

GREENPEACE

BUSINESS



Self sufficient, zero fossil fuel energy development – wind turbine and solar panels fitted to residential block in Bow, London – DE technologies promise an energy revolution

'The technology exists to enable a radical overhaul of the way in which energy is generated, distributed and consumed – an overhaul whose impact on the energy industry could match the internet's impact on communications.'

THE ECONOMIST TECHNOLOGY QUARTERLY

www.greenpeace.org.uk

Is smart energy the future?

Faced with the massive contribution made to global warming by conventional fossil-fuel power stations, Greenpeace is calling for a reinvention of the electricity supply industry, involving the creation of smart or decentralised energy (DE) systems throughout local communities (page 5). DE reduces climate-changing emissions because the technologies are clean and both the power generation and the transmission are more efficient.

DE also improves the security of the electricity supply. A town served by a network of many small interlinked power stations is less likely to be blacked out than a town dependent on a small number of large and distant power stations. As key parts of the electricity networks reach the end of their natural lives, there is now an opportunity to remodel our electricity system to allow everyone to be a part of the solution to both climate change and our reliance on outmoded and destructive technologies.

Some European countries are already putting this vision into practice. In Denmark 55% of electricity is generated by DE, and in the Netherlands 40% – compared to only 5% in the UK. In Finland, 98% of households in Helsinki are supplied with locally generated heat through community heat networks.

Solar innovators such as California-based Nanosolar also argue against the continued use of power stations, located far from the electricity users. Spurred on by supportive legislation in Germany and Japan and by breakthrough technologies, Silicon Valley investors now see solar as a major new business opportunity (page 6).

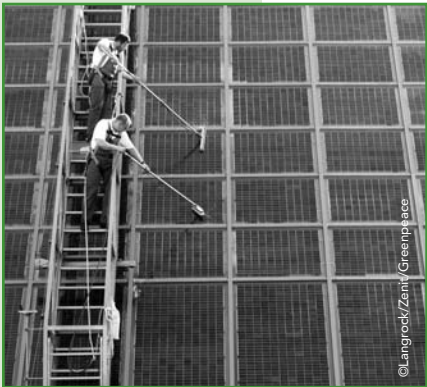
We are now receiving almost daily an avalanche of revelations about climate change damage – from news of melting permafrost in Siberia and disappearing ice sheets in Greenland to UN reports on the devastating consequences of climate change for poor countries. It is time for innovative action and bold government leadership – with decentralised, smart energy rather than nuclear or coal-fired power stations being the way forward for the world's energy needs.

Car usage remains a major cause of CO₂ emissions, yet manufacturers across the world continue to fight fuel efficiency legislation (page 4). In other stories, Greenpeace has uncovered an exploding marketplace in illegally logged plywood being laundered through China (page 8); a new Greenpeace report shows how UK supermarkets continue to deplete fish stocks and destroy marine ecosystems with unsustainable procurement policies (page 10); and Richard Reed, CEO of Innocent Drinks tells us how his company is pushing ahead down the sustainability trail (page 7).

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Silicon Valley investors lead solar expansion



Workers cleaning the photovoltaic facility on the roof of German government ministry building

This article was written for Greenpeace Business by Martin Roscheisen, CEO of Nanosolar.

This decade has seen solar electricity begin to become a mainstream commercial growth industry. This is due in part to the political lead taken by governments in Japan and Germany, which has encouraged entrepreneurs and technological innovators to develop solar power into a scaleable foundation for a major

industry. While solar was used in all kinds of ways in pre-mainstream days, it has now found its forte as the very best energy source for reliably addressing the daytime peak in electricity demand in developed countries with grid electricity. No other technology can generate power right when and where you need it without having to utilise expensive long-haul grid transmission capacity.

The German Government's strong and decisive renewable energy laws have helped to create an open global market with enough momentum and long-term commitment to change the solar industry fundamentally. Firstly, the German programme has generated a substantial immediate expansion of the global photovoltaics (PV) market. But secondly and ultimately more importantly, it has triggered second-order effects and virtuous circles, making the development of advanced solar technology eminently attractive to private investors.

Our own company, Nanosolar, has experienced this sea change in investibility. In 2001, when we raised our first round of financing, the common refrain in Silicon Valley was that solar electricity technology was something that General Electric (GE) should be doing and funding. It took the foresight of one of the top five franchise venture capital firms, Benchmark Capital, an early investor in eBay, to complete the funding. We thus became the first solar electricity technology company in history to receive Silicon Valley funding – a landmark signal. (Further investment support also came from Google founders Larry Page and Sergey Brin.) Today, every single venture firm has now at least one partner looking at clean energy and solar investments, and companies such as Nanosolar are now at a point where they have successfully concentrated more innovation dollars on solar technology than a giant corporation such as GE.

With the capital to explore technological possibilities, there has been a renaissance in

discovery. The new technologies being advanced are not only about far more cost-efficient solar cells, but also enable capital to be used far more smartly and efficiently: Nanosolar's technology, for instance, has such a high intrinsic process throughput that it is possible to build for as little as \$15 million a plant capable of producing 100MW of solar panels each year, far less than the \$250–300 million it costs to build a plant with the same capacity of conventional silicon wafer-based solar panels. These are manufacturing economies that will significantly affect the traditional PV manufacturers.

The new privately funded companies are also attracting an unprecedented quality of professional talent. For instance, Nanosolar's head of manufacturing, Werner Dumanski, ran IBM/Hitachi's \$4.5 billion hard-disk business and brought to market several of the most challenging technology generations in the field of thin-film storage disks. Having this level of talent work on solar electricity products is a historic first.

The market size and level of customer demand that can be addressed are ultimately dictated by the total system economics – including panels, other components, and installation. With today's technology, the total system cost in countries where there is relatively little PV business (eg Great Britain) can be as much as double that in countries where system integration is highly streamlined (eg Japan). With more cost-efficient products entering the market, systems will become incrementally more affordable, simply by virtue of the corresponding economies associated with streamlining the system integration business. This will lead to a virtuous circle between PV panel manufacturers and PV system integrators, much like the Wintel cycle which drove the PC industry.

With the key drivers in place to enable rapid growth in the solar sector, the most important help the industry can receive from political leaders at this point is the formulation of predictable and consistent policy. Regulations that are set for only a limited period of, say, two or four years – however well-intentioned they may be – do not tend to lead to the kind of R&D investment necessary to make a real difference in solar technology or to create sustainable, high-value jobs. But if the current political and entrepreneurial momentum is allowed to continue, we will gain a new growth industry where more profit means more environmental benefit.

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'We are going to move towards a future with a solar panel on every building.'

MARTIN ROSCHEISEN,
CEO, NANOSOLAR