Tidal Lagoons

A tidal lagoon is a rock walled impoundment, an oval shaped breakwater enclosing an area of shallow coastal sea forming a lagoon. Tidal water is trapped and released from the lagoon through electricity generating water turbines built within the impoundment walls.

The company and patent holder of the tidal lagoon is Tidal Electric Limited, who are proposing the first tidal lagoon worldwide, in Swansea Bay, which will impound two square miles of sea near Port Talbot.

If located in the Severn Estuary, it could generate at least 7% of England and Wales electricity consumption as well as being low-cost and low-carbon.

In comparison to the Barrage, the lagoon could be significantly less extensive and environmentally damaging, it will also be more cost effective and more powerful than the barrage. Lagoons can generate twice as much power per square mile impounded than the barrage and could extract about 25-40% more energy from two thirds of the impounded area. See the table below for a more detailed comparison:

The table below summarises the main details of the schemes:

	Barrage	**Lagoons (largest scenario)**
Power Generated	17-19 TW hours/year	24 TW hours/year
Average output	1.95 -2.17 GW	2.75 GW
Capacity	8.64 GW	4.50 GW
Capacity Factor	26%	61%
Emissions avoided	4.6-5.1 mtC per year	6.5 mtC per year
Impounded area	185 square miles	115 square miles
Overall wall length	9.8 miles	95 miles (approx)
Aggregates required	13 m tonnes	200 m tonnes (approx)
Design life	Min 120 years	Min 120 years
Generation cost	5.5 pence/kWhour	2.0-2.5 pence/kWhour

Even if several lagoons were built to impound no more than 115 square miles of the estuary, they'd still cover 70 square meters less than the 185 square meters the

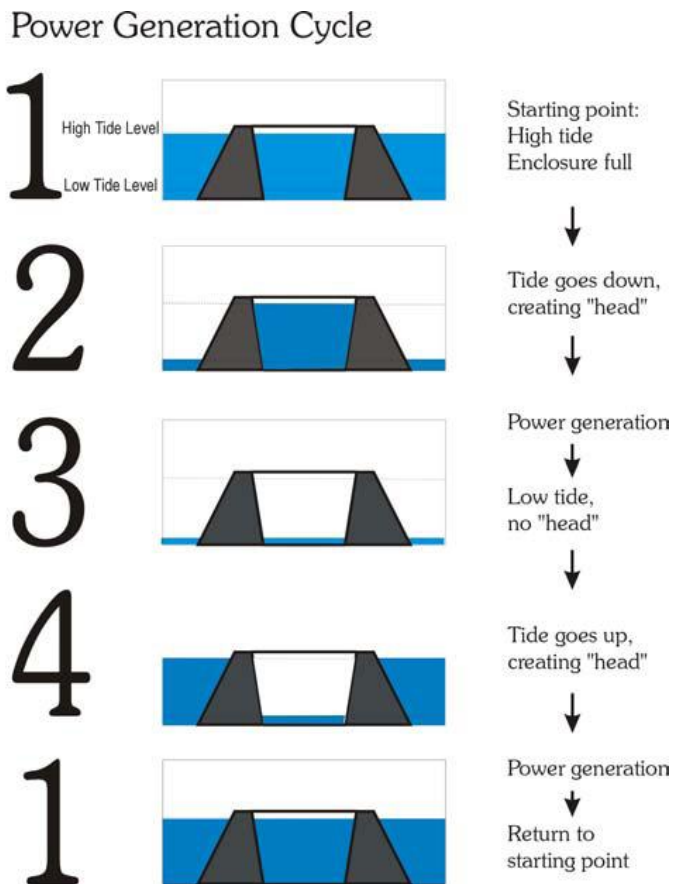
barrage would impound. This area of lagoons would also capture about 25-41% more of the Estuary's tidal energy than the barrage. This is due to the fact that the lagoons generate electricity on the ebb and flood tides, while the barrage is limited to generating mostly on the ebb tide to reduce silting.

Overall, the lagoons would generate twice as much electricity per square mile impounded than the barrage.

CAPACITY FACTORS:

- Multi pool lagoon: 61%
- Barrage 26%
- Onshore windfarms 30%
- Offshore windfarms: 35%
- Marine current turbines: 33%
- Wylfa nuclear power plant: 56%

Basic operation of a tidal lagoon showing changes in water levels:



COSTS:

- LAGOON: £20/MWh. Privately funded according to developer
- BARRAGE: £60/MWh. Dependant on major public-private finance contracts.

SUMMARY: Electricity costs of the lagoon will be significantly less than the barrage. In addition, there will be smaller capital outlays, rather than the one-off multi-billion pound sum of the barrage.

TRANSPORT:

Lagoons in the Severn would not impede shipping. However, the barrage would, so there would need to be a lock-gate system in place. The barrage would offer the potential for a road/rail scheme to link Devon to South Wales, however, a strategic need for this isn't great.

ENVIRONMENTAL:

Lagoons generating 2.75 GW would impound 70 square meters less than the barrage. They would also avoid the intertidal areas and could also form isolated rocky islands that could become significant additional habitat for birds and other species.

Both the lagoons and the barrage would increase sedimentation. However, this may result in environmental benefits of decreased turbidity. One significant environment disadvantage of the lagoons is the requirement for much more construction aggregate than the barrage.

WRITTEN BY NEIL CRUMPTON (energy spokesperson, FOE Cymru), 07742 082 074

www.foe.co.uk/resource/briefings/severn_barrage_lagoons.pdf

Peter Ullman- director of:

Tidal Electric

50 Albemarle St, 3rd Floor

London W1S 4BD

United Kingdom

Phone: 44 (0) 207 692 7557

Fax: 44 (0) 208 254 4929