

Tidal Range Energy: Opportunities and Challenges: Q&A Report

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| <p>Question to Prof Falconer: For efficiency reason, is there minimum tidal range for tidal turbine?</p> | <p>RAF: For a tidal range scheme to generally be efficient in my experience one needs to be considering a tidal range of at least 5 m. However, there are a number of factors to consider, including: (i) that the maximum energy for generation is also proportional to the wetted plan surface area, and (ii) the scheme (i.e. barrage or lagoon) may be primarily planned for other purposes (e.g. protection against coastal erosion and with energy generation being a secondary factor)</p> |
| <p>What technologies could be employed to reduce the carbon footprint of such a construction? I thinking mainly of concrete</p> | <p>RAF: Unable to answer not my field of experience, but I work with colleagues who do have experience in this field. Please email me if you need more info on this matter.</p> |
| <p>Are there any tidal lagoon already built in the UK or world?</p> | <p>RAF: There are currently no lagoons built specifically for tidal energy in the UK so far as I am aware, but there are several barrage projects built worldwide, including: La Rance, Shiwa etc. However, there are several smaller projects built in the UK which help understand the key hydro-environmental characteristics of impoundments, such as Carew Mill and several narrow-entranced harbours (e.g. Poole).</p> |
| <p>192 / 5.000 Hello. I am Denizhan BOZDĞAN, an engineer from Turkey who works in a water treatment plant. What do you know about the use of artificial intelligence in electricity production in water treatment plants? Thanks</p> | <p>RAF: I am not aware specifically of AI technologies being used to generate electricity directly in wastewater treatment plants, but there are considerable opportunities for AI to be used in wastewater treatment plants for other opportunities, such as optimising chloring dosage rates associated with disinfection, etc.</p> |
| <p>Question to Kate: How we deal with navigation function of the estuary and or channel vs. tidal turbine.</p> | <p>RAF: This question is not clear to me, but I assume that the writer wants to know how tidal turbines will affect navigation channels post construction of a barrage. In the design of a barrage scheme a detailed 3-D hydro-morphological study, calibrated against sediment field data, would be undertaken to predict</p> |

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| | any significant changes to navigation channels at the design stage. |
| <p>Any tips for budding start-ups in this industry? I'm the founder of VSP ENERGY, a budding ocean energy start-up (wave & tidal energies) from Visakhapatnam, India. https://www.linkedin.com/company/101827385/</p> | <p>RAF: Difficult to advise directly but would suggest looking first for sites where there is a relatively large tidal range and opportunities to impound a relatively large plan surface area. This would then be followed by undertaking hydrodynamic and environmental impact studies to evaluate the energy generation potential and the impacts on the coastal environment. The energy predictions need to include costings.</p> |
| <p>How can governments and private investors collaborate to overcome the high initial costs associated with tidal energy (or renewable) projects?</p> | <p>RAF: Kate - can I leave this for you?</p> |
| <p>Are you optimistic that we can overcome the apparent lack of joined up thinking in government and regulators which can account for the multiple benefits of tidal range schemes - flood defence, habitat protection as well as low carbon power.</p> | <p>RAF: This is currently a major problem. In my experience Governments segment the different benefits to different departments and this leads to tidal range schemes only being considered in comparison to other forms of energy generation in terms of cost of energy. For example, a lagoon along the North coast of Wales would offer considerable benefits against coastal erosion and flooding. However, that comes under a different Government department to energy generation and the cost of a lagoon when considered for coastal flooding protection would be judged to be extremely expensive if all the cost is considered against flooding. In my view we need a Water-Energy-Food nexus strategy and not separate strategies. For example, I would question whether it's in the countries best interests to convert prime agricultural crop growing land to large solar farms.</p> |
| <p>Is it right that the barrage/lagoon project plans all happened when the Government was Labour.</p> | <p>RAF: Not necessarily in my experience.</p> |

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| <p>What are the most effective energy storage solutions for balancing the intermittent nature of tidal energy, and how feasible are they in terms of cost and scalability?</p> | <p>RAF: Energy storage can be delivered through the use of AI and adjusting the starting head, via a flexible operation approach, to use barrages and lagoons to provide storage to meet generation at times of peak demand.</p> |
| <p>What technological advancements are needed to optimize the performance of marine renewable energy systems in shallow water? And low tidal range</p> | <p>RAF: In my view the main technological advancements on this front will come through the design and operation of the low head turbines currently on the drawing board and now being designed and tested.</p> |