System optimization & circularity in wind energy

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Seminar Havvind og mijlø - Offshore Norge

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WindRise
2024-2026

WindRise
Green platform project

Forskningsrådet

Innovasjon Norge

Siva

WindRise

Offshore Wind Growth and Challenges

Offshore wind energy is rapidly expanding in the EU, with a target of **450 GW by 2050**.

This corresponds to approximately **20,000 new turbines of 20 MW capacity**, or about **750 turbines per year**.

In Europe, **approx. 15% of these foundations are Jacket structures**.

However, **fabrication, installation, transportation, of Jackets** represent major bottlenecks in scaling up.

Currently, there is

no value chain in Europe capable of delivering the required volume.

Moreover, jackets for offshore wind turbines account for **19–36% of total project costs** and are considered to have the **greatest potential for cost reduction**.

WindRise in a nutshell

Objective

Bring together leading players in the design, fabrication, transportation, and installation of offshore wind **Jacket substructures** to:

- Enable **scaling up** and **accelerated deployment** of large offshore wind farms
- Strengthen **Norway's competitiveness** in the global market

Concrete Targets

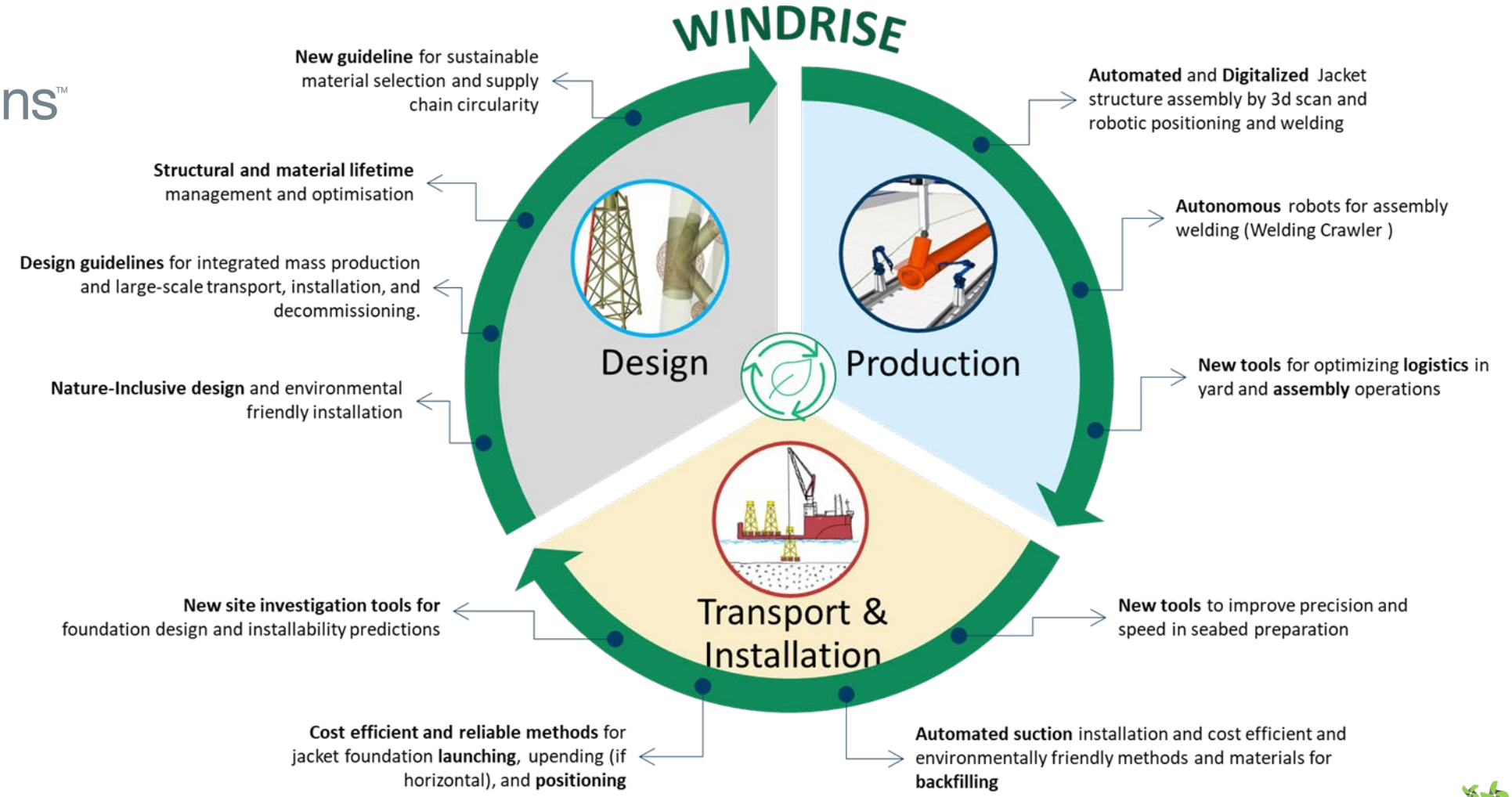
- Increase production capacity and efficiency by **40–60%**
- Reduce costs by **15–25%**
- Cut CO_2 emissions by **30–50%**
- Boost exports by **30–50%**

Project funding through the Green platform initiative

- **Purpose:** Accelerates green business transition through collaborative projects on sustainable value chains, emission cuts, and market-ready solutions.
- **Management:** Jointly run by **Research Council of Norway**, **Innovation Norway**, and **Siva**, funded by the Ministry of Trade and Industry.

Project scope and partners

AkerSolutions
SCANMUDRING
Cranemaster
sarens
BOA
DCF
NGI
SINTEF
MANUFACTURING TECHNOLOGY
NORWEGIAN CATAPULT CENTRE



WindRise

Design and Production

Integrated **structural design** for large scale manufacturing, transport, installation, and decomissioning.

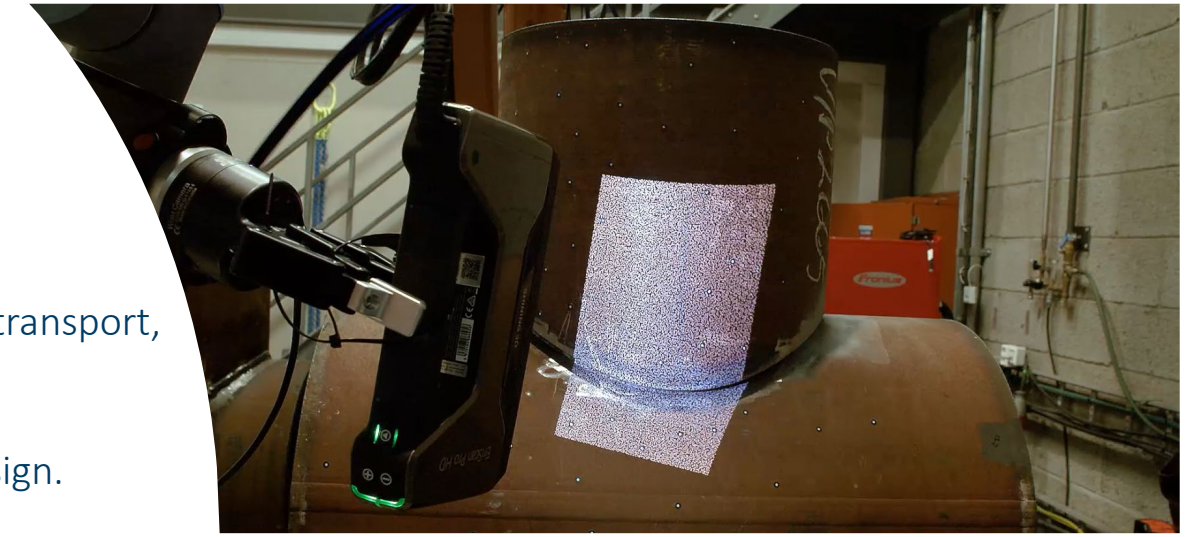
Environmental friendly installation and nature-Inclusive design.

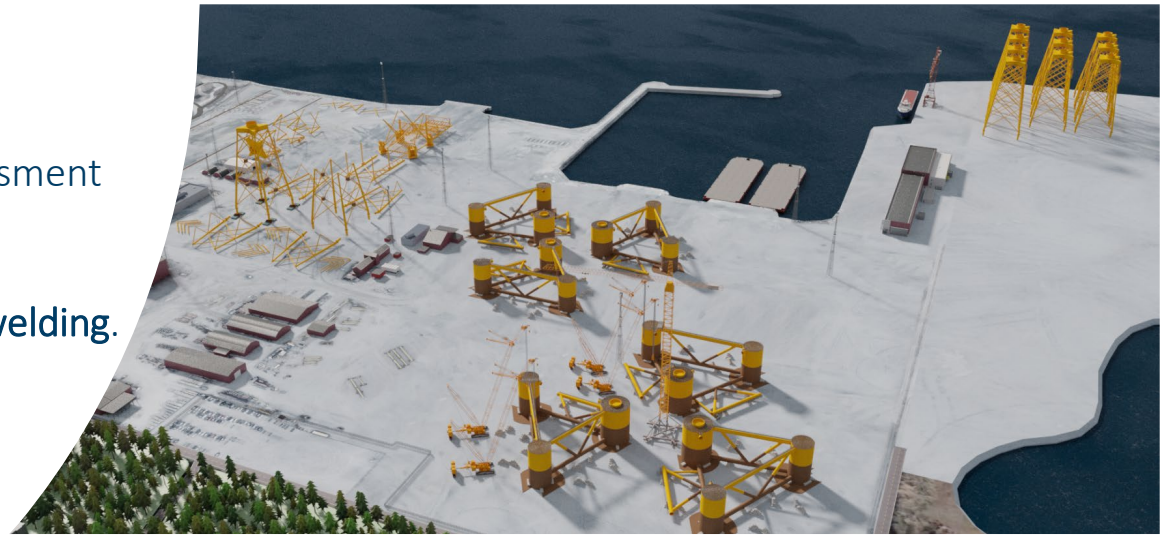
Sustainable material selection and supply chain optimisation (circularity)

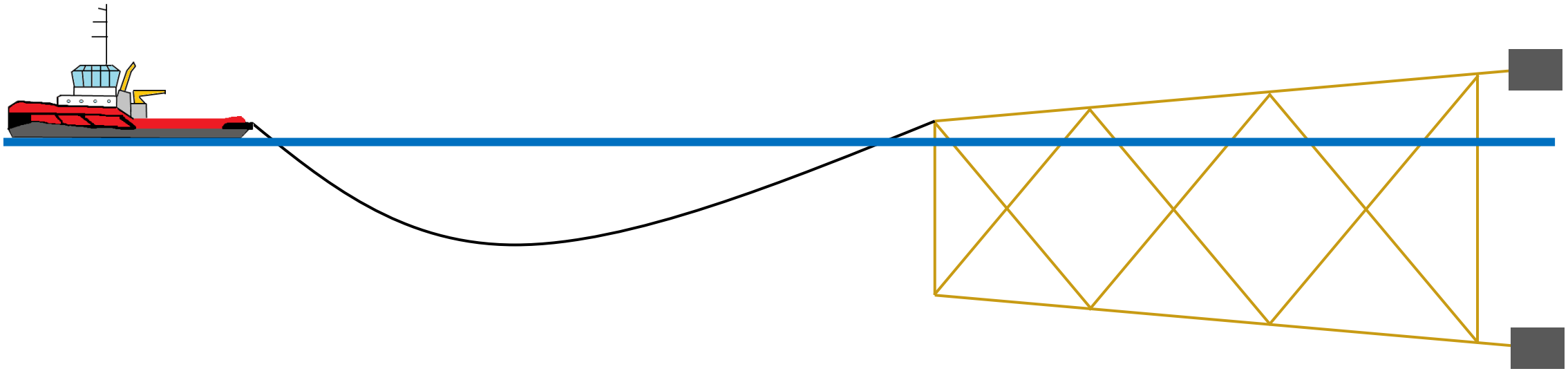
Structural **lifetime management** and optimised quality assessment

Digitalised and **automated** jacket structure **assembly** by 3D measurements, automated positioning, and crawler robot **welding**.

Production levelling and optimised **yard logistics**.







Transport & Installation

Transportation from yard to field, including possible intermediate storage.

Seabed investigation and preparations.

Lowering jacket to seabed.

Seabed fastening/installation.

Demonstration and industrial implementation

Life Cycle Analysis and ripple effects through the economy.

Demonstrator case study (SN II)

TAILWIND

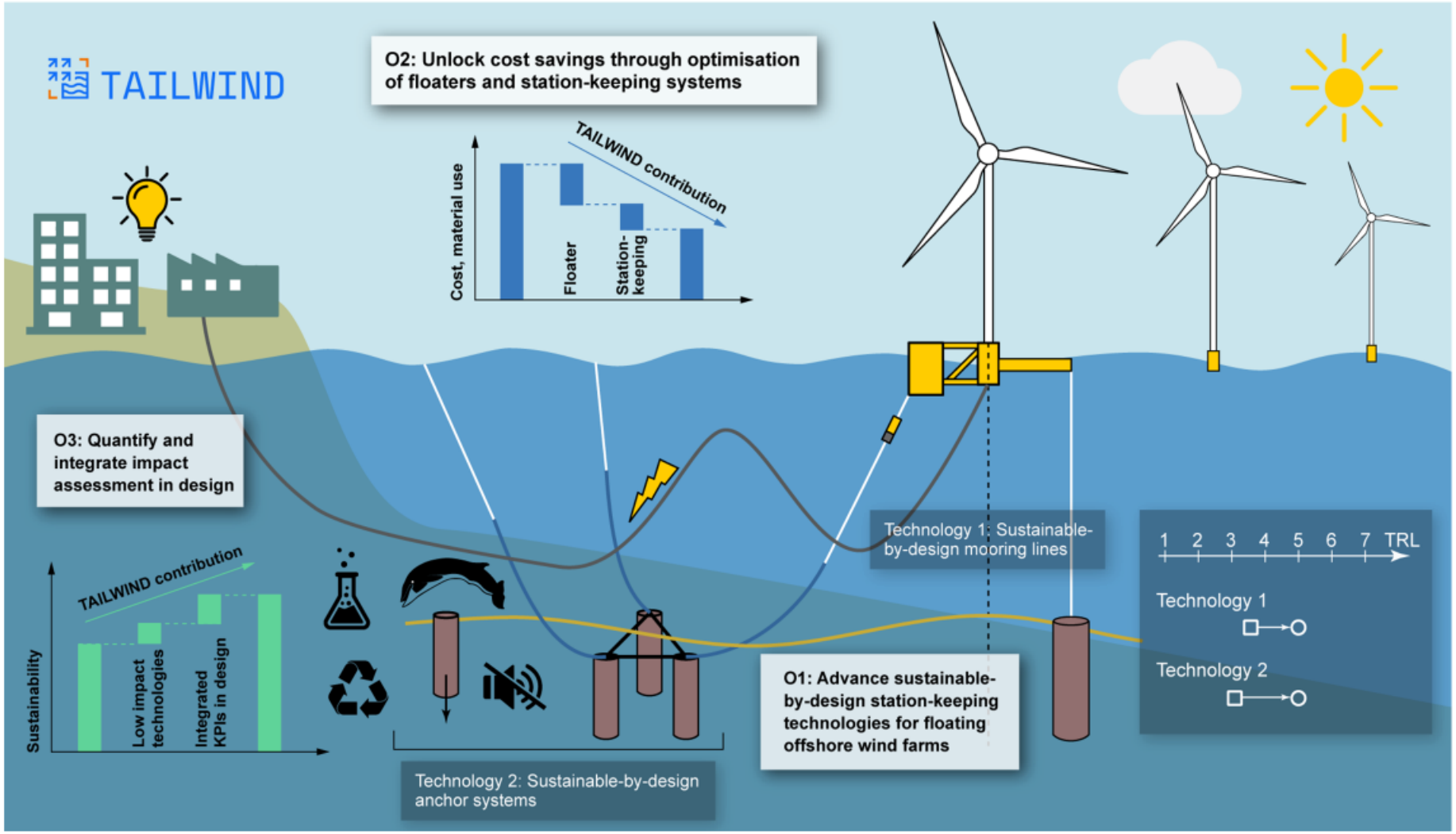
SUSTAINABLE STATION-KEEPING SYSTEMS FOR FLOATING WIND

Start date: January 2024
End date: December 2027
EU funding ≈ 5M€

Funded by
The European Union

TAILWIND

PROJECT OVERVIEW



European Commission

NGI Clarke Modet +

SINTEF

DTU TU Delft

NKT

subsea 7

Bekaert

University of Southampton

Nautilus

ICONS

tecnalia

U.PORTO

SINTEF
75 years

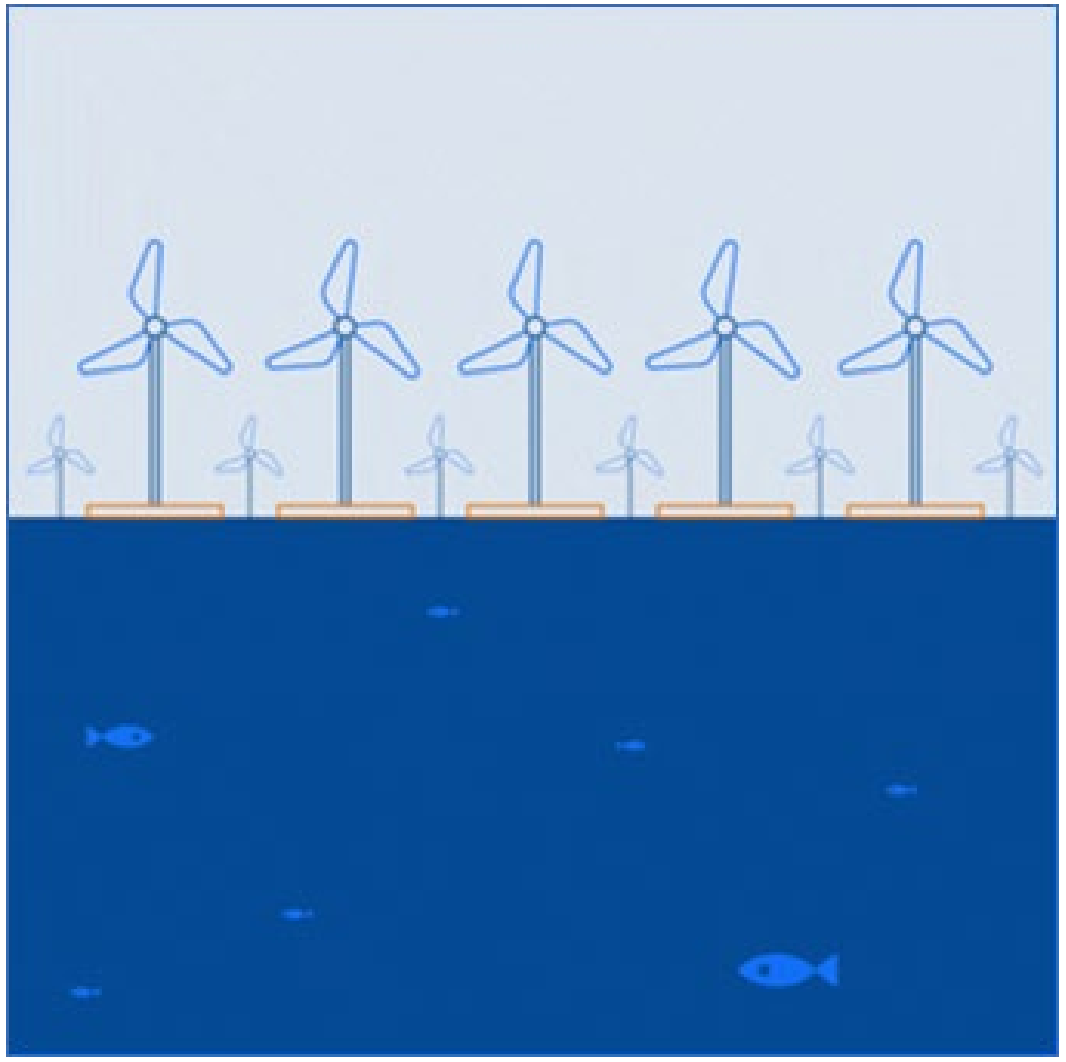
TAILWIND

MOORING LINES

Innovative Mooring Lines
Developing synthetic mooring lines from materials like nylon, polyester, aramid, and HMPE, being lighter and more efficient.

Improved Mooring Configurations
Enhancing stability and resilience with taut and semi-taut systems, minimising seabed impact and benefiting tension leg platforms and buoys.

Testing and Performance
Stimulating whole-life loading scenarios to ensure long-term durability, aiming for Technology Readiness Level 5 (TRL5) and further certification.



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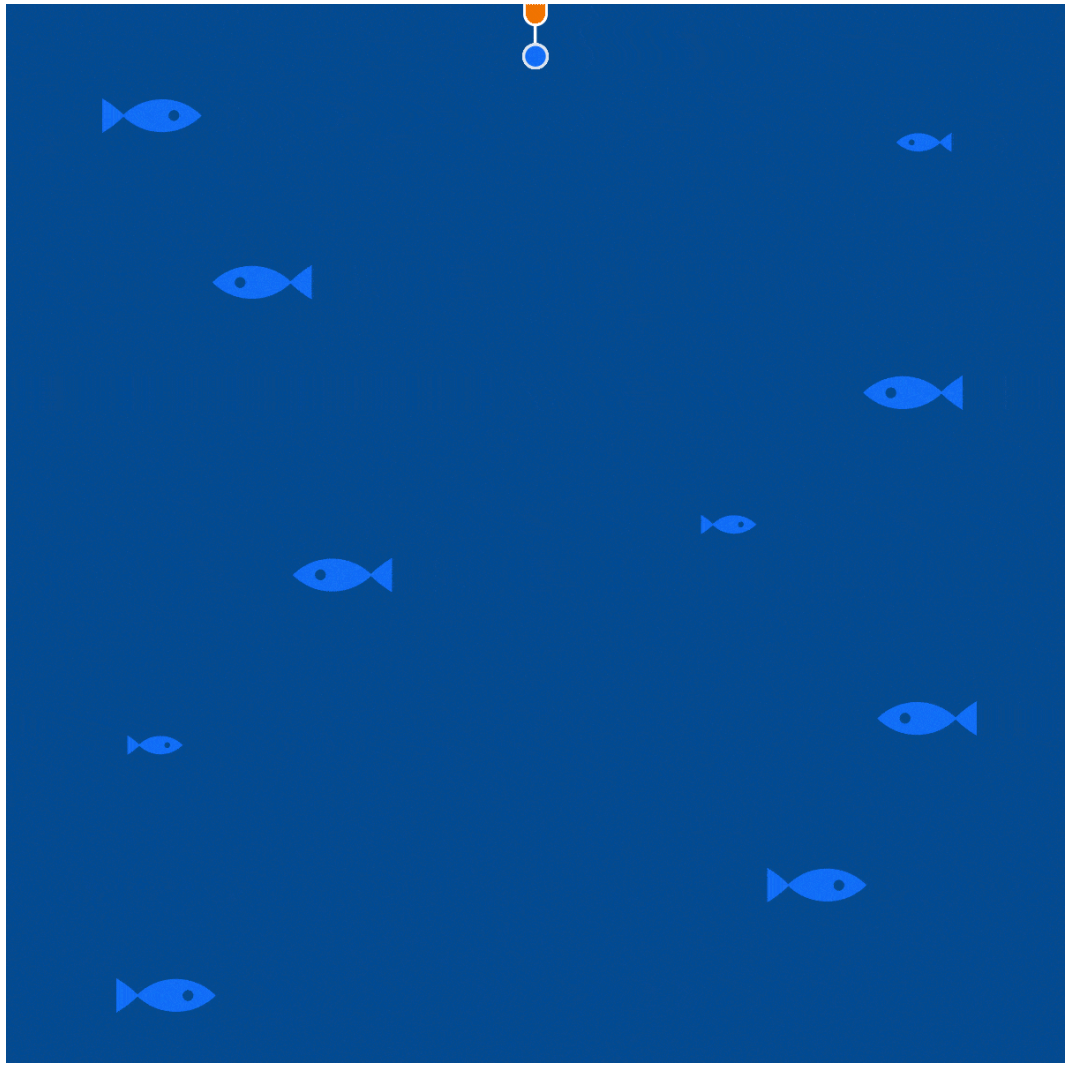
ANCHORING SYSTEM

Innovative Anchor Designs
New shapes and cluster arrangements maximise anchor capacity while minimising material use, reducing the need for large, bulky anchors.

Silent Installation Techniques
Suction anchors and seafloor-level pad-eyes minimise environmental impact, noise, and disturbance to marine life, while enhancing load distribution.

Efficiency and Reliability
The project optimises anchor size, weight, and installation time, using advanced testing methods to ensure durability and performance under multi-directional and long-term loads.



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SUSTAINABILITY

Sustainable-by-design principle

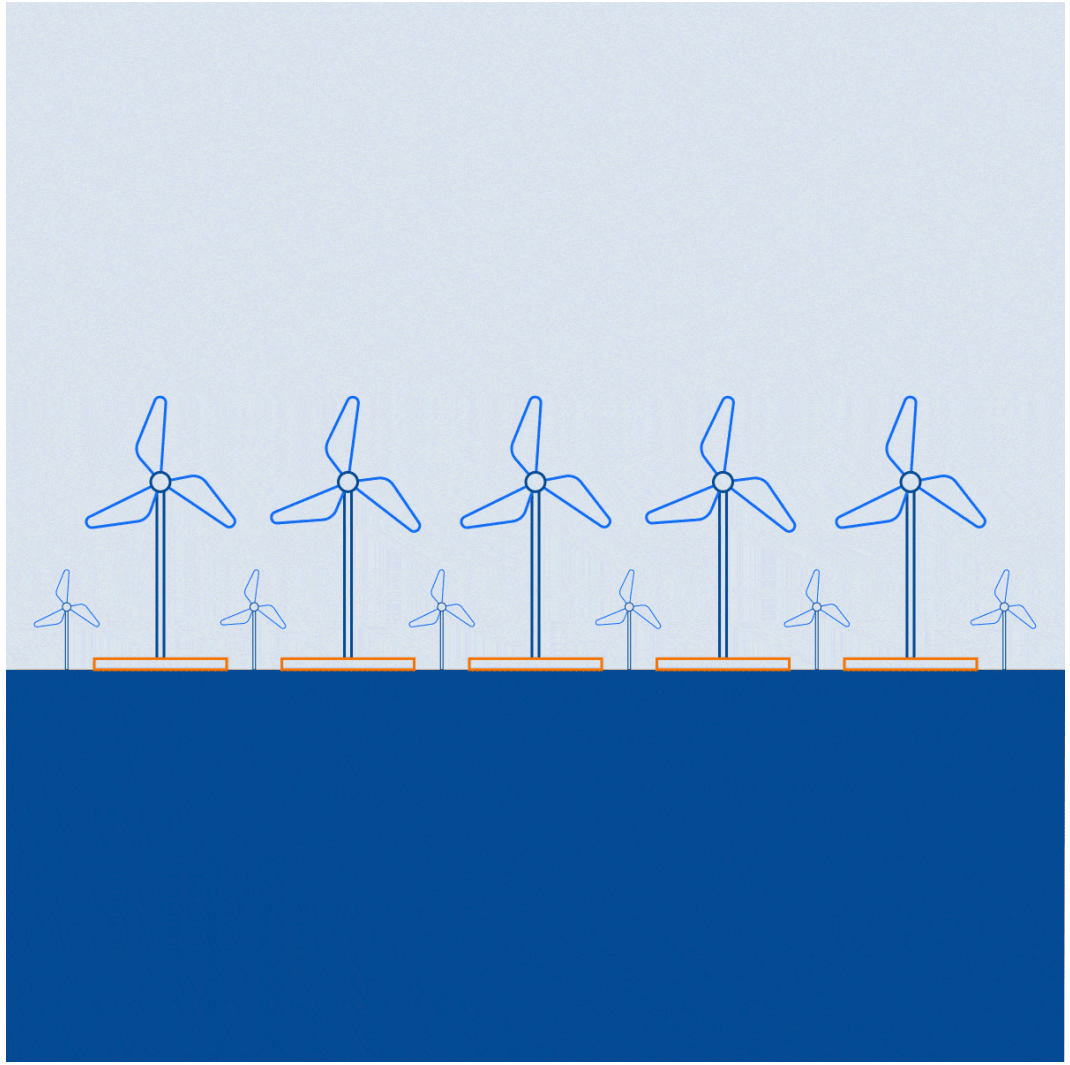
Selection of technologies considering societal, environmental and economic aspects

Sustainability KPIs

Development of metrics beyond LCOE/CAPEX

Impacts on local economy

Quantification of local supply chain involvement



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RECYCLABILITY OF FIBRE ROPES

Value chains
Map existing value chains for the recycling of the four types of rope: Polyethylene Terephthalate (PET), nylon (PA6), High Modulus Polyethylene (HMPE), aramid at their decommissioning stage.

Recycling Technologies Readiness
Investigate the TRL of the recycling processes.

SINTEF

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1950 – 2025
Technology for a better society

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