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# Intersolar 2008: the largest solar fair of the world shows the continuously increasing global importance of solar technology

by Rolf Hug
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Ever since the year 2000 the Intersolar specialists' fair has become an undeniable and indispensable signpost of the turn in energy affairs. At the first Intersolar in Freiburg already, about 200 exhibitors – at the time mainly from Europe – on an exhibition area of 6 000 m2 presented solar technology for the production of electricity and heat. By moving this trade fair to Munich it has become the most significant industrial fair for photovoltaics, solar thermics and solar construction of the world. Over 1 000 companies from around the world displayed their solar technology solutions from 12 to 14 June 2008 on an exhibition area of 76 000 m2. 51 861 visitors arrived in Munich for the Intersolar; 44.9% came from 140 countries abroad and emphasised not only the significant number of international exhibitors (47%) but also the importance of Intersolar as the global leader in its field.

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Left: Great numbers of visitors at the Intersolar 2008. Right: High-tech XXL: Photovoltaic tracking system with 288 m ²: Source of images: Solar Promotion

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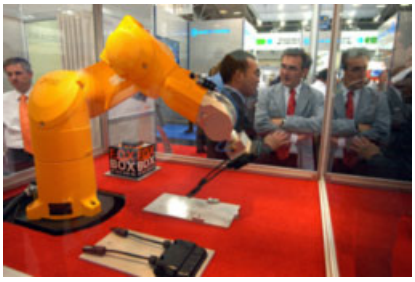
## Innovations on a large scale – and in great detail

For three days visitors at the Intersolar could inform themselves in seven halls about solar power and solar heat: they could see innovative solutions for the regulation of solar thermal systems, high-end components and systems from photovoltaics and solar thermics, as for example the most powerful 2.5 MW PV large-scale inverter. But also production systems and equipment for manufacturers of solar cells and solar modules were presented on a large scale. Industrial equipment manufacturers increasingly contribute to lowering the costs of photovoltaics by creating solutions for the efficient, resource-saving production of solar cells and modules. What the contribution of robotics, assembly and operation technology can mean to the PV industry, the visitors of the Intersolar could see at the Automatica fair that was held simultaneously. There, companies such as Bosch Rexroth AG (Lohr am Main) or Manz Automation AG (Reutlingen) presented automation solutions and production systems for solar cell and module manufacturing.



Automation technology is becoming increasingly important in the solar industry. Left: Robot manufacturing solar cells. Right: Rexroth transfer system TSsolar conveys highly sensitive photovoltaic modules safely and cleanly. Sources of images: Solar Promotion GmbH; Source: Solarserver.

"The level of internationalisation that we have now achieved is an important milestone for the development of the Intersolar and underlines the significance that this fair holds as a branch platform of solar technology. At the same time the figures are also an important indicator for the developing foreign markets and show the international potential that solar technology holds for the industry," emphasises Markus Elsässer, Managing Director of Solar Promotion GmbH, one of two organisers of Intersolar.

In the run-up to the fair already, the international photovoltaics industry discussed the latest developments during the fourth PV Industry Forum and these discussions showed that competitiveness of solar power can be expected in a few years already. And solar thermics too, that has gained significantly in importance due to the new record highs of the oil price, had its own forum. This Solar-Report reflects on a trade fair of superlatives, presents the winners of the Intersolar AWARD 2008 and highlights important innovations that were introduced at the New Fair in Munich.

## Photovoltaic industry on its way to grid parity

Over 600 participants from the world of industry, research and finances discussed the future of global photovoltaic markets on 10 and 11 June during the 4. PV Industry Forum in Munich. The congress revealed rather hesitant optimism regarding the short-term market developments in Germany and Spain, but the focus was on the benefits of scale of industrial PV production that would catapult solar power (grid parity) to competitiveness within a few years and would open new markets throughout world.

As a direct consequence of the new version of the German Law on Renewable Energy (EEG), that was passed on 6 June 2008 experts in the field expect system prices to drop since feed-in tariffs for solar power will be lowered from 1.1.2009 onward. For large-scale photovoltaic systems with an output of over 100 kW the degression will be increased to 10% from 2009, which would significantly limit economic feasibility of new solar power plants of this size in Germany if the current price levels remain constant. But also for smaller PV systems, degression will increase in the next two years from 5 to 8%. From 2011 it will be raised to 9%. In addition the revised law prescribes a growth corridor for the future: when the upper limit for additional photovoltaic construction of 1 500 MW is exceeded, degression is to be increased by another percentage point.

However, on the Industry Forum as well as the Intersolar sensational price developments could be noted, particularly for large-surface thin-film modules. Mass production can lead to significantly lower production costs and at the same time technological developments contribute to increased efficiency. Another advantage of large substrates is that they save time and thus reduce costs of installation. Thin-film production systems manufacturer Applied Materials, for example, anticipates manufacturing costs to have reached about one dollar per watt of output by 2010 – and thus grid parity will have been reached at sunny locations. Announcements made by other large PV companies represented on the Industry Forum also indicated that decreasing production costs will significantly improve economic feasibility of solar power systems.


Left: Large-scale photovoltaic systems speed up economic feasibility of solar power. Right: Worldwide interest in solar technology with good output is on the increase. Source: Solar Promotion GmbH

## Revolutionary solar technology received the Intersolar AWARD

This year Intersolar for the first time bestowed merit upon path-breaking products and services in the field of photovoltaics and solar thermics. "With the Intersolar AWARD we are honouring the innovative power of our sector and make the performances in the field of research and development visible on an international scale," says Carsten Körnig, Managing Director of the Bundesverband Solarwirtschaft (BSW-Solar). The winners of the Intersolar AWARD 2008 are skytron energy (Berlin), SMA Solar Technology (Niestetal), Phoenix Solar (Sulzemoos) and PAW from Hameln. The panel of judges honoured one company in the category of solar thermics and three photovoltaic innovations. In future up to three companies of both categories are to receive awards.

All award winners have significantly improved economic efficiency and reliability of solar technology in its day-to-day applications with their technologies and path-breaking ideas: skytron energy achieved this with a service-oriented system monitoring system for PV plants, SMA Solar Technology with optimal connection of Bluetooth data transmission technology with photovoltaic inverters. Phoenix Solar utilises the architectural form of a bridge as new sub-structure for photovoltaic roofs and PAW impressed the panel of judges with intelligent modular systems for heating and solar technology.

## Hard- and software to manage photovoltaic power plants

With PVGuard and StringGuard Skytron Energy from Berlin developed customer-oriented monitoring solutions for open-space systems. PVGuard takes care of the entire administration of large-scale PV power plants of the megawatt category and includes the full range from a sensor right up to a database-supported software user interface (frontend). The field of application of this system includes the evaluation of a plant, trouble-shooting as well as inverter control (network management). The StringGuard module combines the safeguarding of module strings with precision measuring technology. StringGuard consists of more than 8 current measuring channels, one voltage measuring channel, as well as two digital inputs and makes available the captured data to the field-oriented monitoring system PVGuard. In 2007 solar power plants of well-known system integrators with a total output of over 60 MW had these surveillance components installed.


Solar park "Rote Jahne I" (6 MWp) is monitored by skytron surveillance solutions. Photo: Juwi Solar GmbH

## Multistring inverters with Bluetooth simplify service and reduce the costs of photovoltaic systems

SMA received the Intersolar AWARD 2008 for the new multistring solar inverter Sunny Boy 5000TL. Besides its ergonomic design and simple assembly, it was mainly the communication with the tested transmission standard “Bluetooth” that can be used worldwide that convinced the panel of judges.
State-of-the-art: Solar inverter Sunny Boy 5000TL with "Bluetooth inside". Source: SMA solar Technology AG

All devices of the new Sunny Boy generation are equipped with this transmission standard that also complies with industrial requirements. Thus the inverters offer the possibility of wireless surveillance of photovoltaic systems, as well as system diagnosis via a Notebook or PC.

### Inverters networking over large distances

SMA Solar Technology AG is the only manufacturer that uses Bluetooth Class 1 in its devices, that has a range of up to 100 metres in open air. The inverters network with each other and simultaneously function as receiver and transmitter of data (repeater). With Bluetooth Class1 up to 100 devices can be linked up, the distance to the next device, however, not exceeding 100 metres in open air. "If you imagine a plant in which 100 devices are installed 100 metres apart, the devices network over a

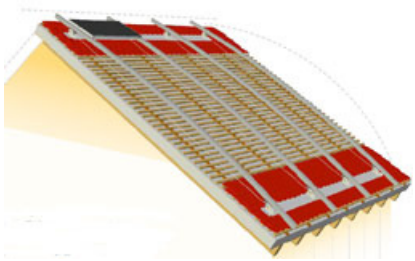
distance of ten kilometres. A Notebook, for example, must only be within reach of one of the inverters and thanks to Bluetooth it can still communicate with all devices, as though they too were within direct reach of the Notebook. This significantly simplifies service," explains Dr Bernd Engel, SMA Head of Development.

### Decreasing costs by doing away with cables and by recognising errors in time

Besides improved system diagnosis and maintenance for artisans, Bluetooth is also of advantage to the operator of solar power plants: radio transmission lowers investment costs because no additional cabling is required. In addition, networking of the devices with Bluetooth ensures effective system surveillance and thus guarantees solar power output. Any possible interferences can be localised with remote surveillance and can thus be identified and corrected more rapidly, unnecessary down-times are avoided.

## Building the bridge to the installation of photovoltaic systems without proof of statics

The assembly system Phoenix Power Bridge also fulfilled the criteria of the panel of judges as far as the degree of innovation, technological benefit and economic feasibility are concerned. The innovative on-roof assembly system was inspired by architecture: the idea to distribute the forces working on the roof in such a way that the rafters of a roof are actually relieved of strain stems from the construction of bridges. Thus the otherwise required static proofs fall away, whilst the stability of the undercarriage and the upholding of roof statics are guaranteed at all times. Through Power Bridge even roofs that were thus far not suitable for the installation of photovoltaic systems due to their static properties can now be equipped with photovoltaic systems.

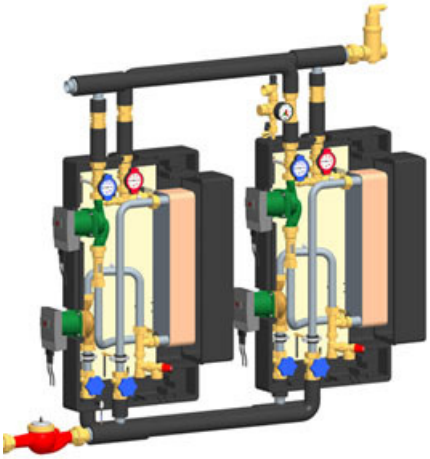
Presentation of the Power Bridge at the Intersolar; Installation sketch. Sources: Solarserver; Phönix Solar AG

### Savings in material and time reduce costs of solar power

The business economic advantages of the system also convinced the panel of judges: due to the large distances between supporting beams, the fitter only requires one third of the usual number of roof hooks which in turn reduces installation time by up to 40%. Another positive aspect of the Power Bridge is that aesthetics were also taken into consideration – thus far rather uncommon in assembly systems: curved rails lend the system its designer look and create a uniform optical appearance without gaps between the modules. "We are very happy that the Intersolar AWARD acknowledged our innovative power. It is our goal to reduce the costs of PV power through continuous innovations and thus to move closer to grid parity. Against the background of constantly rising material costs, innovations such as the Phoenix Power Bridge that promise a significant saving of materials in comparison with conventional solutions, are of particular importance," states Manfred Bächler, Chairperson for Technology of Phoenix Solar AG.

## Solarthermics award for Solex-Max Kaskade

PAW GmbH & Co. KG based in Hameln received the Intersolar AWARD 2008 for its transmission station Solex-Max Kaskade for the effective transmission of thermal energy between the solar collector circuit and the storage circuit in hotels and public facilities to generate process heat and to allow solar air-conditioning. A solar transmission station (Kaskade) consists of two to four parallel modules of 54 kW each and can be used for outputs up to 216 kW, which corresponds approximately to a collector surface of 430 m2. Drinking water storages and heating buffer storages are optimally charged when installed correctly, which is a significant advantage, particularly in large-scale plants.



The pre-manufactured transmission station for high- or low-flow solar thermal systems, with a generously sized stainless steel plate heat exchanger, pre-cabled steering system and a pre-set regulator alows for easy and quick installation as well as safe commissioning. The panel of judges was particularly impressed by the possible application in large-scale solar-thermal systems that would allow for significant saving potentials. At the same time supply safety was taken into consideration, which is, for example, of particular importance for hotels.

Transmission station Solex-Max.
Source: PAW

## Solar air-conditioning and megawatt inverter “off the peg”

Besides the prize-awarded solar innovations the Intersolar also displayed numerous new inventions of German and international companies. These included spectacular products such as the 2.5 MW large-scale inverter by Padcon GmbH (Mainbernheim / Helmstadt) or the significantly smaller adsorption machine ACS 08. The solar air-conditioning product with an air-conditioning output of 7.5 kW that is now ready to be produced in series – a development of the Fraunhofer Institut für Solare Energiesysteme (ISE) and SorTech AG – can be seen as a milestone for solar cooling and would have deserved the Intersolar AWARD in the category of solar thermics.

The SorTech adsorption cooling machine was specifically developed for environmentally friendly air-conditioning of private and commercial buildings and was designed for small-scale applications. In the place of electricity, the ACS 08 is driven with low-temperature heat from about 60 degrees that can be obtained from solar systems, remote heating systems, as well as different sources of waste heat generated in various production processes. This machine generates cold by vaporising water at very low pressures of approx. 10 mbar. With the cold generated in this way, for example, incoming air can be cooled. During operation in winter the adsorption machine can also be used as a heat pump.


Walter Mittelbach, Managing Director of SorTech AG, is delighted about the successful product development, “In co-operation with the Fraunhofer ISE we were able to test our prototype plant under real conditions and to carry out professional measurements. The results of the project work together with the Freiburg researchers were incorporated in the development of our first market-ready product generation ACS 08. This range is on the market since the beginning of 2008 and, in comparison with its predecessor (ACS 05), it has 33% more cooling output and its construction volume is 25% lower.”
Adsorption cooling machine ACS 08. Source: SotTech AG

Another advantage that SorTech points out in relation to its new cooling machine is the simplified integratability into solar heating systems. The reason for this is an optimised re-cooler (RCS 08) that allows for integrated regulation.

## Fair premiere and world record: 2,5 MW inverter system from Franconia

As an opposite to the compact cooling machine by SorTech, the photovoltaic inverter by PADCON GmbH (Mainbernheim) that is suitable for power plants impressed Intersolar visitors by its sheer size in Hall C 4: the large-scale inverter with the strongest performance so far on the PV market weighs 28 t, is over 12 m long and 2.5 m wide and high. With two blocks that each boast an AC output of 1 250 kW with direct feed-in into the 20 kV network level, PADCON AMC 2500C is the strongest solar inverter currently available. Both performance components are linked with an ADIA interface in order to achieve high efficiencies, even in the lower partial load range. MPP tracking in the partial load voltage range of 100 – 1.000 V as well as a broad input voltage range (full load) between 450 and 1.000 V ensure a high degree of efficiency. The PADCON AMC 2500C includes a computer-supported steering unit that provides information on the status of important system components and, if necessary, will carry out an automatic system diagnosis.



Megawatt inverter PADCON AMC 2500C (left); Pre-decessor AMC1600 in a reference power plant (1,75 MWp)

The device is integrated in a tough housing and can be connected easily and quickly with special plug-in contacts on the DC- as well as the AC-side. The AMC 2500C was optimised for the use of thin-film modules and was also approved by the leading thin-film module manufacturer First Solar Inc. whose modules have already been installed in a reference solar power plant of 1.75 MWp. The warranty of the manufacturer covers 24 months, with an optional ex works warranty of up 20 years being available.

## Size matters: new large-scale modules by Inventux and Signet Solar

At the Intersolar, the Californian technology company Signet Solar presented a thin-film module from its production site in Dresden that was opened on 12.06.2008. This module had the dimensions of 2,20 m x 2,60 m and is thus ideally suited for use in solar power plants and large commercial plants. The thin-film silicon technology used by Signet Solar applies amorphous silicon directly onto a glass substrate that is coated with a conductive material. The active layer of the module is thus thinner by a factor of one hundred in comparison to conventional crystalline photovoltaic modules.


Left: A glimpse of the Signet Solar production. Right: Micromorphous thin-film photovoltaic modules by Inventux

For the first time a new micromorphous thin-film module could be scrutinised by experts visiting the fair at the stand of Inventux Technologies AG (Berlin). The tandem solar cells by Inventux consist of an amorphous and a microcrystalline silicon layer. The 120 W modules with a stabilised degree of efficiency of 8.6%, according to Inventux, absorb a particularly broad spectrum of light and thus ensure optimum energy outputs. With a surface area of 1.4 m2 and with their frameless glass/glass design the modules of the X-Series-Micromorph are particularly suitable for large, network-linked photovoltaic systems or for integration into buildings. At its head offices in Berlin, Inventux started the erection of a factory for industrial series manufacturing of these thin-film solar modules.

Intersolar 2008: State-of-the-art solar technology and visions of energy supply of the future. Source: Solar Promotion GmbH

## Solar- and semi-conductor industries to meet in San Francisco in July

"After the fair is before the fair", this quotation is particularly applicable to Intersolar: from 15 to 17 July the first Intersolar North America 2008 will be held in San Francisco. It will also be concentrating on photovoltaics, solar thermics and solar architecture. In conjunction with the SEMICON West, the Intersolar North America 2008 will also attract many visitors from related markets of the semi-conductor and nanoelectronics industries. The specialists' fair, together with SEMICON West, will cover an exhibition surface of 60 000 m2 in the Moscone Center San Francisco. It is expected that 200 international exhibitors from the solar sector and a total of 1 400 exhibitors will be participating. The organisers expect more than 10 000 specialists to be visiting the Intersolar North America. The information offer of the fair will be accompanied by a congress and a diverse framework programme with seminars and workshops.


For further information on the Intersolar North America visit: http://www.intersolar.us/ and for further information on SEMICON West visit http://www.semiconwest.org/index.htm

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