greater skepticism when their solutions aren't yet required by regulation. Stakeholder collaboration emerged as another hurdle; NGOs, developers, and transmission system operators (TSOs) often clash over standards, wording, and priorities, slowing progress.

Nienke added that **NGOs struggle with the scale and standardization of offshore operations**, while **industry players grapple with the added costs of nature-inclusive designs**. Deni noted that Mediterranean regions, lacking established offshore wind industries, resist adopting North Sea best practices; sometimes due to cost concerns, other times due to knowledge gaps.

EFFICIENT SOLUTIONS TO SCALE UP NATURE+ SECTOR



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RESEARCH VS. ACTION: BALANCING EVIDENCE AND IMPLEMENTATION

Finding the **right balance between research and real-world application** dominated the debate. The audience cautioned that adding elements to ecosystems changes them, not restoring 'natural' states but creating new ones; urging more targeted research to avoid unintended consequences. Yet others argued that wind farms were deployed without full impact studies, leading people to question why all of a sudden there is a demand for perfect data for Nature+ purposes.

Nienke agreed that **over-monitoring** can **stall progress**. As Nienke put it: "We could spend years measuring biodiversity gains, or we could just start deploying solutions and learn by doing." Roger argued that more research could actually accelerate scaling, as clear, actionable guidelines, rather than exhaustive studies, would better attract investors and policymakers.

A middle ground was proposed: "Further **research should benefit** from scaling real-world applications and guide what to do, and what not to do, **without paralyzing action**." The group concluded that hard data could reduce uncertainties that hamper scaling Nature+ innovations but acknowledged that scientists and policymakers must align to avoid gridlock.

EFFICIENT SOLUTIONS TO SCALE UP NATURE+ SECTOR



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OFFSHORE WIND TENDERS: OPPORTUNITIES AND BARRIERS

Offshore wind tenders where projects must deliver **measurable ecological benefits**, were a major discussion point. Both **Non-Price Criteria (NPC)** and **Pre-Qualification Criteria** can result in both small pilot projects and scaled application of Nature+ innovations. Roger highlighted that while the **Netherlands** leads with its **50:50 scoring system** (balancing **energy and ecology** in tenders), **other EU countries lag**, often **capping NPC** requirements at **30%** for state-supported projects. Deni questioned whether it's fair to place the **full burden** on **developers**, while others suggested **redirecting OWF budgets** to nearby **restoration sites** if nature solutions within OWF are suboptimal.

Cross-border collaboration was identified as **critical** to scale Nature+ innovations in tenders. Deni advocated for more **cross-border initiatives**, citing **Denmark** and the **UK's macro-restoration** projects as **models**. This may not be easy, as Roger warned that **mismatched timelines** between **project planning** and **innovation development** already create **friction**. Costs are currently under intense scrutiny, so innovators must clearly **articulate value propositions** to gain traction and use pilots to lay the groundwork for **scalable, cross-border solutions**.

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KEY TAKEAWAYS

The Path Forward: Communication, Courage, and Collaboration



Reframe Nature+ as a must-have, not a cost

Highlighting **long-term value** (e.g., resilience, regulatory compliance, brand reputation).



Be brave; start small, but think big

Pilot projects should lay the groundwork for **scalable, cross-border solutions**.



Collaborate and embrace the friction

Disagreements between stakeholders, scientists, and industry are **inevitable but necessary** to refine approaches.

RECOMMENDATIONS



Collaborate

Governments and industry must co-invest in **long-term, internationally standardized monitoring programs** that measure cumulative impacts before and after project installation. This will provide the hard data needed to move beyond debate, inform effective policy, and build data-driven business cases that attract investment.



Prioritise

Regulators and developers should **prioritize innovations** that are **designed for permanence and circularity**. This includes championing the use of durable, reusable materials like composite connections and integrating nature-inclusive designs like artificial reefs that eliminate future decommissioning liabilities. Tender criteria should explicitly reward these long-term value propositions.



Advocate

Industry stakeholders must **actively advocate for and adapt to powerful legislative drivers** like the **EU's Digital Product Passport (DPP)**, which will enforce material transparency. Furthermore, collaborative initiatives, such as creating marketplaces for used equipment, are essential to build the circular infrastructure needed for a second-hand market and a reverse supply chain.



Reframe

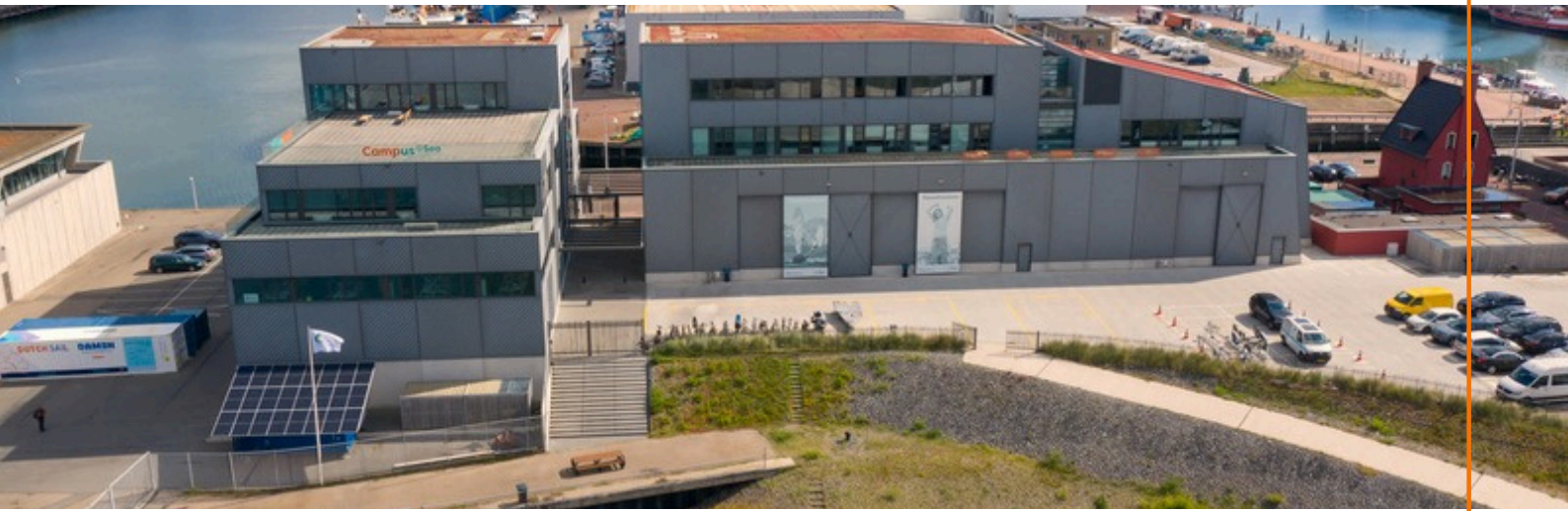
All parties must work to **reframe the conversation around Nature+**, shifting the focus from an upfront "cost" to a **long-term "investment" in resilience**, regulatory security, and brand value. This requires fostering a culture that embraces productive friction—recognizing that disagreements between scientists, industry, and policymakers are essential for refining strategies and achieving robust, consensus-driven solutions.



Food for thought...

- Are we ambitious enough and do we need to be more ambitious in our thinking and our actions?
- When is the right moment to set standards for Nature+?
- Which is the proper entity to make these standards?
- How do we put value behind implementing Nature+ innovations in projects?

About DMEC



DMEC is an accelerator and knowledge centre for offshore renewable energy solutions. As a non-profit organisation, we advance innovation, support market development and further policies for offshore renewable energy development.

Through this integrated approach, we create multipurpose energy solutions including offshore renewable energy, offshore system integration and nature-positive solutions for a wide variety of use cases.

We work closely with key offshore renewable energy players and advise on the uptake of offshore renewable sources to create sustainable growth. By combining our technical and financial expertise and models on offshore renewable energy technologies with our industry insights, we are the go-to partner for developing offshore renewable energy solutions that fit specific market needs.

As an accelerator, we lead international innovation projects, covering the entire trajectory from concept to commercial deployment of offshore renewable energy solutions. We provide project management, technical, financial and market support for a wide variety of national and international offshore renewable energy innovations.

To maximise impact in all of our activities, we team up with top-notch test sites, research institutes and companies across the value chain around the world. With this global network, we help governments worldwide by sharing expertise and insights and advancing science-based policy innovations.

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North-West Europe



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ORESA

The discussions at the **Nature+ Conference** perfectly **mirror** the mission of the **Offshore Renewable Energy Sustainability Alliance (ORESA)**. It was highlighted that for the energy transition to succeed, sustainability should not be a "nice-to-have" but rather become a "must-have", a principle that also lies at the heart of ORESA's goal to enhance territorial resilience in Northwest Europe. Innovations are at the forefront of developing actionable solutions, ranging from circular foundations to autonomous monitoring systems. This directly aligns with ORESA's core activity of providing accelerator-type support to empower these very innovators, while its focus on training the future workforce addresses the need for new skills in a rapidly evolving sector.

The challenges discussed, from financial pressures to policy gaps, are significant but so are the opportunities. With that in mind, we extend a special invitation to any SMEs with an innovative solution that can contribute to a more sustainable offshore energy sector. If you are looking to develop or enhance your sustainability program, we encourage you to sign up for the ORESA innovation call. This is your opportunity to receive accelerator support, connect with key public and private stakeholders, and help build a resilient and nature-positive energy future for Northwest Europe.

Are you who we're looking for? Applications to the first Innovation Call close this November 30 so don't miss this opportunity to take your solutions to the next level!

To find out more visit the [ORESA website](#) or apply directly via the [Innovation Call Survey](#).

Contact

If you prefer to get in touch with the ORESA project manager directly, please contact:



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