



## Challenges

- Printing bio-receptive marine structures
- Reducing the carbon footprint of the construction industry

Project duration: 9 months

Industrial sectors: Construction

Consortium coverage: Finland, Portugal, Netherlands



Renotech Oy is an advanced material technology company based in Finland. Since its creation, Renotech has accrued over 25 years of experience in the development of advanced materials, especially for the construction and marine application areas. As a company, they have worked on the development of 3D printable versions of terrestrial building materials for application in housing, hospitals, silos, etc., 3D printable bio-receptive building materials for marine applications and other specialised areas.

## The Challenge

3D printing allows for the design and realisation of more complex geometries and shapes whilst at the same time reducing the construction time, amount of materials needed and wasted, and associated costs. Within the construction sector, the opportunities created by 3D printing in terms of realising new constructions with functional shapes which previously would not have been possible to realise, unlock the potential to access new application areas. Combining the potential create new shapes with the possibility to print in new materials, such as bio-receptive and low-carbon materials, not only increase the potential application areas, but also represent a reduction in ecological footprint left behind by the construction sector.

## The Project

The aim of the project was to develop new ecologically friendly construction products for both marine and terrestrial applications, making use of 3D printing solutions. With regards to the marine products, the focus was placed on the design and development of marine restoration structures, such as sea walls and artificial reefs, produced using bio-receptive building materials which have been developed by Renotech. For the terrestrial application, the focus was placed on the development of a children's playground, featuring 3D printed ecological houses, futuristic & resource efficient buildings, artistic structures and buildings whose design has been inspired by nature. The successful implementation of this project would open up new possibilities and new application areas for Renotech and the innovative materials which they have produced.



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## Role of the Facility Centres

In order to reach the objectives of the project, Renotech partnered up with XYZ Lab and Vertico. XYZ Lab, which is based in Portugal, has extensive experience in ecological design and were therefore selected to support Renotech initially in the design phase of the foreseen products, artificial reefs and sea walls for the marine application area, and modular structures for ecological houses for the terrestrial application. Vertico, a company based in the Netherlands, is a player in concrete printing. Within the context of this project, they provided solutions related to 3D Printer and process. Renotech used their own innovative materials which had been developed in-house along with other materials which were sourced externally. Finally, quality control checks at various levels were performed by consortium members. Additional help, outside of official EU consortium was sought for digital workflow development from a Canadian SME. A local Finnish SME was also sought to provide help in automation for project success. Through this project, the three involved organisations were able to contribute through their own expertise, Renotech in the field of materials, XYZ Lab in the field of design, and Vertico in the field of concrete printing.

## Results achieved

The production of the terrestrial application structures proved to be more challenging than was initially expected. This was in part due to the fact that the structures were several meters in overall height and therefore could not be printed in a single run of the printer as the structure would collapse.

These issues were not present in the development of the marine application structures, indicating that there are gaps in 3D printing technology and what they can produce and deliver at various sizes and using different materials. For the marine application area, the project has been a success and will allow Renotech to contribute to the EU Green Deal and related environmental targets set by national and EU agencies. The product which has been developed with support of the 3DP PAN EU project has already gained the attention of actors in Finland and abroad. New customers for the innovative materials developed by Renotech have presented themselves and Renotech was invited to participate in an ecosystem restoration project in which the marine application structures such as the artificial reefs would be used and applied in the real world context.

