

Ambitious target

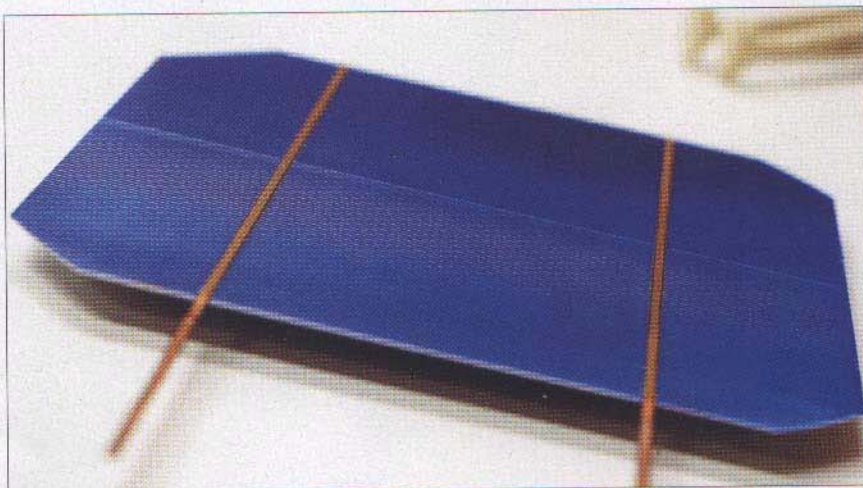
EU project to yield 60 percent cut in module manufacturing costs by 2008

A European consortium consisting of nine leading PV companies, three universities, and four research institutes wants to optimize technology for production of solar modules with crystalline silicon cells. By the end of 2008, the EU project Crystal Clear aims to improve the entire production chain – from silicon to module encapsulation – to such an extent that manufacturing costs for solar modules will drop by 60 percent in comparison with today's figures.

Wim Sinke is convinced: solar modules with classic cells made of crystalline silicon have yet to reach their zenith. »Many people think that crystalline silicon is an outdated technology. But that's not true. It's high-tech,« says Sinke. And he isn't just saying this because he's the project coordinator at the Energy Research Center of the Netherlands (ECN) for the large-scale Crystal Clear EU project focusing on crystalline silicon. Sinke believes that the industry

Project partners

There are nine manufacturers participating in the project: from Spain, BP Solar and Isofoton; from France, Photowatt; from Germany, RWE Schott Solar, Shell Solar, and SolarWorld subsidiaries Deutsche Solar and Deutsche Cell; and from Norway, wafer manufacturer ScanWafer and its parent company, Renewable Energy Corporation. As far as research goes, participants include the University of Konstanz in Germany, the University of Utrecht in Holland, the Institute for Solar Energy at the Polytechnical University of Madrid, the Laboratory for Physics and Semiconductor Applications (PHASE) at the National Center for Scientific Research (CNRS) in Strasbourg, France, the Interuniversity Microelectronics Center (IMEC) in Leuven, Belgium, the Fraunhofer Institute for Solar Energy Systems (ISE) in Freiburg, and ECN, as project coordinator. *jb*



Technology with a future: The potential for reducing the cost of solar cells made of crystalline silicon wafers has a long way to go before it's exhausted.

can profit considerably from the level of knowledge that already has been amassed about crystalline silicon technology. »We've done a lot of research on the technology's basic principles over the years. The research that has been conducted on the crystalline silicon fundamentals is extremely broad and solid,« he says.

The Crystal Clear project, which began in January, has set ambitious goals. Within five years, by the end of the project in Dec. 2008, a production process is to be developed that reduces current solar module manufacturing costs from around €2.50 (\$3.08) per W power by 60 percent to just €1.00 (\$1.23) per W. That would drop the price for a turnkey PV system – including costs for inverter, mounting system, installation, as well as markup – to around €3,500 (\$4,307) per kW (including VAT). In the market survey for turnkey PV systems in the February issue of our German-language sister publication, PHOTON, the average price for a turnkey 2 kW system was as much as €5,900 (\$7,260) per kW.

Crystal Clear is an example of a new form of »integrated project« in which the European Commission no longer is responsible for the management of various subprojects, but rather delegates that responsibility to a project coordinator. The eight subprojects cover the entire value chain – from raw silicon to manufacturing monocrystalline and multicrystalline ingots; from cutting silicon wafers to cell and module production. Even environmental questions like module energy

payback times will be investigated, in addition to material consumption and recycling methods.

With a budget of €28 million (\$34.5 million), Crystal Clear is currently the largest renewable energy project in the European Union's Sixth Framework Programme. Whereas €16 million (\$19.7 million) will come from the EU, the remaining €12 million (\$14.8 million) is to be contributed by the project partners. The consortium consists of leading PV companies and research institutions in Europe (see box).

The project's technological goals are, among other things, to develop large, thin silicon wafers with a surface area as large as 20 × 20 cm and a thickness of less than 0.2 m. At the same time, the wafers should have cell efficiencies between 17 to 18 percent, which would in turn increase module efficiency from a current 11 to 14 percent, to as much as 16 percent. The project participants want to totally reexamine the manner in which cells are connected and encapsulated. Through lower material consumption and higher efficiencies, a solar module's energy payback time will be cut in half.

Project coordinator Sinke admits that the project has quite ambitious goals, but he insists that he sees ways to cut costs at every point in the production chain. The project will result in a technology that immediately can be implemented, according to Sinke's estimates, »by around the year 2010.«

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