HERE COMES THE SUN
Solar Energy's New Dawn

By Angela Bleasdale
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Solar power, for decades regarded as environmentally worthy but uneconomic, is increasingly being seen as a viable energy option with vast commercial potential. In spite of hundreds of millions of dollars of investment during the past 20 years, the world market is still small. Only about 70MW of photovoltaic (PV) cells were produced last year for solar power -- enough to power a small city such as Oxford in the UK.

Yet a combination of new technology developments, rising demand in developing countries and measures by western governments to kickstart their own markets is generating a brighter future and a potential multi-billion-pound market.

According to Strategies Unlimited, a California-based consultancy, the industry has the potential to grow to 1,600MW by the year 2010, under certain conditions. The forecast was released last month at a PV convention in Virginia, organised by the US Institute of Electrical and Electronic Engineers.

Growth like that would be a shot in the arm for the PV industry. For several years, world production has shown steady year-on-year growth of about 15 per cent, but manufacturing capacity still exceeds demand. Globally, there is an estimated annual turnover of just 450m ($680m), according to the Energy Technology Support Unit at Harwell in the UK.

It is a little more than a cottage industry, says John Harford, manager of strategic planning at BP Solar International, a subsidiary of British Petroleum, the UK-based oil group.

PV enables light to be transformed directly into electric power -- when light falls on to the solar cells' thin film of treated semiconductor material (usually silicon), electrical charges are generated and conducted to an external grid.

Much of today's demand comes from remote communities not linked to the national grid in industrialised and developing countries.

Philip Bouverat, commercial director at the Intersolar Group, a specialist solar electric company, says the markets in developing countries are large and growing, and there is a great need for low-cost solar devices to bring electrification to rural communities.

In Indonesia alone, an estimated 11m families are without electricity. Depending on the volumes, the cost of some solar devices could be as low as $3 per watt, says Bouverat. He says that, as volumes increase and the price approaches $1 per watt, solar will become competitive with conventional energy.

At present, solar energy costs about 50p per unit (kWhp) as an installed working system. That compares with approximately 7p per unit for conventional electricity (nuclear and fossil fuel) and 20p per unit for wind-generated power.

In western countries, expansion of the market could lie in grid-connected applications, where PV-generated electricity can be fed back to the national grid. Harford identifies two such applications, the first being centralised PV stations, regarded as the holy grail by many in the industry.

But a more likely application in the shorter term would build on PV's main advantages -- power generation at point of use, avoiding distribution and transmission costs, and the fact it can be integrated into most urban buildings.

It is this area, with its substantial market potential, that has caught the imagination of the European PV industry. Solar panels can be located in the facades or roofs of commercial or domestic buildings to generate a portion of a building's electricity needs.

Richard Page, the UK junior energy minister, supported this view at a recent PV conference in London. He emphasised the UK's commitment to renewable energy, including solar, which was reflected in such government projects as the Technology Foresight programme and the Department of Trade and Industry's New and Renewable Energy programme.

The DTI helped finance the l.5m conversion of a building in Newcastle upon Tyne into the UK's first solar-power office block Page said it showed that office buildings will be able to generate one-third of their electricity needs from PV cladding.

But Greenpeace, the environmental lobbying group, says two-thirds of the UK's present electricity production could be generated by PV if it were deployed wholesale in homes and offices.

Harford says the industry faces a chicken and egg problem -- PV-generated electricity is still more costly than that from fossil-fuel power stations, but, if manufacturers were guaranteed sustained demand, they would invest in high-volume production, reducing costs dramatically.

The US Department of Energy has established a joint programme with the utilities to create what it sees as a necessary virtuous circle. It intends to double sales for solar products in four years and more than double the number of utilities using PV. It spent about $88m (58m) on initiatives in 1995 and its cumulative expenditure is approaching $880m.

For many years, Japan has promoted PV through its "Sunshine" renewable energy programme to reduce the dependence on nuclear energy and on imported oil and gas. By 2000, it aims to stabilise carbon emissions at 1990 levels, a commitment also made by more than 150 developed nations, including the UK. Japan also says new energy sources will account for 2 per cent of its energy requirements by 2000, 3 per cent by 2010.

That compares with the European Commission's PV in 2010 study which calls for production of electricity from renewables to be trebled. It also concludes that roof and building-facade grid-connected applications represent the fastest-growing solar market in Europe.

Other market initiatives include rate-based incentives where individuals or businesses invest in PV, recouping their investment over 10 to 20 years via a premium rate for the electricity they feed into the national grid. The schemes are funded by a small surcharge on electricity bills.

Harford says such schemes work best in countries with a high degree of local autonomy, such as Germany and Switzerland, where utility companies may be owned by local authorities and are more responsive to consumer preferences. He believes other mechanisms would be more appropriate for the UK.

Philip Wolfe, Intersolar's managing director, says the time is right to include PV in the UK's Non-Fossil Fuel Obligation, which subsidises electricity produced from renewable sources. Inclusion would expand the market, he says.

The DTI has so far excluded PV from the NFFO mechanism. The costs of PV-generated electricity have precluded this,@ Page says. The position will be reviewed after the next NFFO order, to be made in 1997.

However, John Battle, Labour's energy spokesman, says the party is committed to prising open NFFO and will include PV as part of its green energy policy.

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