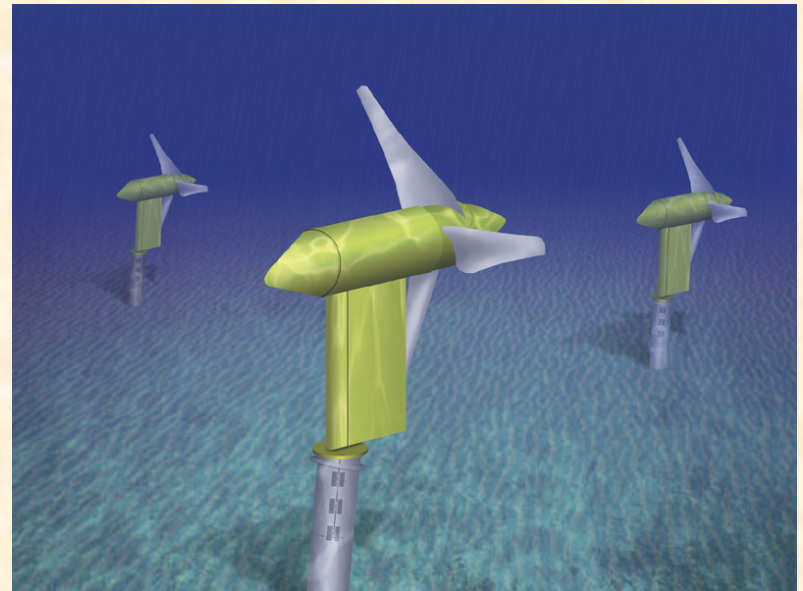


Hydropower without Dams: The Potential for Hydrokinetic and Wave Energy Technologies

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Sponsor: DOE Office of Energy Efficiency and Renewable Energy

- ↪ Free-flow (hydrokinetic) turbines can use the kinetic energy of moving water to generate electricity, without most of the environmental impacts associated with large hydroelectric projects. Similarly, new hydro-mechanical devices can capture ocean wave energy and convert it to electricity with minimal environmental impacts.
- ↪ A technical workshop was held recently to bring together developers, resource and regulatory agencies, scientists and engineers to chart a roadmap for the environmentally sound development of these innovative technologies.
- ↪ Guidance was published to assist developers and regulators understand the potential effects from these new technologies on aquatic organisms, water quality, sediments, and other resources (Coutant and Cada October 2005).



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Compared to conventional hydropower facilities (which typically require the construction of dams, powerhouses, and reservoirs), free-flow turbines are expected to have much smaller impacts on survival and migrations of fish, aquatic and terrestrial habitats, water quality, sediment transport, and visual/aesthetic qualities. DOE recently sponsored a workshop¹ that brought experts together to discuss the characteristics of hydrokinetic and wave energy technologies, the appropriate environments for deployment, environmental concerns associated with deployment, and needed research and mitigation. With support from State Partnership Program funding, ORNL staff provided technical assistance to the New York State Energy Research and Development Agency and the developer of a submerged, free-flow turbine array in the East River, New York City on methods to evaluate the potential for injury to fish and other aquatic animals from contact with the rotating blades. Guidance² on how to deal with these issues has been published to help developers and regulators understand the environmental issues surrounding these new technologies. Although much can be learned from studies of conventional turbines, there is a fundamental concern about extrapolating the environmental effects from single units to energy farms comprised of dozens or hundreds of hydrokinetic turbines.

¹ U.S. Department of Energy 2006. Proceedings of the Hydrokinetic and Wave Energy Technologies Technical and Environmental Issues Workshop. October 26-28, 2005. Washington, DC.

² Coutant, C.C. and G.F. Cada 2005. What's the Future of Instream Hydro? *Hydro Review* XXIV(6):42-49.