

# The Power Of the Moon

The tides are as predictable as night and day, and they're powerful, too. Now there's a way of using their kinetic energy to produce electricity.



BY NIGEL HOLLOWAY

In 1964, when Peter Ullman was attending an international high school in Naples, Italy, where his father was a visiting professor, he would go down to the docks to see off his fellow students returning by ship to the U.S.

He noticed that the angle of the gangplank changed between the time he went on board to say good-bye to his friends and the time he disembarked. If the sea could lift a huge ocean liner, could the tidal energy be harnessed in some other way, too?

The seed of Ullman's idea, planted all those years ago, is beginning to germinate. Ullman's private company, Tidal Electric, is planning to build the world's first hydroelectric tidal lagoon 2 kilometers off the coast of Wales, near Swansea. This first station will cost £35 million to £40 million to generate 30 megawatts of electricity. All being well, the next tidal power station,

along the northern Welsh coast, will generate 432 megawatts, the equivalent of half a nuclear power station. (It may be built before the smaller one. A tidal lagoon would prevent shore erosion, a big problem on the northern Wales coast.)

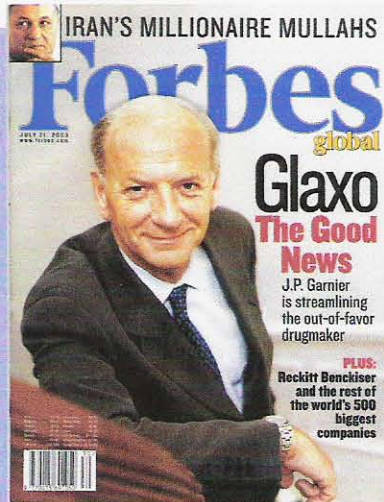
The technology of Ullman's tidal power station is as old as the hills—or rather, the valleys. Hydroelectric turbines have been used for 120 years and there are half a million in use today. But nobody has deployed them in quite this way before. The closest to Ullman's idea are the tidal barrages built across river mouths. The largest barrage is near St. Malo in France and generates 240 megawatts of electricity. But barrages are controversial: They block navigation, impede the migration of fish and alter the shoreline.

Ullman's idea is different. Instead of building a barrier across a river, he has designed a man-made lagoon just out to sea. The walls of the lagoon are built on the seabed and their height exceeds the

**Gas-guzzling power stations made Peter Ullman think of an alternative.**

highest watermark by a meter. At the foot of the wall are the hydroturbines. After the tide rises, water rushes through the turbines and fills the lagoon. At low tide the water runs out of the lagoon, turning the turbine blades the other way, thus generating electricity in both directions. Two tides a day therefore generate energy four times.

Tidal energy is plentiful and predictable far into the future, a boon for power generation. The optimal location for a tidal power station is at a place where there is a big difference in water level between high and low tides. Wales is a good place to start because it has this attribute, as well as a sizable population and strong public support for renewable energy. Ullman reckons the U.K. alone could generate 8% of its total power needs from tidal lagoons, and there are at



least 19 other places around the world that would be suitable for this type of power station. "The concept could be applied off the northwestern coast of Mexico or off Gujarat, western India," says Ullman.

He says that his tidal power station will not require a capital grant from the British government (he is looking for financing now). By contrast, an offshore windmill farm to be built in the Solway Firth in Scotland is receiving a grant of £18 million, a third of the capital cost. (Windmills also are more of a visual intrusion.) And tidal energy is cheap: It costs about 2 pence per kilowatt hour, roughly the same as coal- or gas-fired power stations in the U.K.

In addition Tidal Electric will receive a so-called green certificate, currently worth about 3 pence per kilowatt hour. These certificates are part of an incentive scheme set up by the British government to increase the proportion of total energy

generation from renewable sources from 2.6% currently to 10% by 2010. The credit would form part of the revenue of Tidal Electric, a ten-year-old company based in the U.S. and England.

Ullman's inspiration was dormant for decades while he returned to the U.S. and earned a degree in English at Yale University, where he wrote an unpublished novel. After graduating he started a construction business, acquired a plumber's license and had a business making wooden toys. After the first Gulf war, as the father of three small children, he started to worry about the U.S. dependence on Middle East oil and on fossil fuels in general. Still living near his alma mater, he persuaded a couple of Yale mechanical engineering students to run a computer simulation of a tidal power station. "I was surprised to see that there was a significant amount of power in tides," he says, sitting in the impeccably tidy living room of his house in West Simsbury, Connecticut.

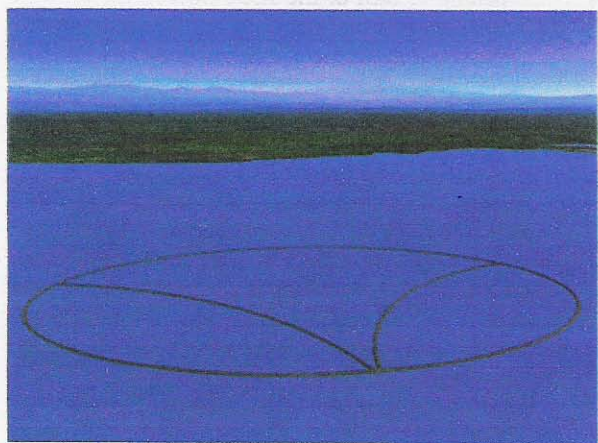
Ullman, 55, has suffered several false starts in the eight years since he patented the technology. His efforts to build a power station coincided with unprecedented turmoil in the power industry. Five large power companies studied Ullman's idea, but the firms either collapsed or were restructured before they could go ahead and invest in it, he says.

Now Ullman must raise £2.5 million for the engineering-and-design phase and then submit the plans for approval by the Welsh Assembly in Cardiff. British investment bank N.M. Rothschild & Sons has the job of raising the money. "It involves a major leap for a bank to lend money for the first project, but there's a queue of bankers to do the second and third," Ullman says.

If Ullman is able to raise the money, the tidal lagoon would be a monument to his persistence. And the world will have another renewable resource to tap. **FB**

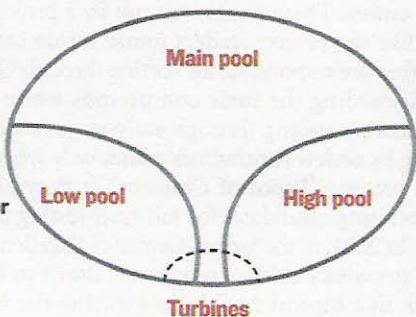
## The Lunar Cycle Could Produce a Lot of Juice

Tidal Electric plans to build a power station using a tidal lagoon off the coast of Wales.



Artist's impression of a tidal lagoon 2 kilometers offshore.

The lagoon is divided into three cells that are filled and emptied in sequence, thereby producing a more continuous output of electricity. Water goes in and out through the turbines.



Power-generation cycle

