Bringing Electricity Access to Countries through Ocean Energy: BEACON -- Combatting Energy Poverty through the Development of a Novel Ocean Energy Probe

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This research was intended to mitigate the energy poverty crisis through the development of a novel, economically feasible, and easily transportable current energy probe prototype. BEACON converts the kinetic energy from any moving body of water into usable electricity. The researcher obtained permission from the United States Coast Guard Auxiliary to test in the Boca Raton Inlet and conducted underwater surveys so precautions could be taken to protect marine life during prototype testing. The preliminary prototype was handheld and included a housing system where cavitation was caused by impellers and failed to generate ample electricity. The first iteration of the prototype, BEACON 1.0, was handheld and utilized three-bladed propellers. Electricity was generated, however the researcher sought to improve prototype practicality. BEACON 2.0, the autonomous prototype, had pelton wheels attached to an AC generator. The AC power was converted to DC power through a bridge rectifier. The DC power was transferred to LED lights, which were powered consistently. BEACON 3.0, the third and final prototype, was sourced from 90% recycled materials and cost $12. Flow tests were conducted in the Inlet to model conversion ratios of RPM to battery charge rate over time so the data could be extrapolated and applied to future prototype development. The researcher envisions that BEACON 1.0 can be used in classrooms for STEM instruction, BEACON 2.0 can be utilized in developing countries for access to devices dependent on electricity, and aspects of BEACON 3.0 can be incorporated into both prototypes to increase economic feasibility.

Awards Won: