CCNY leads study to identify top NJ tidal power generation sites

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With a coastline stretching from New York Harbor to Cape May, New Jersey stands to benefit from a new study designed to pinpoint the top 20 sites for hydrokinetic energy, a renewable resource produced by the movement of tides, waves and currents in oceans and other bodies of water. A City College of New York (CCNY) engineering professor is partnering with Natural Currents Energy Services, LLC (NCES), a leader in tidal power technology, to locate these sites.

Dr. Hansong Tang, Assistant Professor of Civil Engineering in CCNY's Grove School of Engineering, will perform computer modeling for the project and Roger Bason, president and founder of NCES, will conduct field measurements. The 18-month effort is supported by $260,415 from New Jersey Department of Transportation (NJDOT) and the University Transportation Research Center, which is based at CCNY.

Recent advances in tidal energy technology, tidal site permitting and hydro-power demonstration projects have encouraged the New Jersey government officials to further support the investigation of the statewide potential for tidal power generation so that the state can achieve its goal of 20% renewable energy by 2020. It is believed that this analysis and the execution of tidal energy projects will generate jobs, stimulate the New Jersey economy and reduce atmospheric concentrations of greenhouse gasses and CO2, which are known to impact the earth's climate.

Site selection is critical to hydrokinetic energy projects because the

kinetic energy in a current is related to its speed cubed. This means a tide stream moving twice as fast as another tide stream of equal volume would generate eight times as much energy as the slower flow. Because measurements cannot be obtained from every cubic meter of the study area, Professor Tang will apply his computer modeling skills to produce refined estimates.

"There are existing coastal ocean models that estimate flow velocities over areas of one square kilometer or larger, but we need to make flow estimates on scales as small as10 square meters or finer," said Professor Tang. "One of our goals is to successfully and accurately integrate macro-scale and small-scale models to reliably predict multi-scale and multi-physics coastal ocean flows, which is a unique approach that has not been done before."

"Our goal is to better understand the potential for tidal energy generation along the coastline and the technologies that are best suited to harness the power of existing tidal currents," added Roger Bason, president and founder of NCES, which is installing a tidal energy site in New Jersey and plans to build one in New York. "These questions and much more will be answered through our analysis."

Because water is 832 times denser than air, movement of tides, waves, ocean currents and rivers represents an untapped, powerful source of clean energy. According the Union of Concerned Scientists website, in the United States, it could feasibly produce enough power for more than 67 million homes.

"Producing useful estimates will involve obtaining computer prediction and field measurements for several variables," Professor Tang said. "Besides measuring flow speeds as the tides rise and ebb, criteria to be computed and measured include changes in depth and velocity."

In May, NCES began installation of two 20kW cross-flow tidal turbines to generate electric power for the Will's Hole Marina and Kingsbridge Financial Services property in Point Pleasant Beach, NJ, on the south shore of the Manasquan River. The project, the first of its kind in New Jersey, was approved by the state department of environmental protection in January 2010.

Natural Currents will also install a renewable energy park on the south shore of Wards Island in the Hell Gate channel between Queens and Bronx Counties in New York City. The project is supported by $990,000 from the U.S. Department of Energy.

Provided by City College of New York