Written evidence submitted by Amir Eilon (CGE0078)

EXECUTIVE SUMMARY

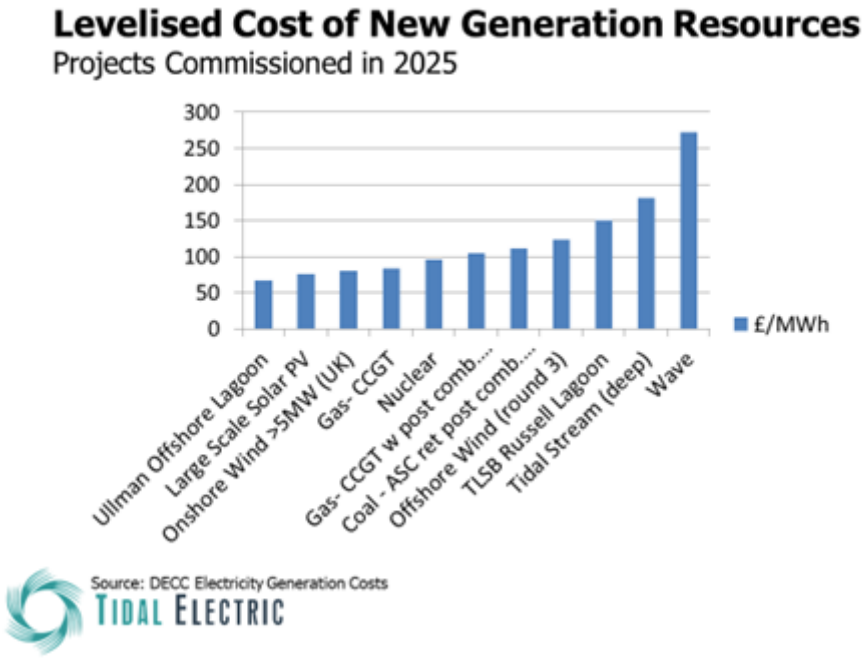
predictable	weather dependant
Nuclear	Hydro
Tidal	Solar
Geothermal	Wind

imports fuel	no fuel
Nuclear	Hydro
	Solar
	Wind
	Tidal
	Geothermal

1. Non-carbon energy delivery can be categorised

from which it can be seen that Tidal Energy and Geothermal alone offer both predictable energy and security of supply. Tidal Energy comes in two forms: tidal stream (from the power of the tidal current) and tidal range (from the potential energy in the rise and fall of the tides). Tidal Range is inherently more efficient than tidal stream (by a factor of 4 if you look at the physics).

2. The key issue for the country is the projected cost of power:

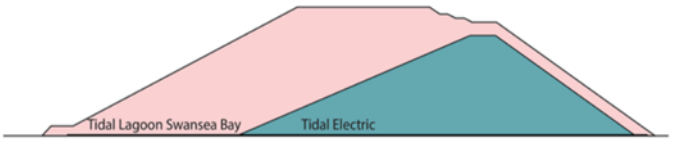


Government support, followed by competition, allowed costs in solar and wind to fall considerably: the latest CfD for offshore wind was £57/MWh (to which some £20/MWh would need to be added for storage for comparable analysis with other predictable supply sources). Government support will be required to get tidal range operational but tidal range should be ready to compete with all renewable energy after the first (few) projects; much less than the 20 years support taken by wind.

INTRODUCTION

3. Tidal Electric, together with Ecotricity (the UK's leading green energy company) and DEME (one of the world's leading marine engineering companies) are promoting the building of the world's first offshore tidal lagoon power plant.
4. The concept behind a tidal lagoon is a simple one – the lagoons are filled and emptied by the tidal changes. The 'filling' and 'emptying' through the turbine hall drives turbines which generate electricity four times a day, maximising efficiency and reducing costs. This delivers a predictable (though intermittent) source of energy supply, thereby able to be comfortably absorbed by the existing electricity distribution grids. Building a number of plants around the UK coastline (see 18 below) would enable the different timing of the tides to convert intermittency into base-load power. As shown here, the offshore design has no high-visibility structures and no moving parts above the water line

5. Offshore tidal lagoons 'interfere' with the beach far less than both Russell lagoons and barrages, dramatically reducing their environmental impact. Building offshore enables a more efficient (i.e. lower cost) structure as shown here: smaller walls (allowing overtopping during storms and spring tides) are possible because there is no human interface with the structure that is impossible to avoid with the Russel lagoons (such as TLSB) that touch the land. Consequently, offshore lagoons cost less to build, operate more efficiently and have significantly less environmental impact than other marine renewables. Accordingly, environmental campaigners, (e.g. Friends of the Earth, RSPB, etc.) are supportive of the offshore lagoon design.



6. ARUPs has completed its Preliminary Feasibility Report which estimates build costs to be circa £1.8m/MW installed capacity. On this basis, and assuming a reasonable CfD (less than nuclear), the project is profitable.
7. The proposed first site is in the Solway Firth, on the English-Scottish border, and could deliver power as early as 2026. The Solway site provides an ideal location and will make use of the existing skills base in the region. The scheme will contribute to economic rebalancing across the UK and could play an integral role in furthering ambitions around the Northern Powerhouse agenda with the benefits to a local supply chain that significant infrastructure projects can bring.
8. The proposed scheme would generate 600,000MWh of electricity annually, enough to power 165,000 homes across the UK. The lifespan of the project is 100+ years: significantly longer than offshore wind and solar projects (whose lifespan is typically around 20 years). Tidal lagoons offer an opportunity to create super-long-term sources of low carbon energy for the UK with near-zero marginal cost.

9. The construction costs of future tidal-range lagoons are expected to fall over time and would eventually compete directly with offshore wind costs. The first project will generate as much electricity as the Tidal Lagoon at Swansea Bay (TLSB), for example, but importantly, it would deliver electricity for half the cost: these superior economics are delivered by siting the lagoons offshore instead of on-shore, and being optimised for power generation.
10. When they are placed offshore tidal lagoons do not impede boat navigation or fish migration, and because they only rise three feet above the high tide line the installation has a very low profile from the perspective of the shore.
11. The Crown Estate has agreed, in principle, to negotiate with a credible syndicate to reserve the chosen site. The Government is yet to define its policy of support towards tidal lagoon. If supported, this would establish the UK as a world leader in hydroelectric energy.

THE PROPOSAL

12. The Government should back the development of offshore tidal lagoon schemes to futureproof the UK's energy supply. Agreeing an appropriate CfD with BEIS is vital to enabling innovative projects like this to proceed. It was the combination of support coupled with competition that drove the costs of offshore wind down from £130 to the current £57/MWh but that took more than 20 years. Government must accept that they will need to provide specific support for lagoon projects in the early days, before lagoons are required to compete with other forms of renewable energy.
13. Swansea Bay Tidal Lagoon made a good case for the merits of tidal-range power being central to the UK energy mix, but failed, rightly, because of their high costs. The energy budget should not be asked to support projects that cost more than Hinkley, which itself is now recognised as 'expensive'.
14. Tidal Electric are asking the Government to enable tidal lagoons to prove their technology allowing them to subsequently compete head-to-head with the cheapest renewables. Failing to subsidise alternative energy sources at their inception is to abandon technology-neutrality and make a bet on wind (accepting a future need for investment in storage: Denmark and Germany have shown the difficulty for the grid to cope with an excessive percentage of unpredictable power in the total energy supply).
15. Tidal Electric understands that Hinkley is 'expensive' in the current market and accordingly are exploring the possibility of committing to the Government (through an open-book approach) to seeking the minimum CfD necessary to attract the finance to build the first project subject to a cap (being the Hinkley price). The syndicate has engaged Green Giraffe to advise on the raising of capital on this basis and we have already had discussions with some leading equity providers interested in taking matters further. In this way the Government would be shielded from any risk of cost over-run.

CONCLUSION

16. Tidal lagoons are an exciting large-scale opportunity to create super-long-term sources of low carbon energy for the UK with security of supply and near-zero marginal cost.
17. The UK could be the pioneer of this industry, building a centre of knowhow and enabling the creation of an industrial proposition with opportunities for British manufacturing to thrive.
18. Once the first project proves the economic viability, there are significant expansion opportunities with the British coastline offering dozens of viable areas for tidal lagoons to be effective. This map sets out the potential areas in blue which are amenable to an offshore tidal lagoon.

19. Furthermore, the technology offers growth and export opportunities, while putting Britain back on the map for world class development of innovation and technology.
20. The policy of supporting a nascent industry followed by the introduction of a competitive regime has worked in offshore wind, driving costs down for the consumer. The same policy is needed to get tidal lagoons to be an important part of the UK energy portfolio mix. Without support at the beginning of this journey tidal lagoons will not be developed in the UK.

April 2019