TIDAL ELECTRIC LIMITED

Tidal Electric has been sponsoring the merits of tidal range power through its unique offshore lagoon structure to the UK Government for over 20 years….. to no avail.

BACKGROUND

We first submitted our offshore lagoon proposal to Godfrey Bevan at the then DTI in 1998. We were able to interest several energy companies such as AES, Dynergy and Phillips-Conoco; we went through legal and technical due diligence with each of them but, just as we were about to sign an agreement with them, each of our potential partners bowed out. It later transpired the DTI was negatively briefing against us (in order, we believe, to deliver their nuclear programme). In an attempt to even the playing field, we retained Tom Thorpe at AEA Technologies because AEA was the DTI's then 'go-to' energy experts and returned with their feasibility study. Our proposal was rejected in 2003 because "you've paid for the AEA study so we couldn't accept its impartiality".

This intellectual bankruptcy has pervaded the debate on renewable energy to the present day:

- Nuclear energy delivers predictable energy that is green but the price bandied about (when talking of subsidy required) does not include the cost of clean-up/decommissioning (because no one knows the real cost?). Additionally, there is no security of supply given the need to import the uranium fuel.
- Gas (and coal in its day) and bio-fuels deliver predictable energy but do not pay to recapture the CO^2 emissions and so the published price is significantly below the real cost.
- Wind and solar have a 20-25 year life and deliver green but unpredictable power but do not pay for the energy-storage to be able to deliver predictable power and so the published price is significantly below the real cost. They do offer security of supply.
- Tidal range has a 100+ year life delivering predictable green power and security of supply. Additionally, the pump storage potential offers the Grid flexibility and could deliver predictability to unpredictable renewables.

REAL COSTS

It is impossible to deliver a credible policy where alternatives are not compared on a like-for-like basis. And the real costs, both in terms of money and climate change impact borne by society at large, will ultimately become all too evident:

- Carbon capture is estimated to cost $600/tonne CO2 [#1]
- Denmark that has a very high proportion of its energy mix coming from wind power has invested heavily in interconnectors to balance their grid : The Viking Link just commenced, and due to complete 2023, will cost €2bn for 1.4GW capacity [#2.] As the UK Government increases its reliance on wind, the cost of the lack of storage will hit the Grid in the not too distant future.
- California, that has a very high proportion of its energy mix coming from solar, is investing heavily in batteries: NextEra Energy is investing $800m to build 700MW, with a 4 hour discharge, capacity to be brought online by end 2022, with plans to invest $30+bn more in the next 5 years (current USA storage capacity only 1.35GW)[#3]

LEVELISED-COST-OF-ENERGY IS A FLAWED TOOL FOR COMPARISON

A further complication is the difficulty in trying to assess alternative power sources with different asset lives using the Levelised Cost of Energy. This measure is based on using discounted cash flows ("DCF") but the present-day discounted value of any cashflow out say 35+ years is negligible. So comparing a 100 year asset with four sequential 25 year assets will in effect ignore the costs of the last two replacements of the shorter-life asset: it's not that the costs are not real, it's simply that DCF cannot account for them.

THE ROLE OF COMPETITION

Much has been made of the successful use of competition to reduce costs. This is true in a mature, established technology such as wind: using competition to judge between one wind project versus another works if the assessment is on a like-for-like basis (even ignoring the true costs i.e. including storage to make them predictable sources of power). The success is evident and laudable.

But competition cannot be used, even using the real costs, to allocate the finite resource of the Contract for Difference ("CfD") budget between established and new technologies. There is no reason to believe that the experience of extraordinary cost reductions cannot be achieved for all technologies, but it took wind 20+ years to achieve those results. [#4] Would it have been possible for the wind industry to predict such an achievement 20 years ago? The tidal lagoon industry will get better at building walls; will get better at producing turbines, and will get better at optimising layouts but only through the experience of building plants!!!

A FALSE START

To give the newer technologies 'a chance' the Government introduced the concept of ring-fencing for tidal stream and wave projects. This would allow the Government to award schemes support through the CfD without these projects having to compete with the mature technologies. However, the experience was not satisfactory: the ring-fencing for tidal stream was put in place in 2014 for 5 years but then scrapped in 2016.

OUR RECOMMENDATIONS

The UK has the second-best tidal resource in the world and yet has seen no meaningful investment in tidal range projects.

Developers are able to assess risks and don't need the Government to 'protect' them (despite this seeming to be the default view of the Energy officials over the years):

- they assess the risk they cannot get planning consent

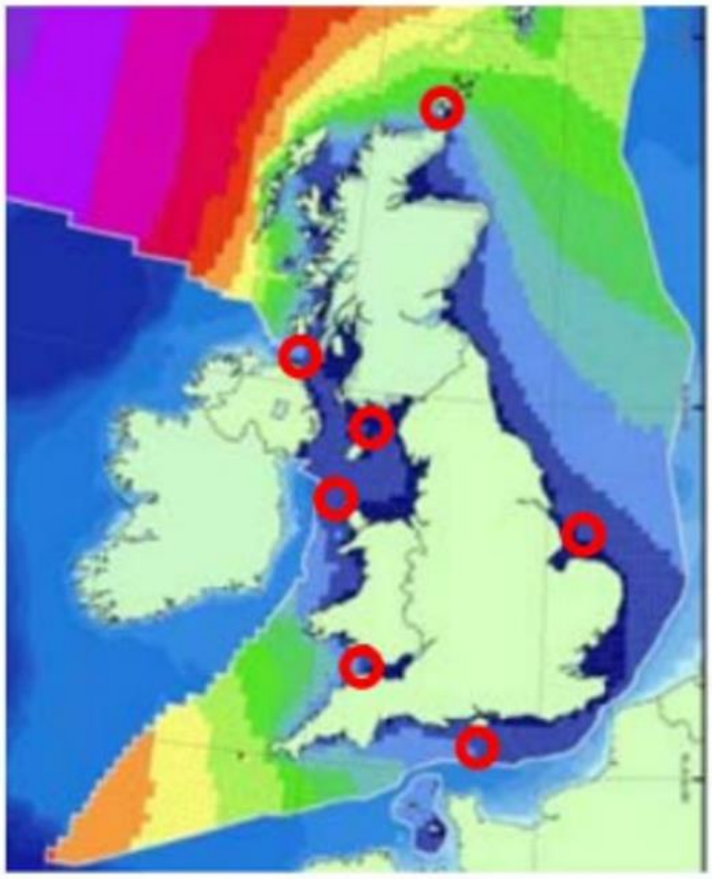
- they assess the risk their technology will not work
- they assess the risk they can raise the construction financing
- they assess the risk they can deliver projects to time and budget

So the question is why have developers not been developing new projects (other than the speculative investment in Tidal Lagoon Swansea Bay ("TLSB") that looks to lose its investors all their money)? This note is in response to yet another enquiry into why investment is not forthcoming, and we repeat the analysis and advice we have proffered to BEIS over the years:

On the positive side:

(i) The CfD mechanism is an eminently investible structure because it eliminates market-price risk from the developer's perspective. In the last round of awards, off-shore wind schemes have been bidding below the market price – i.e. a negative subsidy, immediately paying the Treasury rather than taking support from the Treasury – because of the value of this risk-elimination device.

(ii) The potential for production is significant: It has been estimated [#5] the total UK tidal barrages and lagoon potential as 60GW of capacity and 120TWh of electricity a year (UK total 425 TWh p.a.) - i.e. some 30% of current electricity demand.



Red circles show some of the most significant tidal power sites.

House of Commons Library Briefing Paper #7940 June 2018

On the negative side there is no clarity from Government as to

(a) what price developers might achieve at the end of the (7+years) development and bringing a new plant 'on-line'; nor
(b) the process of selection between competing new technologies (assuming new tech does not have to compete with mature tech which would be a non-starter); nor
(c) the timeliness of the decision making, nor
(d) certainty that policy on the above issues will be adhered to.

In Jun 2019 the UK became first major economy to pass a net-zero emissions law. To achieve this, the Government has to foster a balance of green energy production sources rather than take technology bets. And there is a great need for new tech: "The energy sector will only reach net-zero emissions if there is a significant and concerted global push to accelerate innovation" [#6].

Repeating the mantra of the need to see "Value for Money" (that was used to deny TLSB's pitch for a CfD of £168/MWh [#7]) will simply not be enough to encourage investment in tidal range projects. We believe it is necessary for Government to ***publish*** a clear policy for encouraging new generation technology.

Our suggestion is something along the following lines

(A) Set up 2 ring-fenced Support Schemes; one for new technologies with an asset life of <30 years and another for assets with a life of >30 years
(B) Set a limit for the number of times a particular technology could participate in the (relevant) ring-fenced Scheme.
(C) Set a limit on the total subsidy each ring-fenced Scheme will bear. This can be in MW capacity or better in TWh p.a. delivered into the grid.
(D) Set the basis for decision making between applications: this could be 'first-come-first-served' to foster competition for developers to 'get on with it' or in auction rounds as is the custom for the developed technologies. Timely decision making is of the essence[#7] under whatever regime is decided on.

(E) Set the conditions precedent – e.g. planning approval obtained and an in-principal agreement with the relevant Crown Estate in place. Additionally, consider setting a minimum of local content – e.g. at least [50]% of the construction costs to be spent with UK companies.

(F) Set the price level of support for the energy being delivered into the grid. This could be a figure; e.g. £[70]/MWh. Alternatively, if a fixed price is deemed too (politically) risky, set a premium to the prevailing market price; e.g. [33]% above the average price in the wholesale market in the [3] months before the award.

(G) Set the time limit; e.g. the Support Schemes will be in place for a guaranteed period of [10] years. How the Government gets the developer community to believe "guaranteed" means what it says, given history, will be a challenge for Government to overcome.

If these issues are known, developers can assess the risk that their technology will meet the criteria and decide to pursue investment….or not. If these issues are not known, investors will seek more promising opportunities elsewhere.

It is worth noting that the quantum of support will likely be less than the amount contracted under the Support Schemes because some projects are likely to be abandoned; e.g. lead times are too long or costs prove to be too high. Until construction contracts are signed, costs are only being estimated! But these are risks developers bear; the Government should not be in the business of underwriting execution risks! If the project is abandoned no subsidy will be paid. This approach should also minimise political risk because the criteria are set out clearly and the level of subsidy is limited.

CONCLUSION

Without some specific policy, the development of tidal range power will continue to flounder in the UK. Over two years ago, Tidal Electric had joined with Ecotricity, the UK's leading green energy company, and DEME, one of the world's leading marine engineering companies, and advised by Green Giraffe, the UK's leading renewable energy financial adviser, to pursue a first-of-its-kind project in the Solway. But without transparency on what value the electricity might generate when supplied to the grid, our partners decided the political risks were too high and, as rational companies, could not invest and the project has stalled.

The UK has an inventive industry with support from academia and has/had strong engineering prowess. Additionally, there are centres of excellence across

the country in understanding the marine environment e.g. Lancaster, Liverpool, Cardiff. The hardware for marine energy projects is hard to export – the barriers of entry to manufacture locally are low – but development of the 'software' would allow the UK to become the centre of knowhow that could be exported across the world: as yet, despite plants in France and S. Korea, there is no country that has that reputation.

Without decisive action we risk losing this leading role, as we did with the wind industry[#8], which set up centres of excellence in Denmark and Germany, when the UK Government adopted a 'wait and see' approach when first pitched by the nascent wind industry some 30 years ago.

In addition, we will lose the ability to introduce a reliable, dispatchable and predictable source of renewable power and broaden the portfolio of energy generation capacity our country relies on.

[#1] Bloomberg Green 27th Jan 2020

[#2] IPP Journal 21st July 2020

[#3] TMF 5th September 2020

[#4] The first commercial wind farm was built in 1991 at Delabole in Cornwall.

"The LCOE of wind power declined by a factor of more than three, from more than $150/MWh to approximately $50/MWh between 1980s and the early 2000s " from the National Renewable Energy Laboratory; IEA Wind Task 26: The Past & Future Cost of Wind Energy 2012

[#5] The UK Wave & Tidal Key Resource Areas Report; The Crown Estate October 2012

[#6] IEA Jul 2020

[#7] National Infrastructure Assessment, July 2018: TLSB submitted their proposal for a CfD in 2013 that was investigated by the Hendry Commission in 2016 and was finally rejected in June 2018.

[#8] The largest wind turbine in the world in 1980 was in Orkney