Floating houses

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Climate change is redefining the rules by which we live and at a pace we never expected. Because of rising sea level, several areas of the globe are in danger of vanishing from the map, disappearing under water. Society must adapt and maybe, one day, live in floating houses.

Depending on their geographical situation, some countries are more advanced than others in their adjustment to the effects of global warming, and particularly the rising level of the seas. In 1953, the Netherlands and large parts of Belgium and England were struck by what is known as the Watersnoodramp, literally "flood disaster", destroying 10.000 buildings and killing over 2.500 people. Since then, the "low countries" have developed a culture of flood engineering that has sealed the reputation of its builders and might help to fight the consequences of rising sea levels due to climate change.

A Dutch speciality

The results of FLOATEC, a European R&D project underwritten by EUREKA, can be found all over Europe, but the Netherlands is the primary market for the solution developed within the project. 'It had the full backing of the Dutch government' says Edwin Blom, project leader at Dura Vermeer. 'The authorities designated some areas of the country as preferred grounds for experimentation on amphibian houses'. The project also benefited of a unique legal obligation existing in Netherlands: 7% to 12% of every construction site is to be dedicated to water storage, which makes floating houses also very convenient.

The leading partner in the EUREKA FLOATEC project, Dura Vermeer, is a Dutch company specialising in building homes in a country where many would consider buying a houseboat. It is currently employing some 3000 people in The Netherlands. Over the last 12 years, this company has become an outright leader in a market that barely existed before - that of floating buildings. With some revolutionary achievements under its belt, such as the Rotterdam floating exhibition pavilion, a greenhouse built on water, or the amphibious village in Maasbommel, all located in Netherlands, it has a strong record of daring architectural projects.

Best of both worlds

So, how do you build a floating house? Edwin Blom describes it as a relatively easy construction process: The secret lies in the foundations of the building, made of multiple layers of light plastic foam supporting the concrete, allowing it to float the same way a boat would do. But the technology used until now has its limitations. There is a maximum size and weight beyond which a structure loses its buoyancy and simply sinks. The engineers from Dura Vermeer had to look for a technological partner able to solve this problem, the key being in the use and development of the right type of material.

However, it proved to be impossible to find in the Netherlands a collaborator with the level of skill and innovation required. They finally found the perfect match thanks to the network of European R&D experts offered by EUREKA: Acciona Infrastructures, a Spanish company and a forerunner in the sector of nanotechnology-based composite materials. Whereas most of the research done in the sector has been oriented towards lucrative high-tech sectors such as aerospace or military, Acciona Infrastructures has been from the very start looking to adapt their knowledge to the needs of the construction business. 'We would not have even thought of this market opportunity if we did not take part in this EUREKA project' says Bladimir Osorio, project leader

at Acciona Infrastructures.

Easy as building blocks

Together with a Spanish engineering consultancy, Solintel, the partners worked on a new way to build floating structures: simpler, more solid and using lighter materials. This new building method uses EPS, or expanded polystyrene, 'the same kind as is used for packaging and which people are familiar with: little white balls glued together', says Blom. The modified polystyrene is inserted in multiple layers in between stratums of composite and concrete and divided into beam-like modules that can easily be assembled into a bigger supporting structure 'a bit like building blocks'. The modules are arranged in a floating grid into which the concrete is cast.

Even so, the technology is much more advanced than the one traditionally used, Edwin Blom points at the fact that it is still much cheaper than other method used until now: 'We simply do not need to use as much material as we used to, he says. Smaller blocks can now support bigger structures and, in the end, the cost of the whole building is reduced'. For his Spanish counterpart Osorio, the project was 'a real technological breakthrough that would never have been possible without EUREKA'.

If climate change means more floods in densely populated areas, the technology to answer this problem now exists thanks to the FLOATEC project, and the cards to be played are now in the hands of the governments and local authorities in charge of urban planning. For some countries, small island-states in the Indian and Pacific Oceans, the stakes are even higher, as it is estimated that they could disappear within the next 100 years. According to Jenny Grote Stoutenburg, a researcher in law from the German Max Planck Institute, 'if a threatened island managed to keep an artificial, floating structure, occupied by caretakers,

it could probably maintain its claim to statehood'.

Provided by EUREKA