

Unit 7: Wave Power

Narrator: In our quest to find new sources of renewable energy, engineers are turning to the ocean, a resource that has one big advantage over all of its competitors.

Richard Yemm: I think we can say that, effectively, the opportunities are unlimited. 70 percent of the world's surface is covered in oceans, and all oceans generate large waves and there is power available on any coastline facing those.

Narrator: Wave power is accessible to everyone, and advocates say that it could provide energy for hundreds of thousands of homes. Richard Yemm agrees. His invention, aptly named Pelamis, after a tropical sea snake, looks just like that: a giant red snake, floating on the ocean's surface. And as it bounces up and down on water, it turns the power of the waves into electricity. Here's how it works: waves move the cylinders floating on the ocean's surface. Inside the cylinders are hydraulic rams. These water pumps force the water through a hydraulic motor under high pressure. And this, in turn, drives an electrical generator which produces electricity. Pelamis can generate 750 kilowatts of energy but the plan is to create farms of these sea snakes.

Richard Yemm: The kind of format that we would expect would be an array of machines sharing mooring points between themselves to create a grid of, perhaps, thirty, fifty, a hundred machines covering a couple of square miles of sea surface.

Narrator: And that's enough electricity to light up a small city. The technology was first tested in a lab where wave simulators recreated all types of weather conditions. Then, scale models were created and tested in open water. But the real challenge lies ahead.

John Constable: I imagine it's going to be quite challenging. These are very powerful forces, particularly for those traveling with waves. They've really got to design the technology to survive in a very hostile place, the sea.

Narrator: After five long years, the time has finally arrived to test a life-size prototype. And it's happening here, off the coast of Scotland.

Richard Yemm: The Pelamis is unique in that it combines features which are very survivable; it's long and thin so when big waves come through, its streamline presents the minimal area

to these ocean monsters and storms. But it's that same long, thin form that, in small waves, is the optimal hydrodynamic shape for capturing power.

Narrator: But, today, the team runs into a problem. One of the hydraulic rams malfunctions and Pelamis is taken back to shore for repairs.

Richard Yemm: I think survivability as being a critical issue for everyone in the marine environment. It's one of the biggest factors that we must address if we're going to create economic wave energy.

Narrator: And creating economic energy is key. Pelamis already has its first commercial client in Portugal. After years of tests, the first machines were in place and generating energy in Portugal in 2008. The potential of wave power is tremendous, accessible to all, and limitless in supply. Some believe it may very well change the way we think about energy in the future.

Alex Salmond: This is technology which doesn't offer tens or even hundreds of megawatts of power. As we get better at it, as it's deployed, as we get the economies of scale, as the technology is honed and improved, this is technology of gigawatts of power.