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Shedding Light on Cheaper Solar Energy

By Brenda Townsend Hall

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Renewable sources of energy are the key to solving two of the worlds most pressing yet seemingly irreconcilable problems. On the one hand the developing world needs vastly to increase access to affordable energy because, at present, 1.6 billion people in the world's poorest countries do not have a power supply. However, on the other, we cannot go on depleting the world's finite resources of fossil fuels and contributing to the emission of harmful greenhouse gases by burning them. Thus sustainable development is threatened by a 'double whammy': the difficulty of meeting increasing demands for energy, without which development aims cannot be met, and the by environmentally harmful systems most often used to provide it.

Affordable, renewable energy sources would contribute greatly to breaking this impasse. However, the field is a complex one and nobody believes a single solution will be found that can answer all the world's energy needs. Even renewable sources have their drawbacks – wind and solar systems, for example, may never be able to stand alone as energy providers because they are, by their very nature, intermittent. However, they can be used very effectively in conjunction with other systems. A judicious mix of energy-producing systems can contribute to sustainable development by increasing the availability of energy to the poor, while reducing harmful impacts on the environment. But an intransigent limiting factor is the cost, particularly of the conversion of sunlight for energy. If systems are not affordable they will be beyond the reach of the poorer countries whose needs are most pressing.

Recently, however, a project undertaken by a team of physicists, chemists, material scientists and engineers at Sheffield Hallam University, with funding from the Engineering and Physical Sciences Research Council (EPSRC), has given a new boost to the economic feasibility of solar energy. The research has shown how to reduce the cost of generating solar electricity. Although electricity generation through the interaction of the sun's heat and light with semiconductors (called photovoltaics [PV]) has recognised environmental benefits, the technology has hitherto been hampered by the relatively high costs involved.

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Now the Sheffield Hallam University team has come up with some cost-cutting ideas: a low-cost semiconductor production method called electrodeposition, less reliance on expensive semiconductor materials, and the identification of alternative solar cell devices and manufacturing techniques with higher conversion efficiencies. Such efficiencies mean that more power can be produced per cell so that the cost of each unit of electricity generated is reduced.

PV can help the environment by offsetting the need to rely on electricity generated from the burning of fossil fuels. Two distinct systems now entering the PV market are based on the use of cadmium telluride (CdTe) and copper indium gallium di-selenide (CIGS) materials in solar cells. The team at Sheffield Hallam University has increased our understanding of PV by showing how solar cells based on CdTe and CIGS structures work. Lack of knowledge in this area, combined with cost, has hindered the widespread take-up of the technology. Now the team has opened up the prospect of new solar cells being developed commercially with higher conversion efficiencies than those currently available.

Dr I. M. Dharmadasa, who led the research team says: 'We've already applied for two patents and are preparing the final draft of the third patent in connection with our work, but there's a lot more science to be explored that could increase conversion efficiencies to over 20% in the near future'.

The research initiative, Low-cost, High-efficiency Thin-film Solar Cells with Electrodeposited Semiconductors, has received initial total Engineering and Physical Sciences Research Council funding of £104,632 and follow-up Sheffield Hallam University funding of £140,000. EPSRC is the UK's main agency for funding research in engineering and the physical sciences and invests more than £400 million a year in research and postgraduate training to help the nation handle the next generation of technological change.

With affordable energy provision remaining one of the world's most urgent needs, the advances being made in this area offer real hope for a future in which energy supplies are more widely available without the drawback of environmental damage.

For more information, contact:

Dr I M Dharmadasa, School of Science & Mathematics, Sheffield Hallam University,

Tel: 0114 225 4067, E-mail: dharme@shu.ac.uk;

website: www.shu.ac.uk/schools/sci_eaching/as1/SCResearch.html

EPSRC: www.epsrc.ac.uk/

Jane Reck, EPSRC Press Officer, Tel: 01793 444312, E-mail: jane.reck@epsrc.ac.uk.

The author is a British writer resident in France. She specializes in development and environment issues and writes about the EU. Find out more at www.worldsapartreview.com

Solar Powered Homes Are Becoming More Popular

By Dave Moore

In this day and age of ever growing efficiency, everyday folks are looking to capitalize on today's

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current technology to save money in all areas of their budget. And since energy prices are getting steeper, and concerns of man-made pollution are on the rise, the choice to retrofit an existing home into a solar powered home is becoming more enticing to the average consumer.

Solar Power use for the everyday homeowner used to be limited to just heating the backyard swimming pool. But these days solar power technology has grown by leaps and bounds. You can now have your entire home be powered by solar energy, including (but not limited to) garden and walkway lights, water heater, interior lighting, attic fans, central air conditioner, and, of course, your swimming pool.

Although the solar powered car is becoming the most popular use for this alternative energy source, the steps to create a solar powered home are not too hard (when using a professional service) and well worth the investment. There are a number of solar power panels and solar power kits available on the market, but if you are interested in solar power to power any part of your house, your best bet is to look up "solar power" in your local phone book.

Dave Moore is the operator of

which is a website dedicated

to informing the general public about the uses of Solar Power.



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