

FLORIDA ATLANTIC UNIVERSITY
Center for Ocean Energy Technology

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Description: Ocean energy is an emerging technology that uses the power of ocean currents, waves, tides, and salinity gradient to create renewable energy. Tapping ocean energy resources will reduce our reliance on fossil fuels. Research areas of focus include ocean current and thermal differential systems, cold, deep ocean water-based air-conditioning, underwater hydrogen generation and storage, and environmental impact and mitigation.

The Center for Ocean Energy Technology's (COET) program is structured to be the catalyst that will enable the ocean energy industry in Florida toward determining solutions to answering the state's energy challenge. This project focuses on determining the potential of harnessing specifically the ocean current resource and ocean thermal energy conversion. The regulatory process at State and federal levels is not clearly defined nor the roles and interdependencies of the individual agencies clearly articulated. In addition, knowledge to make these decisions is more on a macro rather than micro level necessary to assess individual devices. COET's mission is to bridge the gap between concept and commercial deployment of ocean energy technologies by providing at-sea testing facilities for both ocean current and thermal energy research and for technology development. Research cuts across environmental, ecological, resource and technology.

Budget: \$8,750,000.00

Universities: UCF, FSU, ERAU, University of Miami, Oregon State University, University of Washington, Pennsylvania State University, University of New Hampshire, University of Hawaii, University of Edinburgh, Heriot-Watt University, Nova Southeastern University, Virginia Polytechnical Institute, Florida Institute of Technology

External Collaborators: Numerous industry and State and federal government as well as FFRDCs, such as National Renewable Energy Laboratory, Woods Hole Oceanographic Institution, U.S. Department of Energy, U.S. Department of Interior (Minerals Management Service), U.S. Department of Commerce (National Oceanic and Atmospheric Administration), and Florida Department of Environmental, Protection, to name a few.

Progress Summary

Florida Atlantic University's Center for Ocean Energy Technology (COET) is focusing its research and development of ocean current and thermal energy. COET is conducting scientific and engineering research in the Florida Current off of Southeast Florida to determine ocean current and temperature profiles.

Progress on oceanographic research and assessment programs include:

1. Acoustic Doppler current profilers, capturing thirteen months of continuous resource characterization data, are being decommissioned and data assessment and analysis underway.
2. Ocean Thermal Energy Conversion measurement of Conductivity, Temperature, and Depth (CTD) conducted over one year to produce time series mapping of the temperature profile. Weekly assessments include more than 48 data sets of ocean thermal gradients offshore Ft. Lauderdale, FL and monthly more than 6 data sets of ocean thermal gradients in four locations stretching from Miami to Stuart, FL. The measurements are taken from nearshore Florida's SE coast to more than 30 nm offshore into the Florida Straits.
3. Prototype device (20kW) fabrication is underway for ocean current test and evaluation. An in-lab 20 kW coupled motor-generator dynamometer has been constructed to simulate ocean current rotor behavior with respect to motor/generator performance and setup. The 3-phase 240VAC system will provide a platform to fully test the offshore turbine control and monitoring system. In addition, a smaller 2-3 hp system is being integrated for mini-grid and heterogenous generation investigations.
4. Operational and testing requirements are being developed to provide a test and evaluation platform capabilities for ocean current device developers.
5. Participation on the U.S. Technical Advisory Group to the International Electrotechnical Commission in developing global standards for ocean energy convertors.
6. Draft Application for Lease under Interim Policy coordinated with Department of Interior, Minerals Management Service (MMS) and cognizant federal and state regulatory and permitting agencies, with final Application to be submitted in May. Pursuing both research and development in renewable energy on the Outer Continental Shelf (OCS) must comply with the federal Outer Continental Shelf Lands Act. With respect to the COET deployments of prototype devices/systems the major permits, approvals, and authorized actions necessary to construct, operate, maintain, and decommission project facilities while falling outside of State of Florida waters (i.e., the deployment and operations will be more than 3 miles offshore), will involve interaction with the Florida Fish and Wildlife Commission due to its agreements with the U.S. Fish and Wildlife Service. In addition, shore-side activities in support of the offshore deployment will be conducted within State waters, at a commercial marina under the purview of the Florida Department of Environmental Protection. These activities will also engage agencies such as the U.S. Army Corps of Engineers, the National Oceanic and Atmospheric Administration's Marine and Fisheries Service, the U.S. Coast Guard, the U.S. Navy, etc.
7. COET has worked closely with the MMS and other stakeholder agencies to draft and refine environmental/technical. Environmental effects assessments and analyses underway to include such areas as benthic habitat, acoustics, sea turtle and marine mammal migratory patterns.
8. COET hosted The Offshore Ocean Energy Dialogue on March 3-5, 2010 in Boca Raton, FL, bringing together 55 industry, university and federal and state agency participants to begin the conversation on a coordinated approach to meeting the research and development challenges of exploiting surface waves, tidal flows and open-ocean currents and the potential of the thermocline. The group approved seven consensus recommendations that will be helpful in addressing some of the challenges facing development of these important resources. Proceedings from the Dialogue will be made available publicly and be used to plan future topic specific events related to ocean energy development.