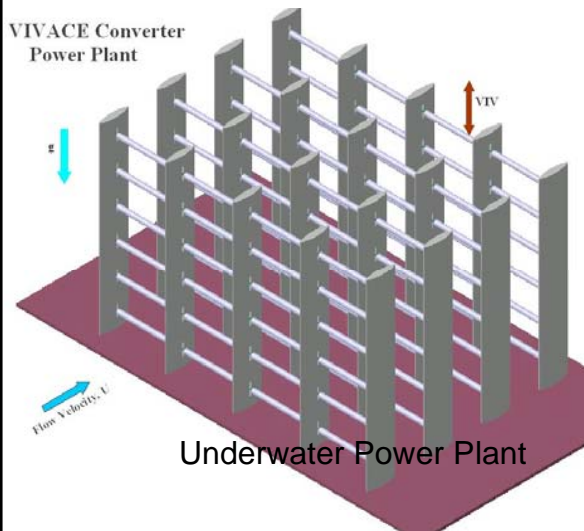


VIVACE: A New Concept in Hydro-Kinetic Energy Conversion

(Extraction of energy from ocean/river currents even of low head and speed)

Product: VIVACE (Vortex Induced Vibration - Aquatic Clean Energy). Cylinder VIV is maximized and transverse mechanical energy is harnessed and converted to usable energy.



Impact: The discovery and development of sustainable, nonpolluting energy sources is arguably one of the most urgent priorities facing mankind today. VIVACE enables the efficient, cost-effective utilization of an abundant, predictable, and renewable alternative energy source in a way compatible with the ocean/riverine environment.

Technology	Fixed Costs	Variable Costs	Capacity Factor	Cost per kWh
	\$/kW	\$/MWh		\$/kWh
Coal	1,481	12.78	85%	0.041
Nuclear	2,248	5.73	90%	0.046
Natural Gas	472	45.32	45%	0.062
Wind	1,356	-18.00	25%	0.069
VIVACE	3,000	0.00	90%	0.055

1. Data from Michigan Public Service Commission
2. Wind variable costs reflect production tax credit

Interested Industry and Agencies: ONR, DOE, NextEnergy, EPRI, VHE, Wayne County Port Authority, several VC's including RPM, Illinois Ventures, Chrysalix, Flagship, Kleiner-Perkins.

Objective: Capture the abundant kinetic energy in ocean/river currents without impounding water, using turbines, or otherwise harming the environment.

Approach: *Under high damping, enhance rather than spoil vortex shedding, maximize rather than suppress VIV, and harness rather than mitigate VIV energy.*

VIVACE converts hydro-kinetic energy to transverse cylinder motion, even in low-head low-speed flows.

VIVACE has been tested in the lab, has high energy density, uses vortices like fish do to move in water, is unobtrusive, has broad velocity synchronization range, and is scalable from 1kW to 1GW. Next, the power take-off system will be optimized and a 3kW prototype will be built and tested in a river. Patent pending.



Current Total Funding: \$350,000 from DOE, ONR, NextEnergy, VHE (Vortex Hydro Energy), OVPR, CoE.

Potential Sources of Funding: ONR, DOE, NextEnergy, WCPA, GESI, VHE, NSF.

Facilities and Infrastructure: Tests are performed in the Low Turbulence Free Surface Water Channel of the Marine Hydro Lab. Prototype tests will be performed in a river. In the market, VIVACE Converters will be connected to the grid to transfer locally unused energy. Besides power plants, applications include irrigation, desalination, hydrogen generation; portable field kits, light houses, instrumentation stations, offshore platforms, idle ships.

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http://www.engin.umich.edu/dept/name/faculty_staff/bernitsas/Main.htm

<http://www.vortexhydroenergy.com/>