

# The hidden power of moss

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Close-up of the moss pots incorporated into a novel table developed at Cambridge University. Credit: Institute for Manufacturing, University of Cambridge

(PhysOrg.com) -- Scientists at Cambridge University are exhibiting a prototype table that demonstrates how biological fuel cells can harness energy from plants.

Moss is regarded as a menace by gardeners who seek to eradicate it from their lawns. Now researchers all over the world are exploring how moss, algae and plants could be used as a source of renewable energy in the future.

A team of designers and scientists at Cambridge University are exhibiting a novel moss table at the London Design Festival which takes place today and tomorrow. The table will showcase an [emerging technology](#) called biophotovoltaics (BPV) which uses the natural process of photosynthesis to generate [electrical energy](#).

Featuring biological fuel cells made from moss, the table has been created to provide a possible vision of the future by Alex Driver and Carlos Peralta from Cambridge's Institute for Manufacturing and Paolo Bombelli from the University's Chemical Engineering and Biotechnology Department.

Still at early stages, BPV has the potential to power small devices such as digital clocks. Low cost BPV devices may become competitive alternatives to conventional renewable technologies such as bio-fuels in the next ten years.

The appeal of BPV lies in its ability to harness a natural process that takes place all around us. Photosynthesis occurs when plants convert carbon dioxide from the atmosphere into [organic compounds](#) using energy from sunlight. Plants use these organic compounds – carbohydrates, proteins and lipids – to grow.

When the moss photosynthesises it releases some of these organic compounds into the soil which contains symbiotic bacteria. The bacteria break down the compounds, which they need to survive, liberating by-products that include electrons. The table designed by the Cambridge University team captures these electrons to produce an electrical current.

The table is based on research into biophotovoltaics funded by the Engineering and Physical Sciences Research Council (EPSRC). This pioneering work involves collaboration between the Departments of Chemical Engineering and Biotechnology, Biochemistry and Plant

Sciences at Cambridge University, and the Chemistry Department at Bath University. The research is led jointly by Dr Adrain Fisher, Professor Christopher Howe and Professor Alison Smith at Cambridge, and Dr Petra Cameron at Bath.

Alex Driver said: “The [moss](#) table provides us with a vision of the future. It suggests a world in which self-sustaining organic-synthetic hybrid objects surround us, and supply us with our daily needs in a clean and environmentally friendly manner.”

Looking into the future, possible applications for BPV include solar panels, power stations and generators. Currently at concept stage, these are envisaged as sustainable solutions to pressing problems across the world – including the growing need for energy and fresh water from vulnerable communities.

A modular system of biological solar panels would be mounted on to the roof of a building to supply it with a portion of its energy requirements. A biophotovoltaic power station would comprise giant algae-coated lily-pads floating on the surface of the ocean near the coastline, generating energy for local communities. A biophotovoltaic generator would feature [algae](#) solar collectors mounted on floating buoys and anchored just offshore to generate energy and harvest desalinated water, which is a waste product of one of the chemical reactions occurring in the device.

The Cambridge team emphasised that the technology was at very early stages. “It will be a long time before a product powered by this technology will be commercially available,” said Dr James Moultrie, Head of the Design Management Group at the Institute for Manufacturing. “The table we are exhibiting this week demonstrates the ways in which designers can play a valuable role in early stage scientific research by identifying commercial potential and is one of the outcomes from our Design in Science research project.”

Provided by University of Cambridge

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