

**RESPONSE TO DEPARTMENT ENERGY AND CLIMATE CHANGE,
SOUTH WEST REGIONAL DEVELOPMENT AGENCY, WELSH
ASSEMBLY GOVERNMENT CONSULTATION**

SEVERN TIDAL POWER: PHASE ONE CONSULTATION

SUMMARY

The Environment Agency welcomes the opportunity to respond to the consultation into the feasibility of generating electricity from the tidal energy of the Severn Estuary. Reconciling the need to reduce greenhouse gas emissions, meet renewable energy targets, and maintain a reliable and secure supply of energy for the UK whilst protecting the environment will present many difficult decisions. We will continue to provide expertise and advice to the project to make sure that Governments can make the best possible decisions based on strong evidence.

Climate change is the most significant challenge the UK faces. Urgent action is needed now to ensure that the UK's future energy supply results in very low levels of greenhouse gas emissions. We support the development of appropriate energy schemes in the Severn Estuary and elsewhere to secure the reduction in greenhouse gas emissions required by 2050; the particular tidal movements of the Severn have a clear potential for the development of renewable energy.

The Severn Estuary is however a unique natural environment. The bird and fish habitats in the estuary and its tributaries are among the most important in Europe. We believe that compliance with the Habitats Directive, particularly with respect to migratory fish, is the most difficult challenge for any potential project in the Severn Estuary. All of the options included in the short list will result in changes – some irreversible - to designated habitats and species.

Given the potential impacts on the environment, Governments must make sure that any energy development in the Severn Estuary is justified both by its contribution to greenhouse gas reduction and energy security, and by how it keeps habitat impacts to a minimum.

We welcome Governments' commitment to technological innovation in the tidal energy sector. There is a real opportunity for the UK to lead the world in the development of innovative tidal energy technologies resulting in green jobs and investment. Governments will need to ensure that financial and regulatory frameworks support the development of these technologies. We understand that the terms of reference of the Severn Tidal Power study limit the assessment to the consideration of tidal range schemes such as barrages and lagoons. We believe that tidal stream technologies may also have potential for future deployment in the estuary if their development can be accelerated.

Many investigations are proposed in phase two of the project. By 2010 however, many issues will still remain unresolved. These represent significant sources of uncertainty, which taken together, mean there is a risk of unforeseen environmental consequences.

1.0 INTRODUCTION

- 1.1 As Governments' principal advisor on the environment in England and Wales, we play a major role in the sustainable management and protection of estuaries. We are responsible for the management of migratory fish, flood risk, the regulation of abstraction of water from rivers and the quality of water in rivers and coastal areas. We also own land, including an extensive area along the banks of the Severn Estuary in North Devon.
- 1.2 Many of our comments on the first phase of the Severn Tidal Power project have been addressed in this consultation document. We look forward to providing continuing support to the project.

2.0 CLIMATE CHANGE

- 2.1 Climate change is the biggest threat the UK faces. Urgent action is needed now to ensure that future energy supplies in the UK result in very low levels of greenhouse gas emissions, if dangerous climate change is to be avoided.
- 2.2 Achieving the necessary greenhouse gas reductions will be challenging for the UK. We acknowledge that renewable energy sources should play a significant role in achieving this. We believe that the development of tidal power from the Severn is only one of many low-carbon supply options to be considered by Government.
- 2.4 Energy saving must also play a prominent role. We believe more must be done to engage consumers in the climate change debate and help them make informed decisions about reducing their energy use.

3.0 THE NATURAL ENVIRONMENT

- 3.1 The Severn Estuary is one of Britain's largest estuaries. It covers 55,700 hectares, including 20,000 hectares of inter-tidal habitat and a 14.5 metre tidal range. Its combination of immense tidal range and classic funnel shape make it unique in the UK and rare worldwide. The Severn and its ten sub-estuaries represent about seven percent of the UK's total estuary resource.
- 3.2 The Severn Estuary provides a vital link in bird migration routes, for example between Africa and Siberia. The extensive inter-tidal habitat provides both an over-wintering ground and a stop-over for passing migratory species. It regularly supports over 60,000 over-wintering wildfowl, including over 50 percent of the British population of European white-fronted geese and 10 percent of dunlin.

- 3.3 A total of 25 percent of the salmon reproductive capacity in England and Wales is found in the rivers feeding the estuary, the most important being the River Wye. Three of only four rivers in the UK that support spawning populations of twaite shad flow into the estuary. The estuary also supports internationally important populations of eel, while the river Wye is the most important UK river for sea lamprey as is the river Usk for river lamprey. The estuary is of fundamental importance for a range of marine fish species, some of which have substantial commercial value. The estuary is an important over-wintering habitat for maturing cod and whiting that support stocks outside the area. These stocks are very low and current levels of fishing are considered unsustainable.
- 3.4 All of the short-listed options will result in changes – some irreversible - to the unique ecology of the estuary, and protected habitats such as the Sabellaria reefs. Such reefs are formed by large colonies of tube dwelling worms. All options would also restrict the access of migratory fish to the Rivers Wye and Usk and the other tributaries. The magnitude and scale of these impacts will vary depending on the precise details of location and mode of operation, for example the siting and shape of the lagoon option.
- 3.5 All of the short-listed options will have a significant impact on migratory fish. There are measures which could possibly mitigate some of the impacts. However, these are untried and their efficacy is uncertain. We welcome the work proposed in phase two to investigate these issues. Despite this, we believe it may prove impossible to compensate for any residual damage to fish populations. The scale of potential intertidal habitat loss will make it very difficult to identify and develop adequate sites for compensation.
- 3.6 The Severn Estuary and Rivers Wye and Usk have been recognised as internationally and nationally important, and are designated under the Habitats and Birds Directives and Ramsar Convention as well as being SSSIs. The project will also have to comply with the requirements of the Water Framework Directive. We believe that compliance with the Habitats Directive, with respect to migratory fish in particular, is the most important and difficult challenge for any potential project in the Severn Estuary.
- 3.7 The impoundment schemes are likely to change the flood and sedimentation characteristics of the estuary and its tributaries. The effectiveness and asset life of existing flood structures may also change. The impacts may prove to be positive as well as negative and it is vital that the work proposed in phase two investigates all of the flood risk management issues in more detail.

4.0 INNOVATIVE TECHNOLOGIES

- 4.1 To date, traditional impoundment techniques have dominated the design of tidal energy schemes. These designs cause environmental impacts which are difficult to mitigate. It is disappointing that such designs are the only ones to make the shortlist.

- 4.2 There are other concepts, such as those provided by the reef and fence proposals, tidal stream technology and free standing lagoons that could be investigated. Some of these have attempted to include environmental needs into their design from the onset. We recognise that these alternative proposals are at a conceptual stage and will require significant development before they could be deployed.
- 4.3 Given its extensive coastline, we believe the UK should take advantage of the potential energy from the tides and establish our position at the forefront of innovative tidal energy technologies. There is an opportunity to build on the work that has already started in academic institutions around the Severn Estuary. This would create significant opportunities for investment and jobs. To secure these benefits, we believe Governments must facilitate the removal of barriers, such as planning processes and finance, to the development of this sector.
- 4.4 The short timescale for submission of proposals to the Severn Tidal Power study may have discouraged more innovative thinking. It is vitally important that emerging technologies and techniques are given encouragement and appropriate financial support to maximise their potential.
- 4.5 We welcome the £0.5 million from the Welsh Assembly Government, South West RDA and Defra to develop innovative technologies in the Severn. However, we believe this sum is too small to produce results in time to support decision making within the timescale of the project. As a matter of urgency, we believe Governments should ensure those companies expressing an interest in tidal energy technologies applicable to the Severn are able to draw on additional money from the £50 million Marine Renewables Deployment Fund.

5.0 ALTERNATIVES

- 5.1 In attempting to cover several government priorities, the terms of reference of the Severn Tidal Power study are rather imprecise. These are driven by a commitment to the EU Renewable Energy Directive; the Climate Change Act and any associated targets for 2050; and a general aspiration to deliver a secure supply of low-carbon energy. It is unclear which of these takes precedence. As a result, in considering the study as a plan for the purposes of Strategic Environmental Assessment (SEA), a difficulty is created in the consideration of alternatives as required by both the SEA and Habitats Directives. These Directives also require consideration of a “do nothing” option. To provide clarity on how to define alternatives, we recommend revision of the terms of reference of the project. We would suggest including clear project objectives and timescales related to the delivery of greenhouse gas emission reductions and contribution to the renewables target.
- 5.2 With the exception of the Cardiff-Weston scheme, alternatives for the four other schemes on the shortlist could be found in other less sensitive estuaries, through increasing investment in more cost-effective, proven, renewable technologies, or through other actions.

5.3 If the Cardiff-Weston scheme cannot be delivered by 2020, and thereby fails to contribute to the renewables target, more innovative technologies not currently shortlisted could become viable alternatives.

6.0 RISK AND UNCERTAINTY

6.1 The topic papers supporting the SEA highlight the gaps in our understanding of the environmental impacts associated with each option. There are many other unknown factors related to the engineering, legal compliance and financial dimensions of the project. As a consequence, an early decision to pursue a project will carry a high level of risk.

6.2 We support the study in its aim to gather information and assess the possible impacts of each short-listed project. The SEA will assess the impacts of each option in relation to specific topic areas. It is vitally important that a structured overview of all aspects of the project and their interactions is included. This will ensure that the process picks up the complex inter-relationships and inter-dependencies and informs the decision-making process.

6.3 At the end of phase two, many of the risks will be seen to be interrelated and together will create a degree of uncertainty for any chosen project. It will be important to document these risks and uncertainties to inform the final decision-making process.

FURTHER INFORMATION

Further information and background to this response can be obtained from Michael Evans, Strategy Manager, either by telephone on 02920 466116 or by e-mail at michael.evans@environment-agency.gov.uk

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Consultation Questions:**Overarching Questions (to be taken into consideration throughout the Consultation Document)****1. *Is the feasibility study taking the right issues into account?***

We believe the range of issues being considered is appropriate. However, we remain concerned that the assessment framework does not make it clear how environmental issues have been considered. The qualitative assessment of the environmental positives and negatives of each option does not appear to inform the subsequent analysis or creation of the short-list. It would be helpful if clear criteria related to the environment were included.

2. *Are there other aspects or other evidence that should be taken into consideration?*

We suggest the project draws on evidence from the construction and operation of the Bay of Fundy and La Rance tidal barrage schemes.

3. *Have we given due weighting to the different benefits and impacts under consideration in our analysis?*

We remain concerned that the environmental costs and benefits associated with all the options are not clearly set out. Hence, it is almost impossible to understand how assessment of the environmental impact of each scheme informed the final short list. The weighting given to environmental factors alongside energy yield and cost is also difficult to understand. The five schemes included in the short list will all result in significant changes to the unique habitats in the estuary and its tributary rivers. The magnitude and scale of the impacts will vary depending on the option. The energy yield and costs are also different. It is difficult to understand why some options have not been included in the shortlist, for example Minehead-Aberthaw, when the cost/kWh is broadly similar as that for Cardiff-Weston. Overall therefore, we are concerned that the environment has not been given sufficient weighting.

4. *Do you think that it is better to wait for new and perhaps less environmentally damaging technologies to be developed, or to move ahead more quickly with available proposals?*

Investing in cheaper, more reliable options to develop an electricity industry that avoids causing climate change, means that Governments may decide on a “do nothing” option in the Severn. We would suggest that a “do nothing” decision is defined in the narrowest terms – only in relation to the Severn Estuary and for a strictly limited period. In the meantime we should urgently initiate new studies to understand the dynamics of the estuary and its ecosystems and to fast-track investment in emerging tidal power technologies, including turbines. Such knowledge and understanding will assist the future design and operation of any tidal power scheme in the estuary.

If the decision is to go ahead with a Cardiff-Weston barrage, it remains unclear if this will preclude other more cost-effective and less environmentally damaging options from being deployed in the future. It is important that this issue is investigated in phase two of the project.

Regional Economic Impacts Study

5. ***Do you agree with the conclusions of the DTZ study and are there any other factors that the feasibility study should be aware of?***

We do not believe that the wider impact of the schemes on fish and fisheries has been fully considered. The Severn Estuary is important as a nursery area. These stocks support fisheries over a very widespread area. The DTZ study has confined its consideration of impact to the narrow geographic region defined. It is important to recognise that the value of fish and fisheries are not only reflected by employment and income in this region. We believe that it would be helpful to pull all the fish and fisheries evaluations together.

Financing and Subsidy Mechanism

6. ***Do you agree with PricewaterhouseCoopers' (PwC) analysis on ownership and delivery of a Severn scheme?***
7. ***Are there any other options for delivery or subsidy that should be considered? Would they be appropriate for all of the tidal power options under consideration?***
8. ***Government believes that the private sector is best placed to design, build and operate a Severn tidal scheme. Government's role would be to set the conditions in which a scheme could come forward. Do you agree?***

We would expect an operating agreement, setting out the day-to-day management regime of the scheme to minimise flood risk and any residual risks to the environment. We would expect to advise on the content of this agreement. We believe Governments should also stipulate a long-term social and environmental sustainability clause in any contracts to take account of any unforeseen environmental or social incidents that may disrupt the future operation of a scheme.

Impacts on Energy Markets

9. ***What are the impacts and potential risks of tidal intermittency on the balancing and energy market?***
10. ***Is it worth considering exploring the option of demand management?***

Managing the peaks in demand to match more closely the available supply will be essential in order to incorporate renewable energy into the grid. We also believe that it is absolutely essential that demand *reduction* is addressed. We

welcome the recent consultations by Government on energy efficiency, but believe more must be done. There must be immediate action to reduce our energy use now.

The public is not sufficiently engaged in the debate on climate change, the urgency of reducing greenhouse gas emissions and the energy choices we face. We believe that Governments have a key role to play in setting out these issues in an engaging way.

11. *Do you consider that a Severn tidal scheme could impact on investment in other energy supply capacity, and if so in what ways?*

Severn Tidal capacity may displace investment in other renewable generation. This alternative renewable capacity could well be both cheaper to buy and generally quicker to bring on stream than a tidal barrier. Moreover, this capacity comes in smaller packets and thus allows output to be more accurately tailored to meet demand.

Short-listing Process

12. *Do you agree with the factors that have been used to determine the short-list for further study?*

Yes, but as previously described, we do not understand to what extent the environment has been included in the assessment framework.

13. *Do you agree that the test of economic feasibility should be relative to the cost of other renewables?*

14. *Do you have any further comments on Parsons Brinckerhoff's Interim Options Appraisal Report? Please support your response with evidence where possible.*

Severn Tidal Power Proposals:

15. *Do you agree that the two lagoon options selected for further study represent a good basis for studying the lagoons?*

The siting of both lagoon options offer limited opportunity for a broader assessment of lagoon technology; an alternative location, shape and size for the lagoons could be helpfully considered, in order to minimise environmental impact.

16. *Given the short-listing criteria, are there any proposals on the short-list which are not suitable? Please support your response with evidence where appropriate.*

17. *Does the short-list represent an appropriate level of ambition given the energy potential of the Estuary?*

It is disappointing that only one option, the Cardiff-Weston scheme, exploits the full energy potential of the estuary.

18. Are there any other schemes that, in your view, should be short-listed?

It is disappointing that only limited funds are being made available for research into tidal reefs and fences. These potentially offer both energy gain and better environmental impact; and we recommend that research into – and consideration of – these technologies should be substantially strengthened.

Please provide appropriate evidence wherever possible and refer to the short-listing criteria.

Strategic Environmental Assessment

19. Which plans, programmes or environmental protection objectives are most significant for this strategic-level environmental assessment?

We suggest the following relevant Welsh plans and programmes be added to the list:

One Wales, WAG's Green Jobs Strategy, WAVE, Sustainable Development Scheme (consultation draft 2009), Making the Most of Wales' Coast, 2007 (ICZM strategy), Marine Bill (draft), Severn Estuary Strategy 2000, CHAMP, Salmon action plans for the Taff/Ely, Usk, Wye, Severn Estuary and River Severn.

The scoping report suggests that the Shoreline Management Plans (SMPs) and Catchment Flood Management Plans (CFMPs) will be used later. We believe the baseline information in these documents is relevant to the study now.

20. Is there any additional information that could help supplement the baseline data? Any further information relating to the baseline indicators, existing problems and trends over time would be very useful.

The current Department of Energy and Climate Change (DECC) Offshore Energy SEA should be added to the baseline data on other seabed users.

As well as further bird and levels data to inform the assessment of flood risk issues, further fish data needs to be collected in relation to marine stocks.

We recommend that further baseline information is included relating to people's connection with the estuary as a cultural and recreational resource. We appreciate that heritage trails are marked on maps within the scoping report, but we believe that the assessment would benefit from more baseline data to show the number of access points to the estuary, and the feeling of wellbeing obtained when by the coast.

We consider that the assessment would also benefit from more information about current levels of canoeing, sailing, kayaking, surfing, fishing and Severn Bore related tourism.

A noise and vibration baseline should be determined and include contributions from current dredging and aggregate extraction activities.

21. *Is there any important information that has not been addressed in view of the SEA scope?*

We support the need to delineate a study area, but strongly recommend that a wider scope is needed when dealing with ancillary development and indirect consequences. This is particularly important for developments related to the provision of construction materials such as stone. The impact on the communities from which such raw materials are sourced should also be considered. We suggest that this is covered under secondary/cumulative impacts.

We support the SEA including a full ecosystems valuation. However, we believe that it should include an assessment of the potential impacts and benefits of the proposals on the water resources of the River Severn and associated catchments. In particular, the SEA should look further into the impact of the proposals:

- on current licensed and un-licensed surface water and groundwater abstractions due to potential changes in water level and water quality
- on future water resource availability, and the benefits to future water resource availability, due to possible altered residual flow requirements to the estuary. Changes to residual flow requirements could increase the available water resources and benefits
- on water dependent conservation sites due to potential changes in groundwater and surface water level and quality changes
- in relation to changes in water quality, including nutrient enrichment, chemical quality, sediment characteristics, flow and mixing regimes. These studies should consider the use of the catchment as a source of drinking water and recipient of consented discharges. The further impacts of quality changes on water dependent conservation sites and general ecology should also be studied.

We suggest that the project considers the SEA of the tidal barrage in the Bay of Fundy, where the SEA ruled out any consideration of further barrage deployment.

Next Steps

22. *Do you agree with the work plan, as outlined in Chapter 6? If not please specify any other areas to be studied*

We are broadly content with the work plan set out in Chapter 6. It is important that the project considers now, the processes required to regulate the construction and operation of any scheme. We would advise that the regulation of any Severn Tidal Power scheme would have to be considered as a project, or a number of small projects. These would require Habitats Regulations Assessment for impacts alone or in combination with other plans and projects. We are concerned that insufficient time has been allocated during phase 2 to fully consider impacts on the environment.

ANNEX TWO - SEA CONSULTATION

General comments

We welcome DECC's intention to follow the 2005 ODPM Practical Guide to the SEA Directive. We also recommend that there should be reference to the Environment Agency's SEA Good Practice Guidelines available on our website at www.environment-agency.gov.uk/research/policy/32903.aspx and the SEA and Climate Change Guidance for Practitioners, also available on our website at http://www.environment-agency.gov.uk/static/documents/Research/seaccjune07_1797458.pdf.

Is the range of environmental problems, issues and receptors covered appropriate? Is the level of receptor sensitivity appropriate?

Please see our response to question 20.

Is the methodology proposed appropriate for this strategic-level environmental assessment?

We are generally content with the methodology for this strategic-level environmental assessment but consider that for comparative purposes a "do nothing option" should perhaps be included. We have already set out our concerns on the approach to alternatives adopted in the project to date. Under the Habitats Directive, alternative solutions to a project that will have adverse effects on designated European sites must be considered before proceeding on the basis of overriding public interest. Alternatives should include other projects in other locations and a "zero" option and thus it is important to be clear what the objectives of the project are in order to assess alternatives properly.

We are pleased that the SEA and Feasibility Study areas will extend beyond the main Severn Estuary, particularly in relation to the assessment of the effects to migratory birds and fish.

Are there any major plans or projects that should be included in the assessment of cumulative effects?

We are pleased that the study is picking up on the outputs of the Offshore Energy SEA. The project should also consider the emerging National Policy Statements and their Appraisals of Sustainability, particularly those on energy. This will ensure that the cumulative effects of the proposed developments are effectively assessed.

Local level plans or projects, such as the Swansea Bay Waterfront Masterplan should also be considered.

Are there any changes that should be made to the proposed SEA objectives; including any consolidation of the objectives? Are there any other SEA objectives, assessment criteria or indicators that should be included?

We suggest rationalising the objectives and checking that they relate directly to the issues by comparing the two tables (table 7.1 and 8.1). Several objectives can be grouped together, for example, SE1, SE2, SE5, SE6, SE8 and SE9 under SE3 as they all relate to sustainable communities. The ecology objectives do not need to be split into designated, valuable and other protected habitats and the same for species. We suggest that these areas are combined to reduce the number of objectives.

The objectives should be tied more directly to the issues; phrases such as “to seek to...” should be removed. The objectives should be as clear as possible so progress can be properly measured. An example of this is:

Stated issue: ‘alterations to migratory cues for fish’.

Stated objective: ‘to avoid adverse effects on designated wildlife sites for fish of international and national importance’.

The objective is much wider and more unfocussed than the stated issue; a better objective would be ‘to avoid alterations to migratory cues for fish’.

We also suggest that the objectives on waste are strengthened.

Are the relevant aspects of sustainable development covered, if the SEA addresses the issues identified in this SEA scoping report?

The SEA scoping report (including baseline information) would benefit from more focus on people’s connection with the estuary as a cultural and recreational resource. The SEA must fully address the issue of sustainable communities as one of the Government’s top four UK priority areas for action within the UK Sustainable Development Strategy.

We support the drive to include wider carbon footprint implications from the construction of a tidal power option. This would help assess the overall sustainability of the options.

Any further suggestions regarding the scope of the SEA and its proposed assessment of the short-listed options?

We are pleased to see that the need for monitoring is considered. However, the scoping report should state that monitoring is to ‘*identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action*’ (Article 10 of the SEA Directive). The ODPM Practical Guide to the SEA Directive states best practice is to ‘*consider how to react if monitoring reveals adverse effects*’ which may include action on the part of the responsible authority or others.

ANNEX THREE - CORRECTIONS

1. We believe there is a mistake in the Executive Summary in the English language version at paragraph 6. In describing the long list options it is stated that the smallest scheme generates roughly the same as a large fossil fuel power plant. Even the short-listed schemes (with the exception of Cardiff-Weston) produce significantly below what is possible from a large fossil fuel power plant. For example, Aberthaw power station can produce around 10 TWh per annum, compared to the proposed Shoots Barrage at 2.77 TWh and Offshore lagoons at 0.27 TWh to 2.45 TWh.
2. Discussion of migratory fish on page 76 of the consultation document makes reference to the 'UK stronghold' of twaite shad. It should more accurately say 'only UK habitats'.
3. Section 6.7, omits any reference to the new Eel Regulations.
4. Figure 6.2, the record of species looks misleading. Allis shad is recorded for the Forest of Dean, twaite shad in Barry. However, very few twaite are recorded on the map for the rivers Wye and Usk.
5. The table on page 92 of the Financing and Ownership paper has a summary table containing information seemingly at odds with that in other papers. It states that the post mitigation impact on "risk to fish stocks" is "low". This is not the situation described in the fisheries technical paper and misrepresents the risk as assessed by your technical experts.