BEIS statement on Swansea Bay Tidal Lagoon 10 July 2018

Calculations and assumptions

#	BEIS statement	Assumptions	Rebuttal
1	The proposed tidal lagoon at Swansea Bay would have a capital cost more than 3 times as much, per unit of electricity, as the Hinkley Point C nuclear power station.	Simple calculation of capital cost divided by units of electricity produced per year. Note BEIS assumes 520GWh/yr for Swansea Bay (actual 570GWh as stated by Hendry).	Annual analysis – does not account for the fact that tidal lasts twice as long as nuclear (120 years vs. 60 years). Accounting for asset life takes 3.1 times the cost down to 1.5 times the cost for Swansea Bay. Applying this logic to a tidal plant that is not a pathfinder, such as Cardiff, derives a ratio of 1.0 (large scale lagoons are the same cost as nuclear).
	3 times	Correct answer:	1 times
2	It would cost only around £400m to use offshore wind instead to generate the same power as the proposed £1.3bn lagoon at Swansea Bay.	Analyses 60 years of supply. Offshore wind is assumed to last for 25 years and cost £1,486/kW. The load factor is assumed to be 50%.	The "BEIS Electricity Generation Costs November 2016" states the department's own assumptions for the costs of different generating technologies. For offshore wind commissioned in 2025 it states a lifetime of 22 years, a 48% load factor and a capital cost of £2,100/kW (middle scenario). An analysis of offshore wind farms (two recently built and two recently awarded CfDs yet to be built) gives a capacity weighted average capital cost of £2,888/kW. Using BEIS assumptions brings the comparable cost of providing 60 years of Swansea Bay's output from £400m to £776m. Accounting for the fact that tidal lasts 120 years, this brings the actual comparable cost of supply from offshore wind to £1,553m as opposed to Swansea Bay's £1,315m.
	£400m	Correct answer:	£1,553m
3	The entire proposed programme of tidal lagoons – consisting of 6 lagoons – would cost approximately 2 and a half times the cost of Hinkley, to produce around the same amount of electricity.	Hendry states 6 lagoons will produce 30.1TWh per year. BEIS states that Hinkley will produce 26TWh per year. Capex of 6 lagoons is £53.4bn as per Hendry. BEIS states Hinkley capex is £20bn.	Even taking the BEIS approach, the result is not 2.5 times the cost but 2.3 times when correcting for accurate output figures for both power stations. Accounting for the fact that tidal lasts twice as long as nuclear, the cost of tidal is 1.2 times the cost of nuclear. This does not account for risk transfer to the public via decommissioning costs, fuel scarcity risks, safety risks, state security

#	BEIS statement	Assumptions	Rebuttal
			risks, waste processing costs, regeneration benefits or cost curve opportunities on tidal lagoons. Note nuclear waste processing currently costs UK taxpayers £3bn per year.
	2.5 times	Correct answer:	1.2 times
4	Enough offshore wind to provide the same generation as the proposed programme of lagoons is estimated to cost at least £31.5bn less to build.	Analyses 60 years of supply. Offshore wind is assumed to last for 25 years and cost £1,236/kW. The load factor is assumed to be 50%.	The "BEIS Electricity Generation Costs November 2016" states the department's own assumptions for the costs of different generating technologies. For offshore wind commissioned in 2025 it states a lifetime of 22 years, a 48% load factor and a capital cost of £2,100/kW (middle scenario). An analysis of offshore wind farms (two recently built and two recently awarded CfDs) gives a capacity weighted average capital cost of £2,888/kW. Using BEIS assumptions brings the comparable cost of providing 60 years of equivalent output with offshore wind to £12.4bn less than with a fleet of tidal lagoons. Accounting for the fact that tidal lasts 120 years, this brings the actual comparable cost of supply from offshore wind to be £28.5bn more expensive than a fleet of tidal lagoons.
	£31.5bn less	Correct answer:	£28.5bn more
5	The entire proposed programme of tidal lagoons could cost up to £20 billion more to produce the same quantity of electricity compared to generating that same electricity through a mix of offshore wind and nuclear.	Unclear whether analysis is based on BEIS DDM system model or capex based calculations as points 1-4.	Analysing capital costs only: using BEIS assumptions over a 60 year basis it would cost £21.3bn more to build a fleet of tidal lagoons than a 50/50 mix (on an output basis) of offshore wind and nuclear. Accounting for the fact that tidal lasts for 120 years, it would cost £10.7bn less to build a fleet of tidal lagoons compared to a 50/50 mix (on an output basis) of offshore wind and nuclear. On a full system costs basis, an independent UK electricity system modelling study (carried out by Aurora Energy Research in September 2016) showed that replacing Hinkley with wind or tidal would both require the same amount of additional system spending and that replacing Hinkley with tidal achieves a greater carbon reduction than replacing Hinkley with wind.
	£20bn more	Correct answer:	£10.7bn less

#	BEIS statement	Assumptions	Rebuttal
6	The proposed programme of tidal lagoons could cost the average household consumer up to an additional £700 between 2031 and 2050.	BEIS have not disclosed either modelling assumptions (specifically what the base scenario against which "additional" spending is measured) or the financial structures assumed for tidal lagoons. Therefore figure cannot be verified.	The developer behind Swansea Bay commissioned an independent electricity system modelling study to assess the full system impacts of a fleet of tidal lagoons. This fleet included 10 sites and 25.3GW of tidal capacity in total. The study was carried out by Aurora Energy Research in September 2016. The study concluded that a portfolio of 10 tidal lagoons would cost consumers an additional £8.50 per year on their bills. Over the period 2031-2050 this equates to £170 per UK household. Tidal lagoons also reduced spending in the Balancing Mechanism and the Capacity Market due to their reliability and the complementary phasing of generation cycles of projects around the coast. As a comparison Hinkley will add £10-15 per year to bills (source: NAO). This equates to £200-300 per household 2031-2050. Scaling the costs of Hinkley to deliver the same equivalent electricity as a portfolio of 10 tidal lagoons brings the cost to £277-415 per household 2031-2050.
	£700	Correct answer:	£170
7	The additional cost of this proposal on household bills is the same as every household in Wales paying £15,000.	BEIS have not disclosed the financial structures assumed for tidal lagoons therefore figure cannot be verified.	UK consumers pay the cost of CfD subsidies. To present the costs of CfDs as being borne by Welsh households only is deliberately emotive, misleading and purely notional.
	£15,000	Correct answer:	N/A
8	*GC quote: "Decommissioning costs of £1bn."*	Unverified figure – no evidence presented.	In November 2014 the developer behind Swansea Bay submitted evidence to a BEIS consultation on the decommissioning of tidal lagoons. As part of this submission it put forward proposals for a decommissioning strategy involving partial removal of the structure which was costed using an evidence based exercise at £40m in present undiscounted terms. Further to this a £50m perpetuity fund was also proposed to provide ongoing maintenance of the remaining infrastructure. Both these funds were reserved for in the financial model accompanying a formal offer to BEIS in June 2016. No response from BEIS to the November 2015 evidence submission was received by the developer.

#	BEIS statement	Assumptions	Rebuttal
			By comparison, decommissioning costs for Hinkley are estimated at £7.3bn in present undiscounted terms.
	£1bn	Correct answer:	£40m
9	*GC quote: "Independent advice concluded that the civil engineering used in Swansea Bay offers limited scope for innovation and capital cost reduction – estimated at 5% - in the construction of subsequent facilities."*	Unverified figure – no evidence presented.	The first full scale tidal lagoon at Cardiff requires 2.2 times the length of bund wall as Swansea Bay and has a capital cost of 6.2 times that of Swansea. In return it captures 11.6 times as much water and produces 10.2 times as much electricity. These economies of scale represent a capex/energy output cost reduction of 36% on the second project alone. This is not achieved through assumed supply chain, learning or increased productivity, it is simply driven by geometric ratio. Other improvement on top of that is additional.
	5%	Correct answer:	36% via geometry plus learning