

Justification Report Template (Maximum 2 pages)

1. Combination: Aquaculture + Offshore Wind + Biotech + Offshore Fixed Terminal
2. Basin selected: Mediterranean
3. Description:

The combination of aquaculture with a floating platform combining offshore wind, biotechnology and offshore fixed terminal has ~~already~~ been studied in detail in a European collaborative project, TROPOS. ~~A TROPOS objective is to develop a modular, adapted to deep waters.~~ TROPOS selected ~~43~~ sites ~~locations~~ to study the potential of significant scale modular multi-use offshore platforms, adapted to deep waters; a main site in Canary Islands, two sites in Greece and one in Taiwan. A floating platform allows for the integration of a wide range of sectors, but the main idea behind TROPOS is to combine ocean renewable energy and aquaculture resources ~~to-with~~ the maritime transport and leisure sectors. The TROPOS platform design concept is composed of modules, allowing for different platform configurations to be adapted to local needs and conditions.

TROPOS has also raised the interest of industrial companies including DCNS, the French shipyard company which has joined the project in its late stages. TROPOS has also conducted analysis through close cooperation with other European funded projects, namely MERMAID and H2OCEAN. MERMAID project focuses on innovative multi-purpose offshore platforms: planning, design and operation whereas H2OCEAN aims at the development of a wind-wave power open-sea platform equipped for hydrogen generation with support for multiple users of energy.

~~The~~ TROPOS ~~consortium has put in a lot of effort in the project, and the design ed solutions within the project are is~~ of interest to industrial actors in the offshore activities field. TROPOS believes that multi-use offshore platforms are not currently economically competitive and that governmental ~~intervention investment~~ is required for demonstration. TROPOS feel that this platform is commercially ready and collaboration between public and private entities should allow for the development of a first large scale demonstrator.

Three concepts were developed in the project: "Green and Blue", combining aquaculture with wind energy; "Sustainable Service Hub", a platform focused on transport and energy related needs; and "Leisure Island", a platform orientated to ocean tourism. The Green and Blue is the concept considered to take forward.

Commented [CED1]: Can delete if short on space

Commented [MJB2]: Is this for 'Blue and Green'?

Commented [MJB3]: Is this because the next stage is demonstration? Is it expected that there are enough grounds to expect it to be commercial once demonstrated.

Commented [CED4]: Are we therefore considering the concept is at: *engaged – Commercial readiness level 3 and/or potential to move to pilot in 2-5 year*. I cannot see a pilot combining all four sectors within 1-2 years.

MJB: Agree

4. Description of the concept / project

3.14.1 Technical

Modular Development Approach – combined as most appropriate in each area.

Commented [CED5]: Can this be turned into a full sentence?

~~In TROPOS 17 modules have been investigated to cover 3 platform concepts (Leisure, Green & Blue, Sustainable Production concepts). Platforms are not designed to operate as standalone modules, but to form a single structure with a central unit.~~

Green and Blue (Crete). This €430 million concept is composed of three different parts: i) 30 floating satellite units with two 2-3.3 MW wind turbines, an algae farm and cages for fish aquaculture; ii) the central unit, where focused on the main services (workshop, fish processing unit, algae bio-refinery, storage, accommodation, and electrical substation); and iii) the floating module for

Commented [MJB6]: It is not clear how

Commented [MJB7]: Now on the small side of offshore turbine range.



container traffic has a 160 meter berth for a container ship, storage for 232 twenty-foot equivalent units (TEUs) containers, berths for offshore supply vessels and a helipad.

The Green & Blue concept focuses on the use of physical and biological ocean resources for energy and food. A combination of aquaculture facilities (producing both fish and algae) integrated with an offshore wind farm. A bio refinery is used to make it possible to convert the algae cultivated on the platform into biomass. The platforms are in a triangle shape with two wind turbines in the lower corners of the triangle and an aquaculture cage located at the platform legs. A pier and a berth for vessels are also incorporated and the platform has a storage capacity in order to store spare parts and any containers dropped off from ships.

Commented [MJB8]: ?

Commented [CED9]: Presume TROPOS considers wind turbines on a floating foundation, there are currently no turbines installed with this technology.

Commented [CED10]: Resource overlap? Presume TROPOS identified Crete as a location as had good levels of all resource?

3.4.4.2 Socio-economic

- Skilled labour availability available
- Creation of jobs (>9000 FTE)
- Estimated Gross value added
- Increase reputation of all industries
- Increased food production

3.5.4.3 Environmental

- Joint waste and waste water treatment results in reduction of overall impacts
- Joint logistics reduce environmental footprint
- Floating structures have less impact on the sea floor than fixed structures
- Self-sustaining, low environmental impact aquaculture installation

3.6.4.4 Financial

- Joint logistics for erection, supply and maintenance save costs
- Introduction of new revenue
- Strong interest by stakeholders/businesses in the concept
- Possibility of sufficient profit from aquaculture to justify development
- Offers the opportunity for a novel offshore wind turbine foundation technology to be demonstrated

Commented [MJB11]: On its own? This is hard to believe.

4.5. Multi-use platform concept

A combination of aquaculture, offshore wind, biotechnology and offshore fixed terminal can be considered as an offshore multi-use of space platform. ~~The scale of the concept should kick off with an autonomous stand alone project with a combination of self-sustaining green and blue energy.~~

Commented [CED12]: Above, TROPOS defines it as a multi-use offshore platform

6. Scale of concept / project

The scale of the concept should kick off with an autonomous stand-alone project with a combination of self-sustaining green and blue energy.

Commented [MJB13]: What scale is this - the Full TROPOS project?

6.7. Key threats/challenges to be solved



- Having two turbine less than 6 diameters away means that the floating platform will need to ensure that they are never downwind from one another - otherwise severe fatigue loading will lessen their life markedly.
- Storage and use of the produced extra energy
- High investment costs and added financial risk
- Safety concerns of workers
- Interaction between fish growth and offshore -wind energy devices/turbines is unknown
- Operational problems caused by the combinations are not researched
- Risk for of damage due to from strong-severe storms
- Impacts insurance opportunities
- Possible increase of fouling due to fish farming
- Obtaining planning and consent orders from appropriate authorities

Commented [CED14]: Do not see this as a key threat. Does storage refer to solar PV, as you can store energy from wind turbines but why would you want to do that for 90MW of wind capacity - would export it all with only storage at grid scale (if needed)

7-8. Customer/societal problem that can be solved by combining the sector

- Self-sustainable fish farms
- Offshore fish farming reduces the impacts on the coast
- Increased use of renewable energy in the Mediterranean-
- Technological development within the offshore wind industry
-
- Increased seafood production