EC FUNDED PROJECT **“THE BLUE GROWTH FARM”**

theBlueGrowthfarm

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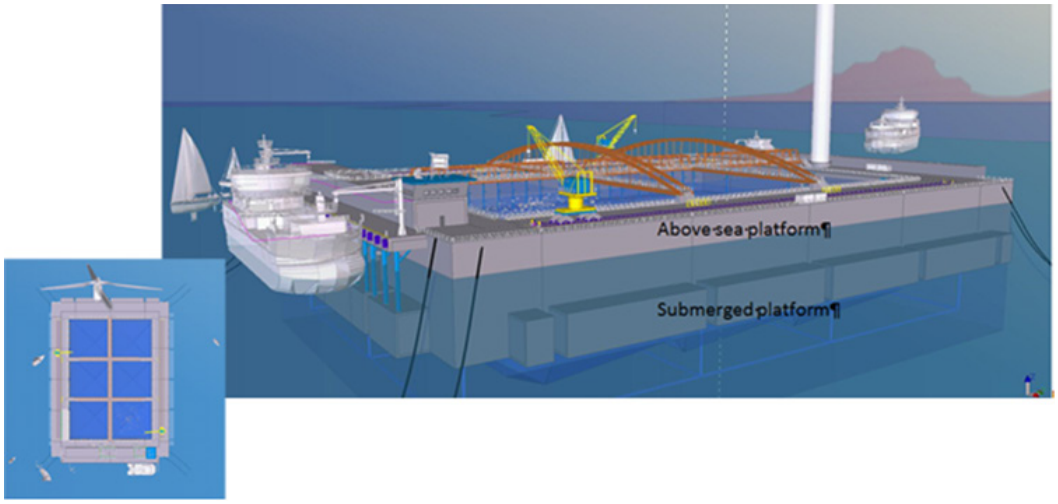
The further expansion of marine fish farming in coastal waters is limited by a lack of suitable sites, concerns about pollution, sustainability and, in many cases, regulatory issues and local community opposition. The aim of Blue Growth Farm project’s is to overcome these limitations to the expansion of marine aqua-culture through the design of an efficient multi-functional offshore platform, combining fish production with the generation of renewable energy from wind and waves.

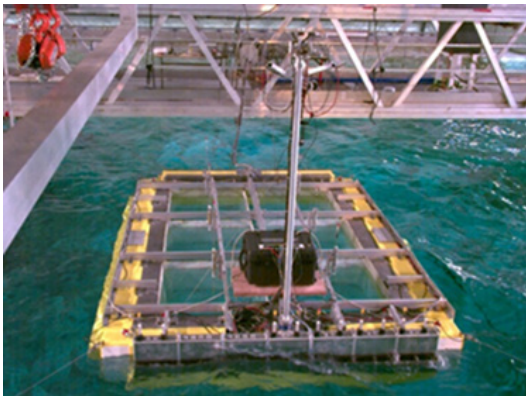


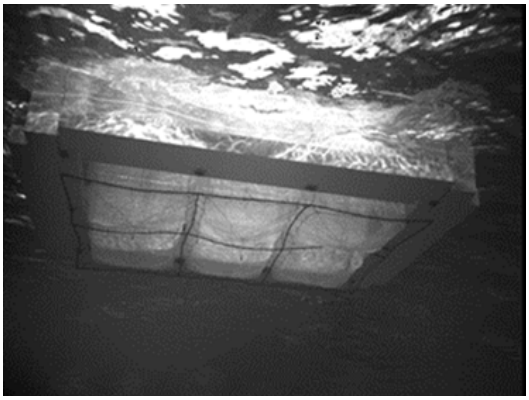
Given the nature of the problem it is addressing, key platform design requirements are that it must be able to withstand offshore conditions including wave significant heights of up to 6.5m whilst offering the highest standards of fish welfare, efficient use of resources, minimal environmental footprint and visual impact and, at the same time be commercially viable. If all these goals are met, the system should be attractive option for commercial investors, and much less likely to attract opposition for its deployment from regulators or local communities.

Whilst various designs for offshore fish farming systems have been proposed over the years, so far none have had widespread uptake due to various concerns including their real ability to withstand harsh offshore conditions, unknown and unproven technology, the inherent difficulties in managing units to which access may be limited for long periods, security and, not the least, cost. All of these concerns have been taken into account in the design of the BGF platform.

Firstly, the fish will be grown in floating net pens, much as currently practiced, so fish faring technology used is well proven. However rather than being exposed to the open sea, the net pens will be held within rectangular open-bottomed “pool” formed by floating, prefabricated concrete caissons joined together on site. The caissons, which also act as the collar for the pens, have a draught of 20m thereby affording the cages protection from most of the incident wave energy and currents. Water exchange within the pool is facilitated by surface openings at the aft of the platform which allows the outflow of water upwelling from the bottom of the pool due to the motion of the platform and the effects of sub-surface currents. The large open areas within the caissons will be used to house the feed silos, automatic feeding system, and other infrastructure such as a net store, ensiling system and workshop. The design of all these facilities is based on requirements dictated by the fish production programmes which have been developed for three different species (salmon, sea bream and sea bass) at three notional sites in Europe. Each programme has been tailored to give maximal production from the cage space available whilst ensuring all parameters remain within set limits for best stock welfare.

The renewable energy systems comprise a 10MW wind turbine on the forward deck of the platform, and an array of wave energy converters (WECs) devices which form an integral part of the structure of the forward caissons. The energy produced will be used to power all the on-board equipment, and the excess supplied to the local grid via umbilical cable. All systems on the platform, which include an automated feeding system, biomass estimator, under water and deck cameras, water quality sensors, security/surveillance systems, meteorological sensors, and structural health monitoring systems, will be linked to a central control room on the platform which will in turn be linked wirelessly to an onshore remote control room, allowing the system to be operated and monitored remotely when sea conditions do not allow operatives access to the platform.





Various designs for the platform have been studied by means of computational analysis to determine their behavior under a wide range of sea conditions. The selected configuration was planned to be studied also via experimental testing. A 1:40 scale model of the selected design was then built and tested in a wave tank trial at the Ecole Centrale de Nantes (FR), in order to validate the computer model assumptions.

A higher scale 1:15 scale prototype was built and is now in place at the NOEL open sea test site at Reggio Calabria in Italy. This prototype is fitted with an array of sensors to monitor its performance and behavior for the entire duration of the experimental campaign (7 months) before its decommissioned in early 2022. The data collected will provide valuable information on the aero-hydrodyna behavior of the platform, the net pens and the wind and WEC systems, and will be used to optimise the models for predicting the behavior of all systems at full scale, thus enabling reliable virtual testing before any investment being mobilised.

Parallel to the engineering design work on the platform, the project has also looked at the social acceptance of multi-use platforms by holding workshops and meetings with stakeholders and local communities in two selected locations, Reggio Calabria (Italy), and Islay (on the west coast of Scotland). This interaction has provided valuable information on the key factors that most strongly influence public perception of such offshore systems which could be helpful in guiding potential investors on how best to win local approval and support for their proposed activitie

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