

Power from the tides...

Tidal power is a proven technology: it has been used for centuries in small mill-type applications where natural conditions make it possible. Tidal energy can be converted into electrical energy in several ways. Conventional systems such as barrages (or low dams) store water in inlets from high tides for release through hydraulic turbines during lower tides. The newest technology which converts tidal or coastal currents to power seems to be very promising because it is less environmentally destructive.

How does it work?

The usual technique (referred to as "barrage" technology) is to dam a tidally-affected estuary or inlet, allowing the tidal flow to build up on the ocean side of the dam and then generating power during the few hour high tide periods. In this way it is functioning in La Rance. After the water level reaches maximum high tide, gate valves are closed and the water is impounded and awaits low tide when it is released and produces power. The gates can be opened or closed in sequence with the tides permitting water flow only when there is sufficient head to power the turbines. The basic technology of power production is similar to that for low head hydro power plants what means that the head drives the water through the turbine generators. The main difference, apart from the salt water environment, is that the turbines in tidal barrages have to deal with regularly varying heads of water. The turbines are designed so that the flow of water both into and out of the basin produces electricity. Because of the intermittent nature of this flow, the effective duty factor of such an installation is less than 100%. A tidal power station produces only about one third as much electrical energy as would a hydroelectric power plant of the same peak capacity operating continuously. Tidal barrages are effectively fences which completely block an estuary channel.

Where are they used?

There are many sites around the world where tidal turbines would be effective. Coastal currents are strongest at the margins of the world's larger oceans. A review of likely tidal power sites in the late 1980s estimated the energy resource was in excess of 330.000 MW. South East Asia is one area where it is likely such currents could be exploited for energy. In particular, the Chinese and Japanese coasts, and the large number of straits between the islands of the Philippines are

suitable for development of power generation from coastal currents. In these entire regions underwater turbine farms can be developed. The ideal site is close to shore; in water depths of about 30m where at the best site currents could generate more than 10 megawatts of energy per square kilometre. The European Union has already identified 106 sites which would be suitable for the turbines, 42 of them around the UK. The first tidal turbines will be deployed off the Southwest coast of England. It will be 12-15 m in diameter, and is expected to generate 300 kW (enough to power a small village). It is estimated that the cost of energy from these early turbines will be USD 0.10/kWh. This is more expensive than conventional sources of energy (coal, gas), but significantly lower than what many island communities already pay for energy. As the technology matures further, prices will probably continue to drop.