

Ramboll

Tidal Foundation Selection

Tidal foundations are a fundamental part of a tidal stream energy farm. The aim of this paper is to provide a roadmap for selecting an appropriate foundation that best serves the device and environmental conditions for the site for construction, installation and operation.

There are many, often competing, factors that must be taken into account when selecting a foundation structure and in order to be an efficient, cost effective solution, it must suitably weigh and score them. These are, to name a few, material and fabrication costs, type and grade of sea bed and lifetime requirements.

The foundation itself, however, is heavily influenced by the installation conditions, vessels and techniques that will be used to transport and place the structures on the seabed. Therefore, it is vital to suitably score and weigh these factors in a manner that reflects their importance.

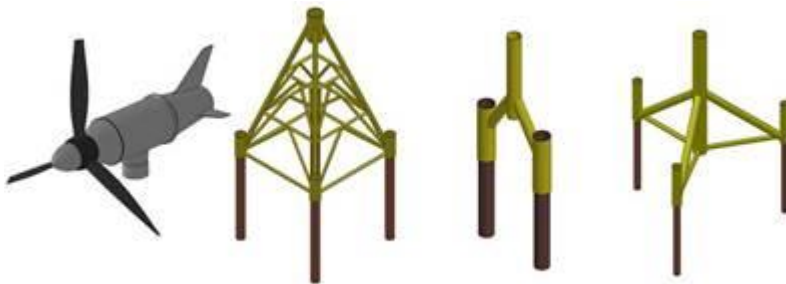


Fig. 1 Tidal Turbine and Foundation Options

This paper will provide a framework for this type of study and possible short cuts to eliminate pitfalls

- Ramboll's experience at the tidal foundation concept selection stage (several projects to-date) in determining the best foundation structure (monopile, tripod, tri-pile, gravity base...) taking into account technical design aspects such as seabed conditions/ULS load magnitude/fatigue load characteristics. We will discuss a matrix we created and how we 'weighed' the considerations relative to one-another.
- How progression through the detailed design altered our appreciation of the relative importance of the above and the impact on our design.
- A more in-depth run-through of our experience in fatigue design of tidal foundations (importance of the static and dynamic load components, impact of major-cycle current change on fatigue life in addition to the usual load case table (series of 600 second time-domain analyses)).
- Our assessment of where the foundation design fits in with other parameters such as decommissioning cost, cable connection, installation and O&M cost (the duration required for

these operations and implication in terms of ship hire duration/associated cost e.t.c). In our experience the key cost driver is the installation and O&M time and all reasonable efforts should be made in the foundation design to ease/quicken this process. Even if this leads to a 'less-than-optimal' structure in terms of quantity of steel, the additional cost is insignificant relative to the additional installation cost/installation risk.