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# Press Release

**Freiburg**  
**September 27, 2012**  
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## **German Environmental Award for Concentrator Photovoltaics**

### **Andreas Bett from Fraunhofer ISE and Hansjörg Lerchenmüller from Soitec Solar awarded for their achievement in solar energy technology**

In the sun-rich regions of the world, concentrator photovoltaics (CPV) are used in large power plants to generate electrical energy from the sun. With this technology, almost twice the incident sunlight can be converted into electricity as compared to conventional silicon technology. Beginning in a research laboratory years ago, today's technology contributes to the energy turnaround on an industrial scale. Currently, thousands of industrially produced concentrator modules track the sun in large power plants. In each module lenses concentrate the sun by a factor of 500 onto small multi-junction semiconductor solar cells, which efficiently convert the sunlight into electrical energy. Upon receiving the German Environmental Award 2012, the success story of the concentrator photovoltaic technology continues.

Dr. Andreas Bett from the Fraunhofer Institute for Solar Energy Systems ISE and Hansjörg Lerchenmüller, General Manager of Soitec Solar GmbH, receive the prize for their achievements in research and industry. Soitec Solar brings this technology, originally developed by Fraunhofer ISE, onto the market. Günther Cramer, co-founder and chairman of the board of SMA Solar Technology AG, is a further recipient of this year's prize. The German Environmental Award 2012 will be presented to the winners by the German President Joachim Gauck on October 28, 2012 in Leipzig.

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For many years now, research and industry have been working on solar energy systems and components, making

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them increasingly efficient and therefore more competitive on the market. Aside from the conventional silicon solar cell technology, a variety of other cell technologies suitable for specific applications have been successfully brought onto the market. One of these solar cell technologies is concentrator photovoltaics (CPV), conceived particularly for use in large power plants ranging from a few to several hundred megawatts in locations having a large amount of direct solar radiation. Concentrator power plants have a modular construction and therefore are freely scalable. The technology combines a special cell concept with a lens and a two-axis tracking system and can convert up to twice the sunlight into electricity as compared to conventional silicon PV technology. For CPV manufacturers like Soitec Solar, important markets for this technology are sun-rich countries with a high amount of direct irradiation, like South Africa or the USA.

Miniature multi-junction solar cells with a diameter of only three millimeters are responsible for the power production in these megawatt solar power plants. Unlike silicon solar cells which have only one type of semiconductor, multi-junction solar cells are made up of a stack of different semiconductors from groups III and V of the periodic table, here namely gallium-indium-phosphide, gallium-indium-arsenide and germanium. Each of these semiconductors converts different wavelength ranges of light into electricity. For each multi-junction solar cell, a Fresnel lens is used to concentrate the direct sunlight by a factor of 500 onto the cell. "A cost-effective optical lens concentrates the sunlight and allows the economical use of the comparative costly semiconductors used in this system. Depending on the concentration factor, only one five-hundredth to one-thousandth of the semiconductor material is required, yet still improving the efficiency of the solar cell," says Dr. Andreas Bett, Division Director "Materials – Solar Cells and Technology" and Deputy Director of Fraunhofer ISE.

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Decisive for an efficient and economical operation of large CPV power plants is the interplay between the singular components, as emphasized by both award winners from Freiburg. This plays a part in the module construction, the connection of the modules as well as for the entire system technology and process control. "The efficiency of a concentrator module manufactured by Soitec Solar is currently about 30 percent. At the same time, we are using cost-effective materials. Exactly this combination of low material costs and high efficiency is the key to keeping electricity production costs down," explains Hansjörg Lerchenmüller, General Manager of Soitec Solar GmbH in Freiburg. In 2009, Andreas Bett and his team achieved a world record efficiency of 41.1 % for a III-V multi-junction solar cell under laboratory conditions. Both Bett and Lerchenmüller see further potential for increasing the efficiency of solar cells and modules in the future.

At Fraunhofer ISE in a research team with over 50 scientists, Bett is actively working to further increase the efficiency of multi-junction solar cells. In a specially equipped laboratory called Concentrator Technology ConTEC they also work on optimizing the construction of the concentrator PV module. Today, the cooperation between Fraunhofer ISE and Soitec Solar is still a given. Soitec is working on expanding the installed capacity of CPV power plants worldwide. With Soitec Solar GmbH, the Freiburg subsidiary of the French semiconductor materials company Soitec, Lerchenmüller has contributed greatly to the industrial implementation, commercialization and the international expansion of the concentrator technology. The company successfully transferred the concept of the concentrator module to industry and today stands as one of the market leaders in the field. Soitec Solar has set up a 70 MWp automated production line for CPV modules in Freiburg, Germany. Presently, a module factory with 280 MWp production capacity is being constructed in San Diego, California. The signs are good for further expansion and new record

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efficiencies. For Bett and Lerchenmüller, receiving the German Environmental Award is “gratification, motivation and, above all, a great pleasure.”

“Andreas Bett and Hansjörg Lerchenmüller were key contributors to develop this very innovative, reliable and efficient CPV technology” says Gaetan Borgers, Executive Vice President of Soitec's Solar Energy Division. “Today, Soitec operates in Freiburg one of the world's most modern production lines for manufacturing CPV modules. We already have more than 10 MWp installed around the world “Also Prof. Eicke R. Weber, Director of the Fraunhofer ISE is greatly pleased, “Giving the German Environmental Award to the exceptionally successful tandem of Fraunhofer ISE and Soitec Solar sends a clear signal and emphasizes the significance that innovations in photovoltaics have for the future global energy supply.”

## **About the German Environmental Award**

Every year in October, the Deutsche Bundesstiftung Umwelt (DBU) awards the German Environmental Award endowed at 500,000 euro, the highest endowed environmental award in Europe. Since 1993, the DBU honors individuals for their outstanding achievement and applications in environmental conservation, the German medium-sized businesses for innovation and creative environmental technology or scientists for the dissemination of their sustainable ideas and results into policy and the community. With the German Environmental Award, the DBU strives not only to honor, but also to motivate individuals as well as corporations. Since in many cases, only interdisciplinary solutions provide answers for the large challenges we are facing today: climate and environmental protection, conservation of resources, efficiency improvements and sustainable development.

## **About Fraunhofer ISE**

With a staff of 1200, the Fraunhofer Institute for Solar Energy Systems ISE, based in Freiburg, is the largest solar

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energy research institute in Europe. Fraunhofer ISE is committed to promoting energy supply systems which are sustainable, economic, safe and socially just. It creates the technological foundations for supplying energy efficiently and on an environmentally sound basis in industrialized, threshold and developing countries. To this end, the institute develops materials, components, systems and processes for a total of eight different business areas: Energy-Efficient Buildings, Applied Optics and Functional Surfaces, Solar Thermal Technology, Silicon Photovoltaics, Photovoltaic Modules and Systems, Alternative Photovoltaic Technology, Renewable Power Supply and Hydrogen Technology. Fraunhofer ISE also has numerous accredited test facilities. [www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)

## **About Soitec**

Soitec is an international manufacturing company, a world-leader in generating and manufacturing revolutionary semiconductor materials, at the frontier of the most exciting energy and electronic challenges. Soitec's products include substrates for micro and nanoelectronics, most notably SOI (Silicon-on-Insulator) and concentrator photovoltaics (CPV). The company's core technologies are Smart Cut™, Smart Stacking™ and Concentrix™. Soitec also holds broad expertise in the field of epitaxy. Applications include consumer and mobile electronics, microelectronics-driven IT, telecommunications, automotive electronics, lighting products and large scale solar power plants. Soitec has manufacturing plants and R&D centers in France, Singapore, Germany, and the United States. [www.soitec.com](http://www.soitec.com)

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Dr. Andreas Bett, Fraunhofer ISE, and Hansjörg Lerchenmüller, Soitec Solar, receive the German Environmental Prize 2012 for the successful development and commercialization of the concentrator photovoltaic technology.  
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