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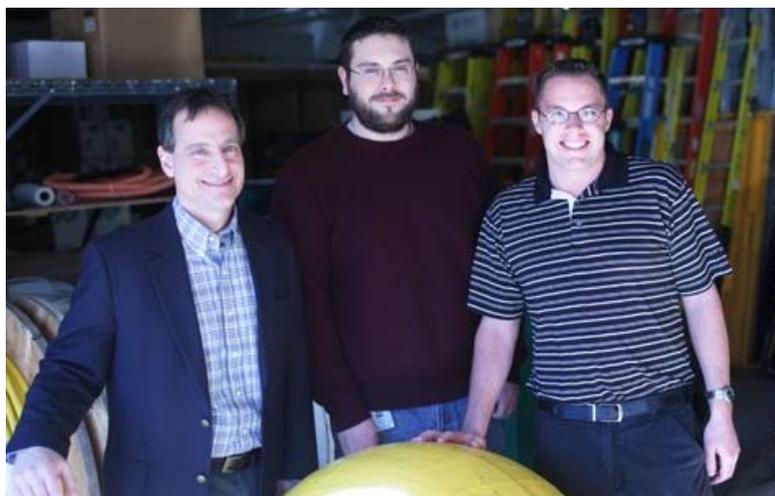
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THE UNIVERSITY OF RHODE ISLAND



## College of Engineering

Shaping the world in which we live.



## Wave Power

### *Creating energy and jobs with innovative buoys*

At Electro Standards Laboratories, the wave-powered ocean buoy represents the future. Powering buoys by the rise and fall of waves could fundamentally alter everything from military intelligence to ship navigation while opening new markets for Rhode Island research and development company [Electro Standards Laboratories](#).

“We’re banking on them,” says Raymond Sepe Jr., vice president of research and development. “I really believe we have all the pieces to be a success.”

A major piece comes from the University of Rhode Island. Ocean engineering Professors Annette and Stephan Grilli and their students have invested four years partnering with the company to develop the technology. They have modeled the potential power of waves, drafted buoy designs, built scale models, tested them in the University’s wave tank, deployed them for tests in Narragansett Bay and analyzed results.

Sepe says the University team provides ocean engineering skills that complement the controls and linear generator expertise at his company. The unique combination has allowed the partners to leverage hundreds of thousands of



Ocean Engineering Professor Stephan Grilli is partnering with Electro Standards Laboratories to

dollars in government grants.

develop wave-powered buoys.

The U.S. Navy has expressed particular interest. Batteries that power its buoys eventually run dry. When they do, the Navy must send in costly resupply ships.

The buoys under development by Electro Standards and the University would virtually eliminate those trips.

Other potential markets include buoys carrying navigation beacons or sensors to monitor the weather, predict earthquakes or track global climate change. And unlike their solar-powered cousins, wave-powered buoys would generate power 24/7.

“The big picture here is to eventually have a new product on the market,” Stephan Grilli says.

Electro Standards is investing heavily to make that happen. In 2012 the Cranston, R.I. company hired ocean engineer and URI alumnus Doug Gemme ('06) to work exclusively on the project. Sepe has reassigned other staff to the project and helped fund the field tests of the two most promising designs.

One design consists of a linear electric generator with four stabilizing buoys arranged in a square around it. Advanced control techniques actively adjust power flow to maximize energy transfer under changing wave conditions. The outer buoys, resembling miniature rockets, keep the generator from rolling in the waves, allowing maximum stability.

The second design consists of a floating buoy with a generator hanging from it and a weight at the bottom. As the entire device bobs in the waves, the differential motion between the upper float and a resistance plate generates power. The design eliminates the need for hard moorings in deep-water applications.

Stephan Grilli says the designs are unique because they operate in a variety of conditions, hold up during storms and require minimal maintenance. The buoys also incorporate innovative energy storage technology under development at Electro Standards. State-of-the-art supercapacitors exhibit extremely low energy leakage and can charge and recharge millions of times.

Ultimately, the buoys could stand more than 48 feet tall, displace 17 tons of water and generate enough electricity to power the average American home.

The project was born almost by chance. Electro Standards President Raymond Sepe Sr. struck up a conversation with ocean engineering Professor Emeritus Malcolm Spaulding at a conference.

The University had expertise in ocean research and Electro Standards held strong knowledge of linear generators and was searching for new markets. The company's president quickly saw a potential partnership.

The younger Sepe envisions the company finalizing a design and then manufacturing the buoys at its Rhode Island headquarters. That could create jobs and put the Ocean State at the forefront of a nascent industry.



Electro Standards Laboratories Vice President of Research and Development Raymond Sepe Jr. with a prototype buoy.

“We’re a company in Rhode Island and I’d like to stay a company in Rhode Island. And I’d like to be a successful company in Rhode Island,” Sepe says. “If we could put this whole thing together it could be sustaining for the long term.”

*Pictured above left: Electro Standards Laboratories Vice President of Research and Development Raymond Sepe Jr. with company engineers Doug Gemme ('06) and Travis Tucker ('06) with a prototype buoy. Right: One of the prototype buoys deployed for a field test in Narragansett Bay.*

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