

Proposed Tidal Barrage Sites

Wales

**"Shoots"
Barrage**

1 GW

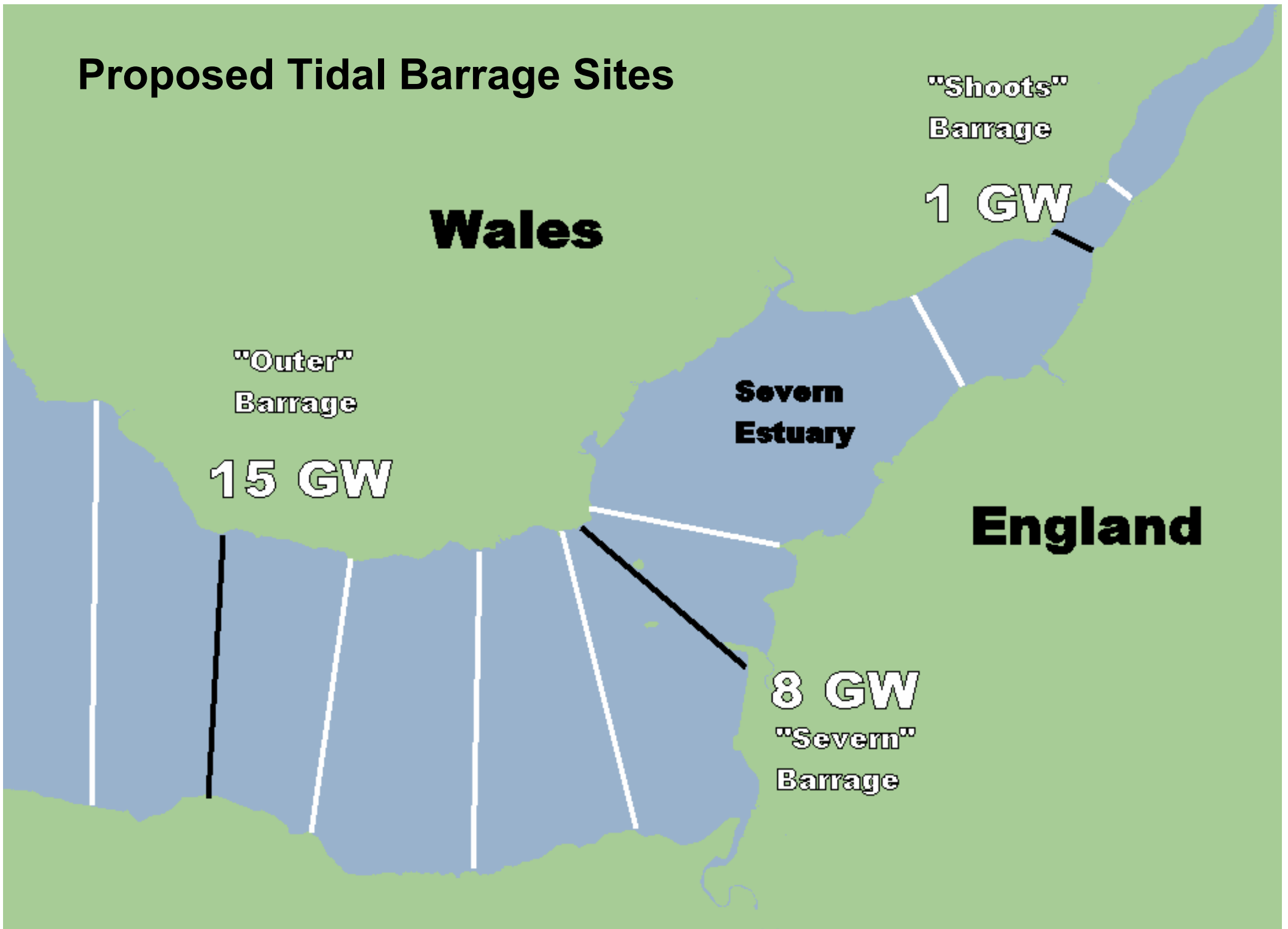
**"Outer"
Barrage**

15 GW

**Severn
Estuary**

England

**8 GW
"Severn"
Barrage**



- **Effects of different site locations**

- One of the complicating factors in assessing the impacts of a barrage is the large number of possible locations and sizes for the barrage. Generally, the larger the barrage the bigger its environmental impact, and the bigger the amount of energy it could create - and therefore the bigger [carbon offset](#) it could have by way of its renewable power generation.
- The largest barrages (sited beyond [Hinkley Point](#) and towards [Minehead](#) on the English side and [Aberthaw](#) on the Welsh side) would significantly affect the entire Severn Estuary and much of the Bristol Channel, but could generate 15 GW peak power and protect the whole of the Somerset levels against flooding and sea-level rise caused by Global Warming. The smallest barrages (sited at [Aust/Chepstow](#)) would affect only the river and estuary in Gloucestershire, but would also only generate perhaps 0.75 GW peak power.



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The **Severn Barrage** is the name of a number of ideas for building a [barrage](#) from the [English coast](#) to the [Welsh](#) coast over the [Severn tidal estuary](#). Ideas for [damming](#) or barraging the [Severn estuary](#) (and [Bristol Channel](#)) have existed since the 19th century. The purposes of such a project has typically been one, or several of: transport links, [flood](#) protection, [harbour](#) creation, or [tidal power](#) generation. In recent decades it is the latter that has grown to be the primary focus for barrage ideas, and the others are now seen as useful side-effects. The UK Government is currently undertaking a [Severn Tidal Power Feasibility Study](#) which will consider all tidal range technologies (including barrages, lagoons and others) in the Severn estuary.

The building of such a barrage would be a huge engineering feat, comparable with some of the world's biggest construction projects. The huge size and cost of most of the ideas over the years are what have kept plans firmly on the drawing board.

- **UK Government study announced - 2007**

- A two year feasibility study was announced in late 2007. This study builds upon past studies and focuses on a variety of tidal range technologies including barrages and lagoons, and innovative designs such as a tidal fence and a tidal reef in the Severn estuary. It aims to provide an up-to-date analysis of all the key issues involved.
- The Study previously lead by [John Hutton, Secretary of State for Business, Enterprise and Regulatory Reformis](#) now being lead by [Ed Miliband, Secretary of State for Energy and Climate Change](#). Other government departments and [Jane Davidson](#), Minister for Environment, Sustainability and Housing for the [Welsh Assembly Government](#) and [Ben Bradshaw](#), Minister for the South West region, strongly support the study.
- The study aims to gather and assess evidence to enable Government to decide whether it could support a tidal power scheme in the Severn Estuary and if so on what basis. Key work areas involved are:
 - The environmental impacts on biodiversity and wildlife; flood management; geomorphology (the study of the evolution and configuration of rocks and land forms); water quality; landscape and compensatory habitat;
 - Engineering and technical areas such as options appraisal; costs; energy yield, design and construction, links to the National Grid and supply chain;
 - Economic considerations - financing; ownership and energy market impacts;
 - The regional social, economic and business impacts;
 - Planning and consents - regulatory compliance; and
 - Stakeholder engagement and communication.
- The feasibility study concluded its first phase when a public consultation was launched on 26th January 2009. A [consortium](#) led by [Parsons Brinckerhoff](#) (PB) has been appointed to manage this part of the project. The process is guided by a [stakeholder steering](#) group. The study will culminate in a full public consultation in 2010.



PARSONS BRINCKERHOFF

- **Parsons Brinckerhoff (PB)** is a planning, engineering, program and construction management organization. The company has been involved in planning and designing some of the world's largest public works projects, such as [Boston's Big Dig](#), Britain's rail system Network Rail, the Sabiya power plant in [Kuwait](#), [Cairo's Metro](#), and the Deep Tunnel Sewerage System in [Singapore](#). Its Chairman is James L. Lammie and [Chief Executive Officer](#) is Keith J. Hawksworth.

- **Possible Benefits**

- Predictable source of [green energy](#) during lifetime of the scheme
- Could maybe reduce the cost of meeting UK's renewable energy targets
- Short carbon payback, probably less than a year
- Long lifetime of scheme (over 120 years for some options)
- Home-grown facility, independent of [foreign uncertainties](#)
- [Flood](#) protection for the vulnerable Severn estuary from [storm surges](#) from the sea, behind impounded areas
- New road and/or rail [transport](#) links could be built across a barrage if demand rises in the future
- Leisure-friendly water conditions behind a barrier
- Boost to local [economy](#) - construction industry in the short term, tourism and infrastructure in the long term [\[24\]](#)
- Reduced [turbidity](#) (cloudiness) of water will improve the density and spread of [invertebrate](#) colonies in the estuary. This should lead to better [carrying capacity](#) for [migratory fish](#) and [migratory birds](#) [\[25\]](#)
- Potential to provide up to 5% of the UK's electricity [\[26\]](#)

- **Possible Disadvantages**

- Existing protected [ecosystems](#) would be heavily altered and while some impacts can be predicted there are many uncertainties and unknowns
- Large areas of the low-tide [mud-flats](#) would be lost, displacing bird populations
- Dangerous barrier to migratory fish
- Likely to stimulate [silting](#) in some areas and [coastal erosion](#) in others
- [Shipping](#) would have to navigate [locks](#)
- Costs associated with navigating the locks would impact trade and commerce
- Existing estuary industries, including fisheries, would be damaged and jobs lost
- [Severn bore](#) weakened or eliminated
- All industrial discharges into the River Severn (e.g. from [Avonmouth](#)) will have to be reassessed
- Negative visual impact upon the landscape (subjective, c.f. [Wind turbines](#))
- Huge amount of concrete (etc.) needed - quarrying of stone likely to impact on other areas.
- Although power supply is predictable, peaks in generation from barrage do not necessarily coincide with peaks in demand

- **Environmental impact**

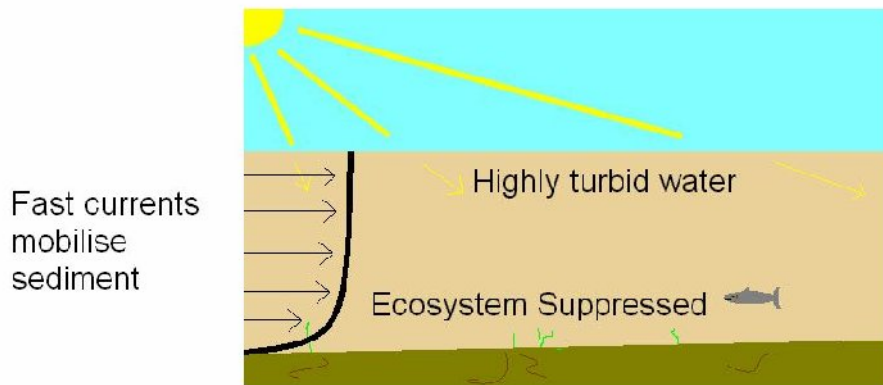
- The Severn Estuary is a [Special Area of Conservation](#) due to the European importance of its ecology. The inter-tidal area provides food for over 85,000 migratory and wintering water birds, and represents 7% of the UK's total estuaries. There are [nature reserves](#) and [Site of Special Scientific Interest](#) (SSSI) on the islands of [Flat Holm](#) and [Steep Holm](#).
- The Barrage was not supported in the 2003 Energy Review due to "strong environmental concerns".
- The [RSPB](#) opposes any Severn Barrage because of the effect it will have the feeding grounds 85,000 birds depend on, stating "The impact a barrage would have is huge. This is one of the most important sites in the UK for wild birds and the chances of them surviving if it went ahead are fairly slim. There wouldn't be enough room left for all the birds and there wouldn't be enough food for those that remained. The estuary is one of the UK's most important sites for water birds and its wildlife value must be taken fully into account."

- **Possible effect of turbidity reductions in Severn Estuary**

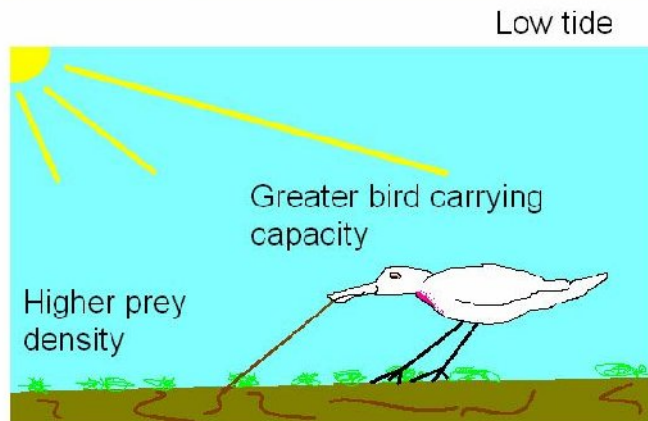
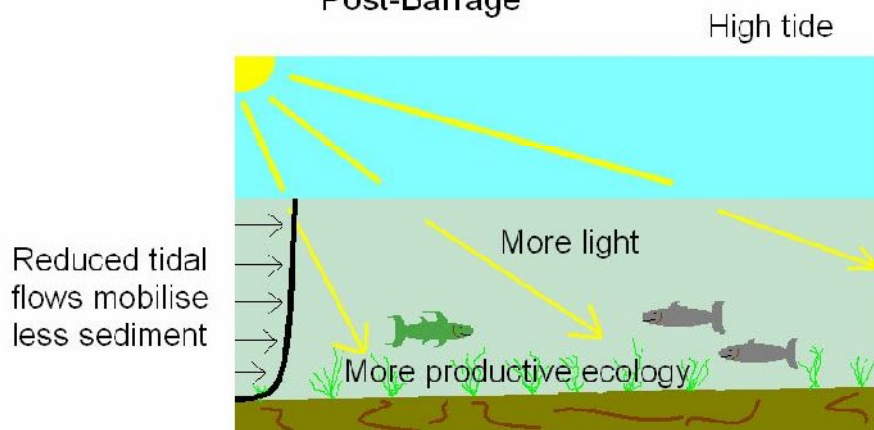
- The present strong [tidal](#) currents in the estuary serve to lift up [silt sediment](#) and so keep the water thick with fine particles. This blocks light-penetration and means that the Severn Estuary [marine](#) environment is actually a relative [desert](#), in terms of both plant and [fish](#) life.
- The barrage will not create a "[lagoon](#)" - as both opponents and supporters have sometimes claimed. Tidal power stations by definition require that the tide flows through the barrage, but the tidal range in the Severn would be halved.
- [DEFRA](#) claims that the [environmental effects](#) of the barrage still need more analysis before final conclusions can be drawn. The [Sustainable Development Commission](#) is investigating UK tidal resources, including tidal power in the Severn Estuary and its environmental impact, and should report mid-2007. [\[33\]](#)

Effect of Turbidity Changes to Severn Estuary Ecosystem

Pre-Barrage



Post-Barrage



- My drawing based on work of Kirby, R. (20th November 2006) "Environmental similarities and contrasts between the La Rance and (potential) Severn Barrages" (conference Presentation) Renewable Energy and the Nuclear Debate, Cardiff County Hall, Symmons Mudge Associates.
- This drawing is particularly inaccurate, and I would suggest it was produced by someone without any Physical Geography education. For a start, when a Barrage is in operation, the birds will be denied access to the mudflats for at least 80% of the time (100% of the time when the low tide occurs at night) Secondly, the drawing suggests that the existing mudflats are almost Barren of life. In fact, the present unspoilt Severn silt/sand banks are an extremely rich feeding ground for all entities. The silty waters are particularly rich in bringing basic nutrients, supporting molluscs and worms, along with the fish that feed on these Molluscs and worms at upper tide levels and birds which feed on the mud-flats at low-tide. The migratory wading birds do not arrive on the Severn mud-flats just for the view! The water will never be clear. the suspensions will always be there, having been gathered from the higher flowing upper reaches, and on an incoming tide from the Bristol Channel. Remember that the Bristol Channel has been gathering deposits for Millenia. People should remember that it didn't take long for Somerset or the Dutch Polders to be reclaimed from Saltwater marshland. If the Severn Barrage was built, and Global warming continues at its present rate, we shall in the years to come, have massive Mangrove swamps with an infestation of tropical mosquitoes, supporting an entirely different ecosystem.

- **Construction costs**

- The estimated costs of the most recent plans are huge. Figures are as high as £23 billion [37]. Recent studies [38] have suggested that the smaller short-listed options could be privately financed, and so in effect the matter of cost and risk becomes a private one between the building consortium and their banks. Schemes of the scale of Cardiff-Weston are likely to require significant Government involvement. If the banks feel that a smaller project is viable and decide to lend the money at an acceptable cost of finance then the projects will go ahead (subject to planning and other approvals). None of this cost would directly fall on the tax-payer but any support mechanism for the tidal power would be likely to fall on consumers. There would though be secondary knock-on costs from the tidal power project that might be met by the tax-payer, such as modifying existing ports, provision of compensatory habitat and dealing with environmental change. However, these would be offset by the positive knock-on effects, such as flood protection - which would have otherwise also cost tax-payer money. Whether the parties actually decided to exchange monies for these knock-on effects would be a matter for Government negotiation.

- **Backers**

- The former [Prime Minister of the United Kingdom](#), [Tony Blair](#) [39] (who backed it in the last weeks of his tenure)
- The former [Secretary of State for Wales](#), [Peter Hain](#)
- The [Welsh Assembly](#)
- The [Commons Welsh Affairs Select Committee](#)
- Welsh First Minister, [Rhodri Morgan](#)[40]
- The [South West Regional Assembly](#)
- Weston Super Mare MP, [John Penrose](#)[41]
- Cardiff Central MP, [Jenny Willott](#)[42]
- Northavon MP, [Steve Webb](#)[43][44]
- Ogmore MP and Parliamentary Under Secretary of State for Wales, [Huw Irranca-Davies](#)[45]
- Kingswood MP, [Roger Berry](#)[46]
- [Bristol](#) City Council has passed a motion calling for an urgent reappraisal [47]
- Bristol West MP, [Stephen Williams](#) has also said that the project must be urgently investigated, and has proposed an EDM on the subject[48][49]
- [North Somerset](#) Council has also called for a new appraisal[50]
- Scientist and "[Gaia](#)" theorist, Dr [James Lovelock](#) CBE[40]
- The Minister for Local Environment, Marine and Animal Welfare at [Defra](#), [Ben Bradshaw](#)[51]
- The [Secretary of State for Environment, Food and Rural Affairs](#), [David Miliband](#), has said that the project "Has to be worthy of very serious consideration" [52]
- The former [Secretary of State for Trade and Industry](#), [Alistair Darling](#) [53]

- **Opponents**
- Former UK Science Minister, [Lord Sainsbury](#)
- MP for Woodspring, [Liam Fox](#)
- Bristol [Green Party](#)
- Gloucestershire Green Party
- South West Green Party
- [RSPB](#) Wales
- [Friends of the Earth](#) Wales
- [World Wildlife Fund](#) Wales
- [Avon Wildlife Trust](#)
- Political commentator, [George Monbiot](#)