Harnessing the Power of the Tide

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Have you ever heard the roar of a waterfall, experienced the power of raging rapids, or seen the damage that can be caused by floodwaters? Imagine being able to harness all that power and make it work for us instead of against us ("Waterpower," 2009). Water power can and has been in use since ancient times, with the use of waterwheels and tidal mills. In the modern day it is being done, with great success, in places like northern France, Scotland, and Wales, England. Through the use of tidal barrages, offshore turbines, and tidal reefs, people are able to produce power from the water's current. "Renewable energy is becoming an increasingly important source. Renewable energy sources include wind, wave, tidal, hydro, and solar power among others. Tidal power has a significant advantage over most of the others in that it can be predictable" ("Tidal Turbines," 2010). With the use of these machines, power problems could be an issue of the past.

Energy in the flow of water has been used since ancient times. With waterwheels, past civilizations were able to run machinery and grind grain. The wheel stood upright with paddles attached to it and would tread along the surface of the water. When the water's current struck the paddles, it would, in turn, cause the wheel to turn. The use of the waterwheel became more and more common and more refined as time went by and is still used to this day ("Waterpower," 2009).

In modern day, the use of water has never been more important. With the cost of everything going up and worry about resources running out, renewable resources, like the use of water current, have never been more important than they are right now. In France, they are able to use the tide from the waters of Rance Estuary, to produce power through the use of a

tidal barrage. They built a "barrage 330 meters long in which the turbines were to be housed, a lock to allow the passage of small craft, a rockfill dam 165 meters long, and a mobile weir with six gates to rapidly balance the levels for the emptying and filling of the reservoir" ("How France eclipsed the UK with Brittany," 2011). They used two dozen reversible turbines that were specially made to "produce energy during both the rising and falling tides so that efficiency is increased" ("How France eclipsed the UK with Brittany," 2011). The tidal barrage is able to produce enough energy to provide power to 250,000 households. Although the barrage is able to provide power to those who need it, it does have some drawbacks. It is only able to produce power as long as "the tide is flowing in or out" ("How France eclipsed the UK with Brittany," 2011), which is about ten hours a day. During these times other power plants have to take up the slack in order to produce power to those who need it. Even though the barrage isn't able to produce power 24 hours a day, it has lowered the cost of electricity from 25 Euro cents per kWh to 18 per kWh. Tidal barrage is just one of the many ways bit is possible to harness the power of the tide ("How France eclipsed the UK with Brittany," 2011).

Another option is offshore turbines (also known as tidal turbines), which are in the testing phase in Orkney, a small island off of Scotland. Tidal turbines look just like big windmills but are built to be submerged under water, in groups, "like an underwater wind farm" ("Energy resources: Tidal Power," 2011). The device was placed in the sea around Orkney and is just one of the many tidal turbines that will be deployed around the Sound of Islay. "The device stands 22.5m (73ft) tall, weighs 1,300 tones and has two sets of blades on a single unit" ("Huge tidal turbines arrived in Orkney ahead of testing," 2010). Using two blades maximizes the amount of power that is captured from the water current in both directions. It produces one gigawatt,

which is enough electricity to power 500 homes. Once the device is placed in the water, the current causes the blades to spin, which, in turn, drives the turbine. The pitch of the blades is constantly adjusting in order to achieve optimal power. The turbine produces power, which is converted to electricity and sent "onshore by means of a subsea cable" ("Tidal Turbines," 2011). There were concerns that placing the tidal turbines on the sea floor would endanger the sea creatures that inhabited the area and cause problems for shipping routes. The turbines are placed in tidal flows around the coast and are spaced out. This is to ensure there won't be a change in the flow of the sea. As for the rotors—they have been designed to turn slowly underwater so that they should not pose any threat to marine life. This system is said to be very reliable in capturing the power of the tide, simplistic, and cost efficient. Through the use of this device, it reduces the carbon footprint and lowers the cost of electricity ("Environmental Impact," n.d.).

Another proposal has been in discussion for years and is in the final stages of design. The Tidal Reef, which will be located between Minehead in Somerset and South Wales, England, could possibly harness up to 50% more energy than a barrage. When looking at the REEF, it "looks like a tidal barrage, but this design does not block the water movement as much, so it wouldn't affect the tides as severely and the environment consequences would be much less" ("Energy resources: Tidal Power," 2011). The REEF can be built in sections, so as a piece is installed, it can start generating power. It would also allow the passage of "migratory fish" ("Tidal Power," 2011) and a shipping lane. It would allow "mud flaps could still be exposed at low tide, and it would be able to generate power for more hours in the tidal cycle….and it could be used to control tidal levels further upstream" ("Energy resources: Tidal

Power," 2011). It will be about 12 miles long, which will produce a significant amount of power. It is designed, however, to reduce environmental damage: "The REEF system uses bidirectional turbines and a 'differential head' of less than three meters to minimize environmental damage and maximize the utilization of the plant" ("The Water Turbines," 2011). By doing this, the output of power is smaller, but it is able to operate longer. This is a system that has never been done before, yet seems to look really good on paper ("Energy resources: Tidal Power," 2011).

There are many different ways to harness the power of the tide. There is the tidal barrage, which has been in operation for over 40 years and is the largest power station in the world. Next is the tidal turbine, which is very cost efficient, simplistic, and reliable. Last, but not least, is the REEF, which has yet to be built but seems to be very eco-friendly and very well designed. Out of these three devices, it is hard to say which one is better. It all depends on the place, circumstances, and needs for a particular device. Tidal turbines seem to be well tested and have stood to up and exceeded all expectations. The use of renewable resources has never been more important than it is now. With the use of devices like these, we can make the planet a cleaner place to live.

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