Aquaculture & Tidal Lagoon Combination for Atlantic Basin Justification Report

1. **Combination:** Aquaculture & Tidal Lagoon
2. **Basin selected:** Atlantic: Location. Within the environs of the lagoon.
3. **Concept:** Large Scale aquaculture farm using some of the tidal lagoon water space. Tidal Lagoon would lease space to farm.
4. **Basin suitability:** Tidal Lagoon perfect environment for aquaculture farm. Plenty of tidal flow for flushing and aeration. Benefits of protected water and good access for O + M.
5. **MUS or MPP**: The concept will be multiple use of space.
6. **Description**

6.1 **Technical** (Rating 4)

Due to their solid infrastructure and large scale, tidal lagoons are highly suitable for adaptation into a tidal lagoon and aquaculture combination. It can be considered an 'engaged' combination of technologies, with construction of the first pilot project from Tidal Lagoon Power due to commence in Swansea Bay in 2016. This project will have a generating capacity of 320MW.

By utilising well established technologies, largely taken from the hydroelectric and tidal barrage industries as well as from coastal engineering, tidal lagoons have proved to be a relatively simple concept. The Swansea Tidal lagoon has been proposed to be manufactured from a sand-core causeway approximately 9.5 km long, containing an 11.5m2 body of water.

Energy is generated when water is allowed to pass through a series of low-head bulb turbines contained within a concrete turbine housing, capable of producing 16MW/h. A synergy is possible between tidal lagoons and aquaculture. Large scale tidal lagoons can be used to generate power when the tide comes in or goes out by forcing the water to enter and exit the lagoon through a turbine. Aquaculture installations could be placed along the deep end of the pool and/or the deep edge outside the pool for relatively easy access. The aquaculture species could range from fish and mussels to seaweed depending on the location.

The Swansea Bay project team are also investigating the potential for developing mariculture. The formation of a new rocky reef as part of the project would provide habitat and encourage colonisation by local marine species. Research indicates there could be opportunities for the reintroduction of the native oyster as well as for fostering habitats for lobsters and kelp. These benefits are further investigated in association with local experts. According to the LDA design source the Lagoon will also include an aquaculture centre to hatch oysters and lobsters. All in all, a combination of these sectors holds promise.

The combination can be seen as a multiple use of space installation.

The current leading project for this combination is Tidal Lagoon Swansea Bay, which intends to commence construction in 2016 as its first commercial level installation.

6.2 **Socio-economic** (Rating 5)

Anticipated investment for these components is estimated to be in excess of £500m. During peak construction, an estimated 1,900 FTE (full time equivalent) jobs would be created or supported, covering a range of skill levels. An additional source of employment can be provided through aquaculture.

6.3 **Environmental** (Rating 3)

Tidal Lagoon has a big impact and changes the existing marine environment. If managed probably it can have a low level of positive impact. This is due to its ability to offset 320MW of fossil fuel generation. There is some concerns over

- Habitat destruction

- Large visual impact
- Change in benthic community and sediment transport

6.4 **Financial** (Rating 5)
Combination with tourism could produce a profitable project, due to:
- Income from tidal energy is predictable and consistent.
- long generation life of the plant will ensure continuous income for many years,

6.5 **Short or Long Term Commercial Viability** (Rating 3) Tidal Lagoon and Tourism is commercial viable in 1-5 years.

6.6 **Overall rating 20**.

7. **Key threats/challenges to be solved**
- A lack of success of the Aquaculture activity
- High investment costs
- Guaranteeing government subsidy
- Environmental damage during construction
- Public acceptance
- Operational problems caused by the combinations are not researched
- May be issues around pollution from Aquaculture

The main stream for investment return will derive from the energy harvesting activity. Aquaculture has a supporting role potentially contributing to the local economy by increasing employement numbers in the wider region.

8. **Customer/societal problem that can be solved by combining the sector**
- Supply of sustainable, secure and renewable energy
- Increased use of space
- Reintroduction of species and removal of invasive species
- Local supply chain is bolstered
- Multi-use of marine space

9. **Suggested companies**

9.1 Tidal Lagoon
- Tidal Lagoon Power
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9.2 Tourism
- Tourism Swansea Bay
- Visit Wales Company