



# 21st Century Guide to Hydrokinetic, Tidal, Ocean Wave Energy Technologies - Concepts, Designs, Environmental Impact

*By U.S. Government, Department of Energy*



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**21st Century Guide to Hydrokinetic, Tidal, Ocean Wave Energy Technologies - Concepts, Designs, Environmental Impact** By U.S. Government, Department of Energy

This ebook provides comprehensive coverage of hydrokinetic energy - power derived from moving water, including wave, marine, and tidal plants. While traditional hydropower is a well-established industry, advanced water power technologies that produce electricity from moving water without the use of a dam are now emerging in the renewable energy sector. These technologies, known as hydrokinetics, generate electricity from the motion of waves, the free flow of tides, ocean currents, or inland waterways. As part of its broad effort to advance the renewable energy industry, the U.S. Department of Energy (DOE) is funding various market acceleration projects designed to address key issues associated with hydrokinetic technologies that harness renewable energy from the nation's oceans and rivers. Hydrokinetic energy conversion devices are designed to be deployed in a stream or current, capturing kinetic energy from the flow of water across or through the rotor (which may take various forms) to power a generator without impounding or diverting the flow of the water resource. Conceptually, this is similar to the way wind energy conversion devices work. Wave energy conversion devices create a system of reacting forces, in which two or more bodies move relative to each other, while at least one body interacts with the waves. The body moved by the waves is called the displacer, while the body that reacts to the displacer is called the reactor. There are many ways that such a system may be configured, including: oscillating water columns (OWC), point-absorbers, attenuators, and overtopping devices. Setting for these various technologies include natural streams, tidal estuaries, near-shore environments, offshore and ocean locations, and constructed waterways. Technologies covered include wave energy conversion devices, terminators, oscillating water columns, point absorbers, attenuators, overtopping devices, in-stream tidal flow energy conversion devices (TISECs), horizontal axis, vertical axis, axial flow machines, open center turbines, ducted turbines, turbine matrix, helical turbines, heave wave devices, heave-surge wave devices, overtopping wave devices, and more. Contents include a thorough review of the potential environmental effects of marine and hydrokinetic energy technologies.

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