

Annex 1: Welsh Government's Research Priorities

These research priorities have been created in consultation with the industry and with key stakeholders and are designed to support the overarching objectives of the Tidal Lagoon Challenge.

In undertaking the tidal lagoon challenge the overarching aims of the Welsh Government are to:

- Increase knowledge and understanding of how current barriers to development may be addressed
- Increase certainty in relation to the benefits that may arise from a tidal lagoon project, whether environmental or socio-economic
- To support the growth of the tidal range sector in Wales

The Welsh Government's research priorities have been grouped into three thematic categories, aligned to the award categories. We recognise that research projects may address more than one priority, or theme, and welcome proposals where this is the case.

Where research is locationally specific, we expect it to be focussed on those areas set out in the indicative map of the [Welsh National Marine Plan](#) (p106, figure 15(d)).

Examples of locationally specific research could be the consideration of a particular environmental receptor, or the logistics impact of a tidal lagoon on a coastal community.

Environmental

The Welsh Government is committed to protecting and enhancing the natural environment. Research is needed to:

- Conduct baseline data and site characterisation studies to understand the environmental conditions and inform future development.
- Identify and verify potential environmental compensation/mitigation measures that would be most appropriate to address the impact of a tidal range project.
- Better understand the potential impacts of tidal range development on key environmental receptors such as fish, birds, physical processes, benthic and water quality.
- Assess the regional scale impacts of tidal range development on the environment, and particularly on protected species and habitats.
- Investigate the potential biodiversity benefits of a tidal range project as an artificial reef and other potential environmental gains from a tidal range project.
- Evaluate the potential impact of tidal lagoon projects on coastal flooding, including their role in adaptation to climate change.
- Inform IROPI evaluation and WFD compliance assessment.
- Potential for interactions between project resulting in cumulative or in-combination effects.
- Assess the environmental impact of pumping in a tidal lagoon scheme
- Suitability of lagoon water for recreation and aquaculture
- Consider how climate change may interact with a tidal lagoon structure
- Assess the environmental impact of using a tidal lagoon for energy storage

Engineering and Technical

The Welsh Government wants to support research that improves the engineering and construction of future tidal range projects. The Welsh Government is keen to understand in all proposals how the embedded carbon of tidal range projects may be reduced. Research is needed to:

- Understand approaches to develop more cost-effective / environmentally protective turbine technologies to improve the efficiency of power generation.
- Investigate ways to improve marine wall/caisson design to reduce overall project cost, improve buildability or deliver carbon savings
- Understand how marine walls can be designed that are adaptable/flexible to future anticipated sea level rises to improve the long-term viability of tidal lagoon projects.
- Develop new approaches to construction in different sea-bed geologies to improve the efficiency and cost-effectiveness of tidal range projects.
- Understand approaches to minimise time-to-first power. A specific focus on best practice, including approaches to turbine installation in a marine environment.
- Investigate ways to decarbonize the materials and / or supply chain to reduce the embedded carbon of tidal range projects.
- Consideration of how to ensure the sustainability and resilience of the supply chain.
- Develop effective decommissioning strategies to ensure liabilities are appropriately managed within the current legal framework.
- Consider beneficial applications of Artificial Intelligence for improved Operations & Maintenance
- Consider the role of tidal lagoons in grid balancing, or other energy system impacts
- Approaches to dredging for maintenance

Socio-Economic and Financial

The Welsh Government has put communities at the heart of its net zero agenda. Where possible, this research should be focussed on considering the potential impact Welsh communities. Research is needed to:

- Develop effective and progressive government support packages to encourage the development of tidal lagoons in Wales.
- Investigate different financial models for delivering a viable tidal lagoon project.
- Identify low-cost, high-impact support mechanisms to reduce the overall project cost of tidal lagoon development.
- Evaluate the potential supply chain and job opportunities associated with tidal lagoon development.
- Assess the impact of tidal lagoon development on local industries and develop strategies to multiply any positive effects / mitigate negative impacts.

- Investigate legislative barriers to bring forward tidal range projects and identify potential solutions.
- Develop community ownership and benefit models to ensure that local communities benefit from tidal range development.
- Conduct social research on attitudes and needs related to tidal range development to inform policy and decision-making.
- Assess the value of the pattern of tidal range energy generation to the UK energy system
- Consider the added value of storage strategies to the financial model / energy system
- Consider how to encourage, facilitate and embed local engineering and technical skills
- Cost effective education and training opportunities in areas with skills shortage