

Wave Energy

For decades, researchers have tried to tap the clean energy of ocean waves. Unfortunately, storms and seawater have wreaked havoc on their delicate turbines. But now there's a solution on the horizon: buoys that generate energy with nothing more than a souped-up rubber band.



In this prototype of a power-generating flotilla, "artificial muscles" attached to buoys convert the vertical and lateral motion of waves into electricity.

The concept derives from the discovery a little over a decade ago of so-called dielectric elastomers, stretchy plastics that react to and generate electricity. When electricity runs through an elastomer, the elastomer compresses and contracts, much the way a muscle does. It didn't take long for researchers at SRI International, a nonprofit organization based in Menlo Park, Calif., to realize that the process would work in reverse: stress and relax the elastomer, and it will generate electricity. One early application of the idea involved harnessing the energy in the compression of an elastomer shoe heel. The shoe device that SRI built — financed by Darpa — generated enough juice from walking to recharge the batteries on, say, a cellphone.

But shoe generators won't curtail our dependence on foreign oil; wave generators that make use of elastomers, on the other hand, might. SRI's idea is as elegant as it is simple. Imagine a cable of elastomer with one end tied to the ocean bottom and the other attached to a buoy on the surface. When the buoy rides up a crest of the wave, it stretches the elastomer. When it sinks into a trough, it contracts and then generates a pulse of electricity. Hoping to power a buoy's light bulb, SRI tried out a version of the idea in the waters off St. Petersburg, Fla., this past summer. While the energy output was a paltry five watts, the firm hopes to scale up. Better yet, the simplicity of the design will in theory make buoy generators cheaper and more durable than other technologies that harness the wind and the waves. Moreover, the buoys could be anchored just beneath the water, where they won't obstruct beachcombers' views of the ocean. "You wouldn't see anything," promises Ron Pelrine, an SRI scientist.