

Science turns sun, surf into green energy

Deborah Smith Science Editor
March 21, 2007

A REVOLUTIONARY technology that uses sunlight and sea water to produce an unlimited supply of clean, hydrogen fuel could be developed within a decade, Sydney researchers say.

Leigh Sheppard, of the University of NSW, estimated that 1.6 million of the solar devices, installed on rooftops, would be able to produce enough hydrogen gas to supply Australia's entire energy needs. While other energy options under discussion, such as nuclear power, produce harmful wastes, the only by-products of this solar hydrogen technology would be oxygen and fresh water, Dr Sheppard said.

"It is the cleanest, greenest energy option for a sustainable economy."

Dr Sheppard said much more research was needed, but the university team was confident it would be able to make the process efficient enough within 10 years for it then to be developed commercially. Its technique relies on using a light sensitive material, titanium dioxide, to harness the power of the sun to split water into oxygen and hydrogen gas. "The process has the additional advantage that it works best in sea water," Dr Sheppard said.

Australia was rich in titanium, and had abundant sunshine. "And we are surrounded by ocean."

It might also be possible to use artesian water, or pump sea water inland, to a large array of solar panels which could produce hydrogen for local use and even for export.

An area covering 40 square kilometres would meet the country's energy needs.

A way of using sunlight to split water was first developed by Japanese scientists in the 1970s, but worldwide interest in developing this approach has only recently been rekindled by concerns about burning fossil fuels and global warming.

The small UNSW team, led by Professor Janusz Nowotny, is a world leader in using titanium dioxide as a catalyst to split water. The researchers have developed instruments which can measure the electrical properties of the material so they can improve its performance by altering its oxygen content or adding impurities.

A visiting German solar expert, Helmut Tributsch, of the Free University in Berlin, said research was urgently needed into ways to convert the sun's power into usable energy, such as hydrogen fuel and photovoltaic electricity. Professor Tributsch said water splitting was a process nature used to harness the sun's energy. "We should really follow the example of nature. It is the only safe way to handle our environment in the long term."

Hydrogen was a clean and efficient fuel for powering everything from vehicles to furnaces and air conditioning. "When you burn it, it gives water, so there is no pollution of the environment," he

said.

Dr Sheppard said hydrogen fuelling stations for cars were operating in several countries including Germany and the US, but a lot more infrastructure would be needed before hydrogen could be widely used as an energy source. He said nuclear power had the advantage that it was a proven technology. "But this is a smarter technology. It does not produce toxic waste."

It could take five more years to commercialise the water-splitting technology once it was fully developed, he said.

Professor Tributsch will give a public lecture on solar energy at the university on Monday night.