



Renewable Energy From Slow Water Currents



We can use slow moving ocean and river waves for a new, reliable and affordable alternative energy source. A University of Michigan engineer has developed a device that acts like a fish that turns the potentially destructive vibrations in water into clean, renewable energy. This machine is named as VIVACE (Vortex Induced Vibrations for Aquatic Clean Energy). It is the first known device that could draw energy from most water currents around the world, according to a statement from the University of Michigan. "There won't be one solution for the world's energy needs," VIVACE

developer Michael Bernitsas, a professor at the U-M department of naval architecture and marine engineering, said in the statement. "But if we could harness 0.1 percent of the energy in the ocean, we could support the energy needs of 15 billion people."

VIVACE can work in flowing water moving slower than 2 knots, or about 2 miles per hour. Here it should be noted that most water currents are slower than 3 knots, while turbines and water mills need an average of 5 or 6 knots to operate efficiently. VIVACE doesn't need waves, tides, turbines or dams. It's an unequaled hydrokinetic energy system that relies on "vortex induced vibrations." Think like a fish not like a bird, say researchers of the University of Michigan. Because in water, nature has invented a different strategy for natural swimmers. If we observe the movement of a tiny sperm or a giant whale, we will see that they generate vortices (or little whirlpools) that they push off of to propel themselves forward. Michael Bernitsas of the University of Michigan, realized that these same vortices could be used to drive a generator. He and his colleagues have invented VIVACE whose cylinders oscillate up and down in moving waters. "This device works naturally in the marine environment," says Bernitsas.

Bernitsas' team has developed a working prototype in their lab. The spring-supported cylinder moves up and down in a tank of moving water. As water bangs into the cylinder, this action induces turbulence which transforms into a vortex. The vortex eventually rolls off the back, giving the cylinder a little push as it goes. The next vortex that forms will spin in reverse and give a push in the opposite direction. These opposing forces cause the cylinder to vibrate up and down. The high density of water, makes the vibrations about 800 times more energetic than they would be in air at the same speed. Due to this, the VIVACE system can produce three to 10 times more energy from a given volume of moving water than tidal turbines.

Bernitsas and his team have tried to duplicate the roughness of fish scales on their cylinders because a rough cylinder surface could increase the power output by 40 to 70 percent compared to a smooth surface. Bernitsas is also impressed with fish tails. His team has begun to experiment with passive tails that could keep vortices from interfering with each other.

Currently Bernitsas' group is working with the U.S. Navy to install two VIVACE systems in the next year: one in the Detroit River and another in an ocean environment somewhere.

Although the production of VIVACE systems in commercial plants is still a future dream, the cost of electricity from a mature VIVACE installation would be roughly 5.5 cents per kilowatt-hour, which is similar to the current price of wind generation. Roger Bedard, EPRI's ocean energy leader is of the opinion that with the passage of time, slower tidal passages will become economical.¹

¹ The Source: <http://www.alternative-energy-news.info>