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Policy Brief

Policy measures to ensure the economic viability of UK tidal range schemes

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Summary

Tidal range schemes (TRSs) - which generate electricity by harnessing the power of tidal movements through coastal structures like barrages or lagoons - present a significant opportunity for the UK to harness renewable energy and contribute to its net zero targets. Unlike wind or solar power, TRSs can provide predictable power generation aligned with tidal cycles and offer large-scale energy storage capabilities. However, due to unique characteristics around their relative capital intensity, high upfront costs and long construction times, these projects face considerable challenges in attracting investment and achieving long-term economic viability. This policy brief, based on the research output conducted by the Centre for Energy Policy at the University of Strathclyde, as part of the EPSRC TARGET project, examines the policy instruments that may be required to support TRS development in the UK. Our analysis suggests that:

1. Current support mechanisms, such as Contracts for Difference (CfD)[i], may be insufficient to incentivise TRS investment due to their long development and payback periods.
2. A Regulated Asset Base (RAB)[ii] model could be more suitable for TRSs, providing greater certainty for investors and potentially reducing the cost of capital.
3. Policy frameworks need to evolve to recognise the multiple benefits of TRSs, including flood defence and regional economic development.
4. A more flexible approach to ‘revenue stacking’ could enhance the economic case for TRSs by allowing projects to access multiple revenue streams from ancillary and capacity markets.

> **“By adapting existing mechanisms and developing new approaches, an environment conducive to investment in TRSs could help unlock their benefits for the UK energy system and the wider economy.”**

Introduction

The UK has significant tidal range resources that remain largely unexploited. Tidal range schemes (TRSs) could play a crucial role in providing predictable low-carbon electricity generation and large-scale energy storage, contributing to energy security, grid flexibility, and additional benefits such as flood and coastal defence. However, despite their potential, TRS projects in the UK remain at pre-development stages, with investors deterred by high capital costs, long payback periods, and regulatory uncertainties.

Our research explores the challenges facing TRS development and examines the policy instruments that may be required to ensure their investability and long-term economic viability.

Key findings

1. The unique characteristics of TRSs imply the need for tailored policy support

TRS projects are characterised by high upfront capital costs and long construction periods, extended operational lifetimes of up to 120 years, and the potential for additional benefits beyond electricity generation, such as flood defence. These features make TRS poorly suited to existing support mechanisms designed for other renewable technologies like wind and solar, which typically have shorter construction times (2-3 years) and operational lifetimes (20-25 years).

2. The current CfD framework may be insufficient

While the CfD mechanism has been successful in supporting offshore wind development, it may not be appropriate for TRSs because of the above characteristics. The required 'strike price' for TRSs is likely to be significantly higher than current market rates, potentially making it uncompetitive in CfD auctions. Moreover, the 15-year contract duration does not provide sufficient long-term revenue certainty for investors given the extended lifespans of TRS projects.

3. Need for flexible 'revenue stacking'

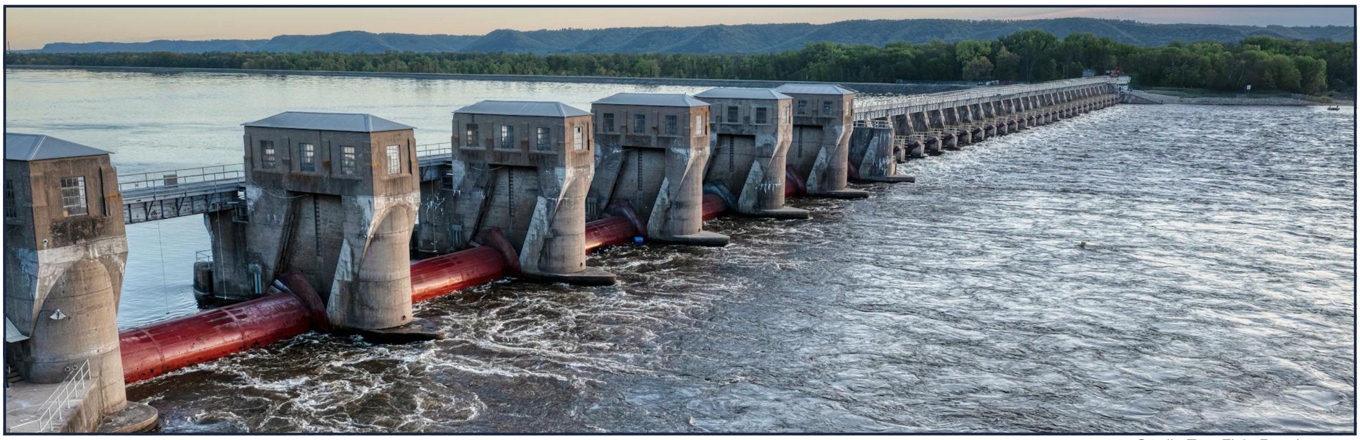
Current restrictions on 'revenue stacking' limit the potential economic viability of TRSs. TRSs could provide multiple services to the energy system, including baseload generation, energy storage, and grid balancing. Allowing TRS to access revenues from both the CfD and Capacity Market mechanisms, and/or other revenue streams, could enhance their economic case.

4. RAB model shows promise for TRS financing

The Regulated Asset Base model, currently being applied to some new nuclear projects in the UK[ii], could be more suitable for TRSs (and other energy system projects with similar characteristics, such as Carbon Capture Utilisation and Storage CCUS). It provides a guaranteed revenue stream throughout the asset's lifetime, including construction and commissioning phases, which could reduce the overall cost of capital by derisking investment. The RAB model also allows for the inclusion of wider socio-economic and environmental benefits in the economic assessment.

5. Recognising wider benefits

TRSs offer benefits beyond electricity generation that are not fully captured by current market mechanisms. These include flood defence and coastal protection, potential for local economic development and job creation, and contribution to UK supply chain development. Policy frameworks need to evolve to recognise and value these additional benefits. The ongoing Review of Electricity Market Arrangements (REMA)[iii] process presents an opportunity to address these valuation challenges. Additionally, the recent CfD consultation (AR6)[iv] has proposed changes to allow projects to stack revenues from ancillary services alongside CfD payments, which could help capture some of these wider benefits for TRS projects.



Credit: Tom Fisk, Pexels.com

Conclusion

The evidence suggests that supporting the development of tidal range schemes and similar large-scale, capital-intensive renewable technologies could benefit from exploring the application of the RAB model, building on the experience with new nuclear development. Current CfD rules might be adapted to better accommodate the characteristics of such projects, with possibilities including longer contract durations and separate auction pots where appropriate.

A more flexible approach to revenue stacking appears valuable, potentially allowing projects to access multiple revenue streams where appropriate. This could be complemented by developing assessment frameworks that account for wider socio-economic and environmental benefits.

The evidence points to opportunities in exploring public-private partnerships in project development, potentially involving local authorities and regional bodies. Investment in supply chain development appears important for cost reduction and maximising nation-wide economic benefits from deployment.

TRSs offer significant potential for low-carbon electricity generation and energy storage in the UK. However, realising this potential calls for a policy framework that recognises the unique characteristics of these projects and provides appropriate support to ensure their long-term economic viability. By adapting existing mechanisms and developing new approaches, an environment conducive to investment in TRSs could help unlock their benefits for the UK energy system and the wider economy.

The challenge lies in balancing the need for public support with the desire to attract private investment. The RAB model appears promising for making tidal range investment viable, while requiring careful implementation to ensure value for money for consumers and taxpayers. As the UK seeks to decarbonise its energy system and enhance energy security, TRSs represent a significant opportunity that merits consideration within the broader context of renewable energy policy development.

Acknowledgements:

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References to underlying research

i A mechanism that provides renewable generators a guaranteed price for their electricity for 15 years, protecting them from volatile market prices. See: DESNZ, 'Contracts for Difference (CfD)':, 2016. [Online]. Available: https://www.gov.uk/government/collections/contracts-for-difference.

ii A regulatory framework that allows infrastructure operators to earn a regulated return on their asset base, including during construction. See: DESNZ. 'Future Funding for Nuclear Plants'. GOV.UK, 26 October 2021. https://www.gov.uk/government/news/future-funding-for-nuclear-plants.

iii DESNZ. 'Review of Electricity Market Arrangements (REMA)'. GOV.UK, 12 March 2024. https://www.gov.uk/government/collections/review-of-electricity-market-arrangements-rema

iv DESNZ. (2023a). *Call for Evidence on introducing non-price factors into the Contracts for Difference Scheme*. https://assets.publishing.service.gov.uk/media/643cfdf622ef3b000c66f2c2/cfd-non-price-factors-call-for-evidence.pdf
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End-notes

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