Department for Business, Energy & Industrial Strategy

TLP Tidal Lagoon Programme: Factsheet

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.

The tidal lagoon proposed for Swansea Bay is estimated to have an annual electricity output of around 0.52 TeraWatt Hours (i.e. 0.52 billion units of energy). The developer's estimated capital cost is £1.3bn.

The annual power output of Hinkley Point C will be 26.1 TeraWatt Hours. The developer's estimated capital cost is £19.6bn, which we have rounded up to £20bn to simplify calculations.

Using these figures, Swansea Bay's cost - in terms of capital cost pounds per unit of electricity - is £1.3bn / 0.52 TeraWatt Hours. This gives a ratio of 2.5.

The equivalent figure for Hinkley Point C using the same calculation would be £20bn / 26TWh, which gives a ratio of 0.8.

The capital costs per unit of annual power output for Swansea Bay tidal lagoon are therefore more than three times that of Hinkley Point C (2.5 / 0.8 = 3.1)

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.

Over a 60-year period, the annual output of Swansea Bay outlined above would generate 30 TeraWatt Hours. This would come at a capital cost estimated by the developer of £1.3bn.

To produce the same electricity output each year using offshore wind would require only 120MW of built capacity, as offshore wind generates power around 50% of the time in comparison to Swansea Bay's 19%.

Offshore wind plants, however, have a lifetime of 25 years. In order to keep generating for 60 years they would need to be rebuilt around 1.4 times in addition to the original installation (for a total of 2.4 builds). A total of 288 MegaWatts of Offshore wind would therefore be needed over the 60 years – the original 120Mw of capacity built 2.4 times.

BEIS' capital and infrastructure cost estimate for offshore wind plants commissioning in 2024 – the same year that Swansea Bay tidal lagoon would begin generating – is £1,486/kW. 288MW of capacity would therefore cost around £400m. This assumes no further cost reductions for offshore wind beyond 2024.

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.

The Hendry Review estimated the total cost of lagoon programme at around £50 billion.

Hinkley Point C is capital costs are estimated by the developer to be £19.6 billion, rounded up to £20 billion.

£50bn is 2.5 times £20bn.

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.

The full lagoon programme is estimated by the Hendry Review to generate 30TWh per year. Over a 60-year period this would provide around 1,800TWh.

To produce the same electricity output each year using offshore wind would require 6-7 GigaWatts of installed capacity, accounting for the fact offshore wind generates power around 50% of the time.

Offshore wind plants, however, have a lifetime of 25 years. In order to keep generating for 60 years they would need to be rebuilt around 1.4 times in addition to the original installation (for a total of 2.4 builds). Approximately 15 GigaWatts of offshore wind would therefore be needed over the 60 years – the original 6-7 GigaWatts of capacity built 2.4 times.

BEIS' capital and infrastructure cost estimate for offshore wind plants commissioning beyond 2030 is 1,236/kW. This is the period when all but one of the proposed lagoons would be built. 15GW of offshore wind would therefore require around £18.5bn of capital expenditure.

The £50bn estimate made by the Hendry Review for the full programme of lagoons is £31.5bn higher that this estimate for onshore wind.

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.

Analysis undertaken by BEIS shows that a full programme of tidal lagoons is more expensive than either offshore wind or nuclear.

A full programme of tidal lagoons would increase power system costs by up to £20bn to 2050 in 2012 prices, in net present value terms.

The proposed programme of tidal lagoons could cost the average household consumer up to an additional £700 between 2031 and 2050.

Household bill analysis undertaken by BEIS shows that the full programme of tidal lagoons could increase the average household electricity bill by up to £35 per year between 2031 and 2050 (2012 prices, undiscounted).

The total cost to the average household electricity billpayer over this 20-year period would be £35 x 20 years = £700.

The additional cost of this proposal on household bills is the same as every household in Wales paying £15,000.

BEIS' Energy and Emissions Projections estimate that there will be 32 million households by 2030.

At an estimated average cost for the lagoon programme of £700 per household consumer between 2031 and 2050, this produced a total bill to households of just over £22bn.

If this cost were to be borne by the 1.5 million estimated Welsh households by 2030 (using the same projections), the cost per household would be £14,933 each (in 2012 prices). This is rounded to £15,000.

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