



UMaine Today

We stand now where two roads diverge. But unlike the roads in Robert Frost's familiar poem, they are not equally fair. The road we have long been traveling is deceptively easy, a smooth superhighway on which we progress with great speed, but at its end lies disaster. The other fork of the road – the one less traveled by – offers our last, our only chance to reach a destination that assures the preservation of the earth. - Rachel Carson

Harnessing Nature

UMaine researchers tap the environment's innate potential to provide energy alternatives

by Aimee Dolloff

Americans have been called to chart a new energy future, invest in clean, renewable energy and combat climate change. While science must lead the way in developing new technologies, the culture of an entire country dependent on fossil fuels must revolutionize the way it operates. This sustainability initiative not only is about preserving what resources we have left and minimizing the damage that already has been done. It's about living in a new way that's respectful of the resources around us.

At the University of Maine, researchers are discovering ways to create energy and improve existing technologies that are both environmentally safe and consumer-friendly by harnessing the energy produced all around us by the sun, wind, water and earth.

"People ask me why UMaine is taking on this challenge. I tell them, 'because this is the future of Maine,'" says Jake Ward, UMaine's assistant vice president of research, economic development and governmental relations. "Maine's greatest challenge in the next half-century is going to be how we support our citizens, our businesses and our environment, and energy is the biggest part of that. Our goal is not just in good research and energy creation, it's in economic development for Maine. All of these areas have the potential to be excellent economic development drivers for the state to keep Maine a great place."

Tidal

The power of waves crashing on Maine's jagged coast has been captured in paintings and photographs for years. Now, it's time to capture that energy to help alleviate the state's dependence on fossil fuels.

Tidal power is tapped by submerged turbines with foils that are turned by ocean currents, similar to the way that wind moves turbines on land. But before full commercialization occurs, researchers and developers need to fully understand all aspects of the project.

"We know how much power potentially could be produced, but we don't know how much you can extract commercially and have it be economically feasible and environmentally responsible," says Michael "Mick" Peterson, UMaine Libra Professor of Engineering.

UMaine researchers are using a \$951,500 federal appropriation to lead a collaborative effort to advance development of Maine's tidal power resource.

They are assessing current prototypes and models of turbines that can be submerged in the ocean to produce power using tidal currents. The researchers also will evaluate the potential environmental impact of harnessing tidal energy off the coast of Eastport in the Western Passage of Passamaquoddy Bay.



Roll on, thou deep and dark blue ocean, roll! – Lord Byron

UMaine oceanography professor Huijie Xue is an expert in oceanographic computer modeling, which is key to understanding how much energy is produced by ocean currents. She points out that Maine's jagged coastline contains many channels and passages perfectly suited for capturing tidal power, including Cobscook Bay in Maine and the Bay of Fundy in Nova Scotia that have some of the highest tides in the world.

"(Eastport) is the most viable site with the highest tides in the continental United States," says Peterson, one of the driving forces behind the project. "If tidal energy is going to be commercialized in the U.S., it's going to be in Maine."

The impact on the ocean environment and how to lessen that effect is another issue researchers are working to understand.

"Since we've been talking about tidal energy, and it's been around for a long time, there's been obvious concern that when you put a turbine in the water, there could be potential (environmental) impact," says Gayle Zydlewski, a fish biologist with UMaine's School of Marine Sciences. "(But) if we do it right, it can be done in a safe and sustainable way."

Once the environmental and commercial viability questions are answered, it is likely that the technology can be implemented fairly quickly.

Maine Maritime Academy (MMA) and Portland-based Ocean Renewable Power Company LLC (ORPC), partners in the ongoing research, bring specialized skills and knowledge that will allow the research and turbine development to advance efficiently and safely, serving the state's economy and the environment.

"It's a technology that is something that we can implement in a fairly short term — a matter of years," says MMA engineering professor Rich Kimball. "For example, offshore wind has a much larger potential, but that's going to be a longer time frame to get that developed."

In addition to involving students from both UMaine and MMA in creating a new industry, there is abundant opportunity for Maine's small coastal communities to benefit from the prospect of jobs and positive economic spin-off.

"This funding will allow us to kick off an important project that is going to have significant economic impact in Washington County and throughout the state," says Chris Sauer, ORPC president and CEO.

The company estimates that in the next seven years, tidal energy has the potential to be a billion-dollar industry in Maine.

Throughout the summer, the company conducted in-water testing of the commercial design of its generator unit, which has turbines made of a composite material developed by U.S. Windblade LLC of Bath, Maine, and a composite structural frame made by Harbor Technologies LLC of Brunswick, Maine — two companies with ties to UMaine's AEWC.

Last year, ORPC proved that its turbine generator unit is technically viable; now it's time to continue with the process to demonstrate that it's ready for commercial use.

"It's critical that we are able to prove through this testing that this turbine generator unit is commercially viable," Sauer says. "It has the potential of catapulting us to the front of the tidal energy industry, while at the same time putting Maine on the world map as far as tidal energy."

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**2 Portland Fish Pier, Suite 307
Portland, ME 04101**



**Phone: 207-772-7707
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