



BEIS consultation on Regulated Asset Base (RAB) model for nuclear

This is a response submitted on behalf of Tidal Range energy project developers and the British Hydropower Association

BEIS has issued its paper on a Regulated Asset Base (RAB) Model for nuclear for consultation.

Response

This response is made on behalf of several tidal range development consortia and the BHA. Tidal range includes both tidal lagoons and tidal barrages.

Tidal Energy and Environmental Services Limited

This company is developing the West Somerset lagoon which is a scheme in the Bristol Channel that would have an installed capacity of 2.5 GW, which is comparable with Hinkley C at 3.2GW, an output of about 7 TWh/y, and a capital cost of about £7bn.

The North Wales Tidal Energy & Coastal Protection Co Ltd (NWETE)

This scheme has an installed capacity of 2GW at a cost of some £7bn and has other benefits including coastal protection for infrastructure, businesses, and communities along the North Wales coast.

The Mersey Tidal Commission

For its tidal range schemes there is planned an installed capacity of between 1GW and 4.2 GW.

The Northern Tidal Power Gateway

For its Morecambe Bay and Duddon schemes there is planned 4GW of power capacity with around £10bn of capital cost.

All these schemes would have a design lifetime of about 120 years

There are as well, around a dozen other comparable tidal range schemes¹ being considered, including significant refinements to the Severn Barrage scheme.

This is a non-confidential response and so it can be published.

Need for an increased and diverse energy mix.

*"There will need to be a substantial increase in low carbon generation- the Committee on Climate Change estimate a four- fold increase may be needed."*²

Following the power interruption at 5PM on 9th August 2019, which impacted hundreds of thousands of people, Andrea Leadsom, the Secretary of State for Business, Energy and Industrial Strategy said *"Friday's incident does however demonstrate the need to have a diverse energy mix."*³

*"We are also considering whether a RAB model could be applied to other firm low carbon technologies such as transport and storage infrastructure for carbon dioxide."*⁴ Thus it would appear that BEIS is open to consideration of some other similar renewable energy schemes.

Similarities between Tideway tunnel, nuclear, and large tidal range power

There are many similarities between the Thames Tideway tunnel, nuclear power and large tidal range power. Quoting from the consultation paper - *"A large-scale new nuclear project bears some similarities with the Thames Tideway Tunnel (TTT) in that it is a complex single asset construction project with a significant upfront capital expenditure requirement, long construction period and a long asset life."*⁵

Indeed I chaired the Thames Tideway Strategy Steering Group for 5 years that analysed the alternatives and selected the tunnel, thus can vouch for these features.

The tunnel capital cost was £4.2bn, the construction period about 8 years, with an asset life of over 120 years. Large tidal range schemes would have a capital cost of about £4-10 bn and a construction period of around 6 years. These schemes would be similar to the Thames Tideway tunnel.

Large tidal range schemes, such as the Severn Barrage were rightly considered by DECC [now BEIS] to result in large loss of intertidal habitat. By changing from ebb

¹ Hendry, The role of tidal lagoons December 2016 table 6 page 65.

² RAB consultation para 5.

³ Infrastructure Intelligence 15/8/2019

⁴ BEIS RAB model for nuclear . Consultation. July 2019 para 20.

⁵ RAB consultation para 25.

only generation to ebb/flood generation with pumping, it is now possible to replicate basin water levels and this problem has large been eliminated.

There was also concern about mortality of fish. By reducing the number of turbine blades and having non-synchronous generation this potential impact has been considerably reduced.

It is therefore believed that stakeholders would now be largely supportive of use of an obvious natural asset by most large tidal range schemes.

In any case a large tidal range scheme, being largely a water based civil engineering project, would be closely similar to the Tideway tunnel.

In addition we believe that society/community, recognising the untapped power in the tides of the likes of the Severn Estuary, will support tidal range energy.

In contrast we believe that a nuclear power station has much less affinity to the water sector and the Tideway tunnel. Further, we believe that little progress has been made on long term nuclear waste disposal and that this would continue to be the case with the community/society.

"In order to raise the amount of finance required, Government would need to provide a GSP offering protection to investors for specified low probability but high impact risks that the private sector would not be able to bear-either at all or at an efficient price (as was the case for TTT).

*The GSP would also protect consumers from exposure to these risks. Examples of specific risks that might be protected by a GSP are (a) risk of cost overrun above a remote threshold, (b) disruption to debt markets, (c) certain risks for which insurance is not available in the market, (d) political risks."*⁶ Both nuclear and large tidal range will need this support.

Therefore it appears there is no fundamental reason why, if the RAB is applied to nuclear power schemes, it should not also apply to large tidal range power schemes.

We understand from Tidal Lagoon Power⁷ that the Treasury agreed to a RAB system for the Swansea Bay Tidal Lagoon in 2015, but held back because of the time it would take to set up the system. If it were set up for nuclear then that should no longer be an issue for tidal range.

⁶ RAB consultation paras 27 and 28.

⁷ Email Shorrock/Binnie11th October 2019 @ 15.40

Consideration of application of RAB to other power sources

*"We know from the development of other low carbon technologies that innovation is most effective when accompanied by supportive policy, including sustainable business models that can stimulate private investment."*⁸ Large tidal range power needs supportive policies including a RAB financing model.

*"We are also considering whether a RAB model could be applied to other firm, low carbon technologies..."*⁹ "firm" is defined as always available.¹⁰

There is no explanation of the logic of proposing to limit the RAB model to so called firm power.

A RAB system requires an economic regulator. In the case of the water industry this is OFWAT. It also requires periodic assessment of the costs and charges - in the case of the water industry every five years.

These assessments are normally based on the construction, operation and maintenance costs of the utility company and a weighted cost of capital. This is fairly complex but such complexity is well worth the benefits for a high cost, long term asset such as the Tideway tunnel, a tidal range scheme, or a nuclear power station.

It would normally be over prescriptive for small short asset life schemes, therefore we believe the consideration of what a RAB should be applied to is to large capital cost, long life power schemes such as large tidal range schemes.

Firm power

Tidal range power is predictable months and many years ahead.

The time of high water varies around the coast. Thus a tidal range scheme in the Severn estuary and another on the northwest coast would provide continuous power at spring tides and near continuous at neap tides.

This has been studied and reported on by Cardiff University¹¹. The predictable maximum no generation gap at neap tides would be about 2 hours. Power output would be predictable, and generate about 96% of the time (studies of this are continuing to see how this could reach 100%, i.e. firm power).

⁸ BEIS Business models for carbon capture, usage and storage July 2019 page 44.

⁹ RAB consultation para 20.

¹⁰ RAB consultation para 6.

¹¹ Cardiff Uni. Tidal range combination case 6 6th October 2019.

Such a short gap could readily be covered by an existing pumped storage scheme such as Dinorwig or the scheme could include batteries to cover this short period. Both methods would produce firm power.

In contrast, it should be noted, that the two major renewable power sources, solar power and wind power, cannot provide any firm power, but both have an important part to play in providing a diverse energy mix.

Wind power however is, by its nature, not predictable. Also, both solar and wind power have relatively short construction periods and operational lives in the order of 20 to 30 years compared to the Tideway tunnel and tidal range of up to 120 years.

Storage

It is interesting that the only other sector currently being considered for RAB financing is “gas with carbon capture, usage, and storage” In that case the gas power station generates carbon dioxide, tries to capture all of it, and then sends it to very long term storage, measured in millennia. Similarly nuclear requires very long term storage of nuclear waste. In the case of large tidal range schemes, all that is required is some short term, an hour or so, storage of electricity with no waste.

A number of tidal range schemes are exploring the integration of compressed air, hydrogen and other energy storage technologies to capture power generated at unwanted times and minimisation of the no generation period.

Cost comparison

Aurora carried out power sector modelling for NIC in 2018. As an illustration, that compared tidal with “anything goes” at 40% renewable in 2050 and found that there was little difference in overall cost.¹² In addition it would appear that the AURORA energy outputs were taken from the Hendry report¹³. These have been compared them with those in the itp supporting technical report.¹⁴

The itp energy outputs were calculated by using 0-D models without the benefits of more energy from recent AI optimisation, pumping, and the more efficient triple regulated turbines. Thus the tidal energy unit cost would almost certainly decrease and tidal range energy becomes more competitive.

Financing

“Despite the progress at HPC, the challenges facing the global nuclear industry have meant that replicating a CfD model for further new nuclear projects has proved very

¹² Aurora Power sector modelling: System cost impact of renewable May 018 page 72

¹³ Charles Hendry The role of tidal lagoons. Final report. December 2016. Table 2 page 67

¹⁴ Itp Technical advisor support to independent review of tidal lagoons November 2016 Table 5-3 page 72

challenging. few project developers have a balance sheet that can accommodate the £15-20bn cost of delivering a new nuclear project and financial investors have been unwilling to invest during the construction phase given the long construction period and risk of cost increases and delays."

Whilst large tidal range schemes are in the range of £4-10bn are somewhat smaller in cost, they do have a not dissimilarly cost, a similar long construction period. They have a limited track record of cost prediction and delivery timescale but all the elements are well practised civil engineering procedures.

*"Our assessment has concluded that a RAB approach could present a sustainable and value for money model for funding new nuclear projects."*¹⁵ Or other similar power projects such as large tidal range projects.

*"These include raising the scale of capital required and establishing an appropriate risk sharing arrangement between the project company, the supply chain, investors, taxpayer and energy suppliers and consumers."*¹⁶ This is true, and almost identical with large tidal range schemes.

RAB system

A RAB system would require the establishment of an economic regulator for the power sector. Once established for the nuclear power sector it should be straightforward to extend that economic regulation to cover large tidal range schemes as well.

We believe that with a RAB financing model, including sufficient support from government such that the relevant and expensive studies can be financed, large tidal range schemes can compete with off-shore wind when all cost elements are taken into account.

Conclusion

This group supports the RAB system being instituted for the nuclear power sector and request that tidal range power can also be included for consideration of RAB financing.

Specific consultation questions

The following consultation questions are answered as if either nuclear or large tidal range is involved.

¹⁵ RAB consultation para 18.

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Question 1 - Have we identified a model which could raise capital to build a new nuclear power station and deliver value for money for consumers and taxpayers?

Both nuclear and tidal range has problems raising capital because of their similar features. The RAB model should enable that to be done for both types of power scheme. This should enable the exposure for taxpayers to be limited to remote events and provide electricity for consumers at an affordable price.

The calculation of value for money should -

- Include cross-department benefits delivered by tidal range schemes such as coastal protection and transport infrastructure.
- Take into account the very long potential lifespan of tidal range schemes (in excess of 100 years)
- Recognise that it is extremely unlikely that any tidal range scheme is likely to require expensive and complex decommissioning at end of life.

Question 2 - Do you have any comments on the components of the Economic Regulatory Regime as described?

No.

Question 3 - Do you have views on how consumer interests are protected under the proposed approach? What else should be considered to protect consumer interests?

Consumers are primarily interested in the cost and reliability of electricity supply. Cost would be controlled by the same economic regulator for both nuclear power and large tidal range power. Reliability and predictability in operation for both types of scheme are high.

If any maintenance is required on the tidal range turbines, and as there would be of the order of about 100 of them, the loss of one for maintenance would be minimal.

The same is true for replacement /updating of turbines as technology improves during the period of operation of the tidal range scheme.

Question 4 - Do you agree that consumer risk sharing could be value for money for consumers if it achieves a lower expected overall cost for consumers compared to a Contract for difference model?

Because private sector financiers are very risk averse we would expect that both nuclear and tidal range schemes, such as the Thames Tideway tunnel, would result in considerably lower cost for consumers, even after taking account of the risk elements effects. As an example with normal private sector finance, the Thames Tideway tunnel was assessed to require a charge of £70-£80/household/years. With RAB financing this was reduced to about £25/householder/year.

Question 5 - Do you have views on the potential way to design a revenue stream for a nuclear RAB model that we describe, and are there alternative models we should consider?

The RAB model used in the water industry, similar to that applied to the Tideway tunnel, has worked reasonably well for three decades, albeit with adjustments from time to time by the Regulator to adapt to government policy and social change. Such a model should be equally appropriate for a nuclear and large tidal range scheme.

Question 6 - Do you have views on our approach to assessing new nuclear project under a nuclear RAB model and determining whether it is value for money for consumers and taxpayers?

The approach should be equally applicable to both nuclear and large tidal range.

In conclusion, this group supports the proposal that RAB should be applied to nuclear power. However, as well, we firmly believe that RAB funding method is even more applicable to large tidal range energy schemes and would have far greater community and stakeholder support.

We very much hope that BEIS will consider that RAB funding should also be applied to tidal range power schemes and look forward to the response and future engagement on this very important issue

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14th October 2019.