



Severn Tidal Power Feasibility Study- Update and Considerations, Don Snow

Background

On the 22nd of January, 2008, a two year Severn Tidal Power Feasibility Study was launched. The study aims to enable Government to decide whether and on what terms a tidal range power scheme in the Severn Estuary could be supported. It will assess in broad terms the costs, benefits and impact of such a scheme, including environmental, social, regional, economic and energy market impacts.

This paper is based on a think-piece produced by the Cardiff Future Forum, who consider trends and potential developments that will impact Cardiff in the medium to long term. It provides an update on the progress of the Severn Tidal Power Feasibility Study and outlines the issues linked to harnessing the Severn Tidal Power resource. It also outlines areas of consideration for the Vision Forum.

Delivering the Vision and Emerging Challenges

The risk of rapidly rising competition for markets, resources and carbon emissions permits presents a challenge to plan developments that will attract investments in buildings, transport and services infrastructure that are sympathetic to reducing the resource and carbon intensity of Cardiff and the Capital Region. At the same time businesses in Cardiff and the Capital Region will face an increasing challenge to become established in the growing markets for environmental goods and services as the basis for meeting aspirations for Green Jobs.

Opportunities for Cardiff

A low carbon economy has been identified by the UK Government as one of the major dynamics now reshaping global manufacturing and it views rapid investment as essential to success. It believes the UK can be a world leader with at least 1 million jobs by 2030. Three areas for manufacturing activity have been identified: supply chains for nuclear and renewable energy equipment; and low carbon vehicles.

The UK will need £100 billion investment in renewable energy generation by 2020 towards de-carbonising the electricity sector of the energy market. Annual revenues of £300-£900 million by 2020 are expected from marine renewables alone. The Renewable energy route map for Wales recognises the opportunity and identifies a need to:

look at the economic and international opportunities for Wales from being at the forefront of marine energy developments over the next 30 years including the important civil engineering construction skills aspect.

Carbon Trading also represents a major opportunity and, whilst London is identified as a hub in a global market estimated at \$64billion in 2007, mini clusters of the



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necessary clean technology businesses exist around London, Cambridge, Cardiff, Oxford, Manchester and Edinburgh.

Despite its historic role in developing the carbon intense global energy market of the 20th Century, Cardiff now has the opportunity to re-position as the centre of a Green Manufacturing Hub with major symbolism and promotional value for Wales. This opportunity exists to position Cardiff and the Capital Region not just for green manufacturing but also as a node in the global trade in carbon emissions permits. Perhaps to emulate, in a low carbon 21st Century economy, the status that Cardiff achieved as the world's biggest coal exchange at the beginning of the 20th Century.

Risks

Much has been achieved in Cardiff and the Capital Region during the latter half of the 20th Century. Major public investment has helped remove a legacy of decline but the European Union recognises that Wales still lags economically as a result of structural defects that include a lack of private investment.

The lack of indigenous private investment capacity places a premium on attracting inward investors and using every advantage available, against a background of likely protracted recovery from dislocated financial markets and recession. The risk is that progress could be reversed by the current recession in the face of stiff competition for public and private investment from other UK and EU regions.

Also the ecological, buildings, services and transport assets that have evolved so far, are vulnerable to climate change. Significant investment will be needed to address physical threats such as sea level rise and storm surge. These threats and their remedies have potential to add significant costs to local businesses and communities. Information from the UK Climate Change Risk Assessment will clarify the risks. Major flood defences are likely to be needed and the Severn River Basin Management Plan will support decision-making whilst the Catchment Flood Management Plan and the Shoreline Management Plan will take into account the objectives of the Water Framework Directive.

Whilst "Do-nothing" is an option for the Severn Tidal Power resource, it does beg questions about what alternative projects could make such a potentially large contribution to the Cardiff economy and to meeting targets such as proposed by the Climate Change Committee for UK electricity generation to be zero carbon by 2030.

In the absence of major renewable energy generation projects the priority would be to aggregate minor measures in major programmes able to attract investment on a scale sufficient to reduce dependency on increasingly costly carbon based energy.

Stressed households and businesses in Cardiff would likely need to raise significant funds to support a massive programme of energy demand management and micro-generation whereas a major renewable energy generation project would likely attract major international investors keen to diversify away from oil and gas.



If development of the Severn Tidal Power resource is approved, its impacts would be superimposed on those already in the system as a result of Climate Change that will affect sea level, storminess, temperature and acidity and create risks for the fish and bird life in Cardiff as well as citizens and property assets. In the absence of a Severn Tidal Power project there would be no funding for offset arrangements to protect fish and bird life from Climate Change impacts that, also, will require the reinforcement of flood defences and modification of infrastructure, particularly drainage systems.

Climate change and increased global competition for commodities will add cost pressures to regional and local economies. Transport and services infrastructure will need transformation to provide households and businesses with secure low impact mobility and energy at reasonable prices.

Development options and their impacts on Cardiff

The Government's Severn Tidal Power Feasibility Study is to help decide whether it should support development and, if so, on what terms. The Government response to the Phase One Consultation confirmed that 5 technical options will be studied in detail during 2009. The challenges, opportunities and risks presented by each option are considered from a Cardiff perspective in **Appendix A**.

Recommendations

The challenge should be to ensure that, in the event of a project proceeding, Cardiff develops as a leader in the global low carbon energy market, retains the wealth created and channels it to the long term benefit of local businesses, communities, natural and built environments as they are impacted by the effects of climate change. Therefore the Cardiff Vision Forum should consider:

- Establishing a Task Group to monitor the development of a Severn Tidal Power project and periodically advise the Vision Forum on Developments
- Through the Task Group, outline a plan for maximising the benefits and minimising the costs to Cardiff of any Government decision to support development of a Severn Tidal Power project. The plan should consider economic, social and environmental risks and opportunities for each project option and identify how development of energy infrastructure in the Severn Estuary can promote the sustainable development of Cardiff.

Appendix A – Severn Tidal Power Options

Development Option	Estimated Cost, Energy Generation and CO2 saving	Comment and Analysis (Cardiff Context)
Upstream Barrages	<p>Shoots Barrage – located just downstream of the Severn Bridges would cost £3.2 Bn to generate just under 1% of UK electricity and save 1.2 Mt CO2 p.a.</p> <p>Beachley Barrage – a slightly smaller project, upstream of the bridges would cost £2.3 Bn to generate about 0.5% of UK electricity and save 0.7 Mt CO2 p.a.</p>	<p>These options would have the least impact on Cardiff except for the possibility that a Shoots Barrage might carry an electrified rail system that would cut journey times to and from the city.</p> <p>Neither of the options appears likely to much modify the sea conditions off Cardiff and impact its local ecological systems. The effect on jobs would likely favour Newport and Bristol.</p>
Welsh Grounds Lagoon	<p>This requires an impoundment between Newport and the crossings. It would cost £4 Bn to generate about 0.75% of UK electricity and save 1.0 Mt CO2 p.a.</p>	<p>It is likely to be visible from Cardiff but have some impact on jobs and consequential development that might be attracted to the city. Transport benefits are unlikely as are modifications to sea conditions off Cardiff and impact on its ecology.</p> <p>Tourism benefits for Cardiff would likely depend on linking the lagoon to Cardiff Bay as part of a total Capital Region tourism offer.</p>
Bridgewater Bay Lagoon	<p>This would require an impoundment between Hinckley Point and Weston costing about £3.8 Bn and generating about 0.75% of UK electricity and save 1.1Mt CO2 p.a.</p>	<p>It would be visible from Cardiff but produce no transport benefits. Sea conditions off Cardiff are unlikely to be significantly modified and the effect on jobs would depend on the implementation of ferry services for construction workers and later possibly as part of a strategy to develop tourism in the Severn Estuary as a whole.</p>
Cardiff-Weston Barrage	<p>The barrage would stretch between Brean Down and Lavernock Point. It would cost about £20.9 Bn and generate some 5% of UK electricity saving 7.2 Mt CO2 p.a.</p>	<p>The economic impact would be significant for Cardiff in terms of direct and indirect jobs but also from development that would likely be a consequence of such a major internationally visible project on the city's</p>

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		<p>doorstep.</p> <p>The barrage would reduce the tidal range and exposure of mud flats on the Cardiff foreshore. In the absence of innovative turbines there is a risk of significant negative impact on fish and bird life in Cardiff Bay and offshore, requiring offset arrangements.</p> <p>However, tide and sea conditions would be moderated offering prospects for better access between Cardiff Bay and the Severn Estuary, and potential for driving a major Cardiff tourism offer based on water sports.</p> <p>Such a large barrage would be more likely to mitigate the effects on Cardiff of marine climate change impacts and possibly could be designed for retrofit of transport systems and further sea defences in lieu of measures on the Cardiff Bay Barrage and the construction of new flood defences for the city.</p>
<p>Severn Embryonic Technologies (SETs).</p>	<p>Whilst other options will not be studied in detail they will be reconsidered in the light of any new evidence arising as detailed studies of the selected options proceed along with work on 3 designs involving Severn Embryonic Technologies (SETs).</p>	<p>Tidal Fence</p> <p>An engineering project to create energy infrastructure that would have limited potential for increasing tourism. It would carry no pedestrians or cyclists and have limited value in modifying sea conditions to encourage more sailing.</p> <p>Tidal Reef</p> <p>This, also, would be an engineering project with limited</p>

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		<p data-bbox="1137 316 1865 448">potential for increasing tourism. It would not be possible to walk, cycle, or cross in other ways. There would be limited modification of sea conditions that currently discourage more sailing.</p> <p data-bbox="1137 485 1413 512">Low Head Turbines</p> <p data-bbox="1137 552 1883 710">This option would be available for integration with all the other options requiring turbines and could have the effect of making them more acceptable in terms of environmental impact – particularly in relation to fish mortality.</p>