

Pull of the tide

Tidal energy seems like it should offer vast potential to power the planet. It's just not so, says **Hans van Haren**

THE fate of a £1.3 billion proposal to build a tidal power lagoon on the UK coast is in the balance.

Green energy proponents around the world see the Swansea project as a trailblazer for a massive untapped source of dependable, renewable energy, and have urged the UK government to back it at a time when investment in such schemes is growing rapidly (see "The colour of money", page 36).

However, tidal energy is not the global saviour many people imagine it to be. The oceans have always created the impression of infinite potential, for example in terms of food resources and waste disposal, which we now know to be an illusion. In the same vein, a lot of people see the oceans as an attractive source of huge amounts of sustainable energy, including tidal power. Again, this is wrong.

In practice, tides can supply only relatively small amounts of



power. And while environmental impacts of tidal energy will vary depending on how we extract it (tidal lagoons are better than most), it will damage ecosystems.

Earth's tides, created by the tug of the moon and sun, hold about 3.5 terawatts of power. That sounds promising, but it is only about 20 per cent of world demand. And only a fraction of that 3.5 terawatts can be harnessed: to turn a turbine, we need water currents with a minimum speed of 1.2 metres per second. This rules out the vast majority of tidal resources as they are in open ocean where tidal currents are too weak, often less than 0.1 metres per second.

Viable currents (or sufficient tidal ranges to generate them in water trapped behind barriers or in lagoons) are found only in shallower waters around ocean perimeters. There are not that

many suitable sites in the world, although the UK has more than its fair share. These include Swansea, if a lagoon is used to dam tidal flows, plus the north of Scotland and the Severn estuary.

Unfortunately, such sites are often in ecologically rich yet fragile straits and estuaries that are crucial spawning grounds for life. Strong tides make them so productive, because turbulence stirs up nutrients. What's more, turbines can kill fish.

The reality is that in total, around 100 gigawatts of power could be generated by suitable sites globally, and it is doubtful whether even this can ever be achieved. There is evidence that tidal barrages, by obstructing the area through which the tide flows, can change currents so much that the potential power can no longer be extracted efficiently. This further reduces permanently exploitable tidal power.

Tides are vital for life in shallow seas. Without their churning effect, marine life would come to a halt. Exploiting tidal energy may seem attractive, but in practice there is little to be had and it has an ecological cost. ■

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