Photo: SolarWorld AG

The sun is shining on PV in Saxony

More and more solar technology companies are establishing themselves in the eastern German state of Saxony. The conditions in the state provide a solid basis for strong growth and the further development of their technologies.

by Stefan Schroeter

The 6 m^2 glass panels used by Saxony-based manufacturer Signet Solar GmbH to produce thin-film solar modules have travelled a long way to get here – they are made in Japan by glass specialist Pilkington. 'Their surface is very homogenous and they have a special film for initial solar module contact,' explains Matthias Gerhardt, Manager Business Development Europe. In order to reduce the high transport costs, these special panels will also be manufactured in Germany in the future. In the Signet Solar factory in Mochau, near Leipzig, a robot lifts the glass panels from the pallet and places them on to a conveyor belt. Here, they first pass through a cleaning machine, before a laser burns the initial structures for the future solar cells into the special film. Ultra-thin coatings of various materials are then applied to the modules in seven different chambers, before the modules are finished off by the laser again.

'We make nine of these panels an hour,' Gerhardt explains. This means that solar modules with an output totalling 20 MW can be produced over a year. Signet Solar has been working on achieving this full capacity since it brought the first production line into service in May 2008. Plans already go much further, however: Signet Solar intends to build further production lines in Mochau by 2011, allowing annual production of solar modules with a total output of 130 MW. Its US parent company, Signet Solar Inc., has plans to create even larger production capacity in India by 2012. The founders of the parent company, who started out in Silicon Valley, California in 2006, originate from India.

The fact that they decided to set up their first production site not under California's powerful sun, but in Mochau, Saxony, testifies to the excellent conditions that prevail for the emerging solar industry in eastern Germany. When Signet Solar was looking for a site in Europe in 2006, the authorities in Saxony offered "a perfect site" in Mochau, according to Gerhardt. Proximity to the research institutes engaged in solar issues was an added bonus. According to data from Saxony's Economic Development Corporation, there are 13 such institutes in Saxony alone, with others located in the neighbouring states of Brandenburg, Saxony-Anhalt and Thuringia. This was an important factor in Signet Solar's considerations, as it intends to build its own research and development centre in Mochau. In addition, a strong semiconductor industry has developed in Saxony's capital, Dresden, around US computer processor manufacturer Advanced Micro Devices (AMD) and German memory chip producer Qimonda. This industry is currently a source of highly skilled staff for the solar sector. Specialists at Qimonda who have lost their jobs in recent months due to the crisis are now switching to manufacturers of solar cells and modules in the region. There is considerable interest from the governments of Saxony and other regions in the east in encouraging commercial enterprises to the area. Depending on their size, companies can expect to receive generous grants. According to Gerhardt, a third of Signet Solar's investment to date of 50 million euros has been funded by the state. Fifteen manufacturers of photovoltaic products have now established themselves in Saxony. With a total of 2,500 employees, they generate an annual turnover of 1.6 billion euros.

> *'The boom in the solar industry is just beginning. We are where Intel were 15 years ago'*

General Motors

The photovoltaics market in Germany has been booming for years, thanks to high feed-in tariffs. Project developers have forged ahead. The large areas of land left vacant following the withdrawal of the Soviet army are used to build photovoltaic installations. A solar power plant with 40 MW of installed peak capacity has been under construction since 2007 on the site of a former Soviet military airbase in Brandis near Leipzig and a 50 MW plant is to be constructed at a former military training ground near Cottbus.

One company which is continuing to focus on the traditional production of crystalline silicon solar modules rather than the new thin-film solar cells is Solar World, based in Bonn. Together with its subsidiary, Deutsche Solar, the company has built up a strong industrial base in the city of Freiberg, Saxony. Chief Executive Frank Asbeck has successfully drawn attention to his company on many occasions through the use of clever PR campaigns. The solar plant he sent to the Vatican as a gift has been producing 'heavenly' electricity, with an output of 220 kW, from the roof of the papal audience hall since November 2008. Asbeck has also publicly announced a takeover bid of Opel, under which Opel would become the first "green" car company in Europe. However, the bid was rejected by General Motors, Asbeck says.

The fact that Asbeck is not only aiming high, but is also capable of achieving his goals, is illustrated in the history of the production site in Saxony. Formerly named Bayer Solar GmbH, the company started manufacturing silicon wafers — a precursor for solar cells — for the photovoltaics industry here in 1997. At that time, annual production capacity was around 1 MW. Solar World took over this production in 2000, expanding it at a rapid pace. Wafer production capacity has since reached 350 MW and plans are already in place to expand to 1 GW. Approximately half the wafers produced are processed by Deutsche Solar's sister company, Deutsche Cell GmbH in Freiberg, into solar cells. There is now also a recycling company in Freiberg


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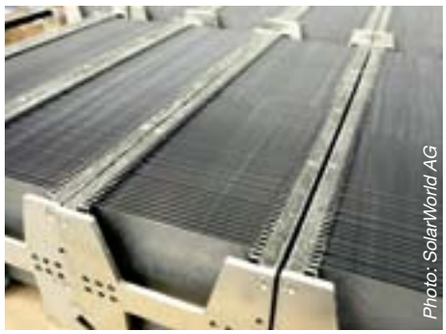
Photo: SolarWorld AG

that turns used or damaged crystalline solar cells back into raw materials for manufacturing wafers.

Asbeck is also forging ambitious plans in the US, effectively taking the opposite route to Signet Solar. Since taking over the crystalline solar activities of Shell Solar in 2006, Solar World has large factories for manufacturing wafers, cells and modules at its disposal in the states of California and Washington. In 2007, it took over a semiconductor plant in Oregon and has since been expanding it to create an integrated wafer and cell factory. With production capacity of 500 MW, this is set to become the largest solar factory in the US, according to the company's own estimates. 'We are convinced that demand for photovoltaic modules will double in the US,' says Asbeck. In his view, the boom in the solar industry is only just beginning. He compares it to developments in the computer processor industry: 'We are where Intel were 15 years ago.'

Blue appearance

The plasma and ion beam specialist Roth & Rau AG, based in Hohenstein-Ernstthal near Chemnitz, was set up in 1990 as a two-man operation. Since the end of the 1990s, the company has been focusing on coating processes for the industrial production of crystalline silicon solar cells, ultimately developing the "SiNA plant", which applies a thin antireflective layer to solar cells using a plasma process. This not only gives the silicon wafers their blue appearance, but also results in higher electricity yield. 'As a result, efficiency increases by 15 or 16%,' explains Bernd Rau, Vice President Research & Development. Roth & Rau are now supplying not only SiNA plants to Europe, Asia and the US, but also complete production lines for crystalline solar cells. The number of employees has grown to 553. Turnover of the listed company has exploded from 9.5 million euros in 2004 to a likely 250 million euros in 2008. 'In the past eleven months we have bought eight companies,' reports Chief Financial Officer Carsten Bovenschen. 'We have founded one company ourselves and four further firms are currently being founded or acquired.'

Von Ardenne Anlagen GmbH, a Dresden-based company, is gaining hands-on experience of thin-film technology. The exterior wall of its assembly building is adorned by a 300 m^2 photovoltaic system which has 420 thin-film modules installed, made from the compound semiconductor copper indium diselenide. The system was manufactured by Würth Solar GmbH, using coating equipment made by Ardenne Anlagen itself. The largest PV façade plant in the city has been supplying solar-generated electricity with a peak capacity of 31.5 kW for two years. 'We get the highest output in March and September,' reports Chief Scientist Johannes Strümpfel. In November, when the sun is low and the weather somewhat hazy, the display only shows output of 13.5 kW.

The façade plant reflects the core competences of the company, which primarily manufactures vacuum coating plants for solar cells and modules as well as for architectural glazing. To be able to satisfy the rapidly growing demand for coating plants, the company has switched over to serial production for customers in Europe, the US and China. Since 2004, turnover has more than doubled to around 160 million euros, and Chief Executive Robin Schild anticipates that the 670 staff will generate further growth of 10% in 2009. According to Schild and Chief Financial Officer Tino Hammer, there is nothing to suggest that the family business would be adversely affected by the financial crisis: 'Long-term finance is in place,' says Hammer. 'And profits are staying in the company to safeguard growth.'

However, the financial crisis will not leave the solar sector untouched. Q-Cells SE, a manufacturer of solar cells based in Saxony-Anhalt, revised its forecasts for the 2008 financial year downwards, as a number of customers had postponed acceptance of agreed quantities until 2009 due to weaker market demand. Still, this can be interpreted as a minor blip in an otherwise booming market. Q-Cells were still expecting to be able to increase turnover on the previous year by at least 40% to 1.75 billion euros. At the same time, Bosch, which took over ersol Solar Energy AG, a manufacturer of solar cells based in Erfurt, announced that it would be expanding production capacities for crystalline solar cells and modules at its Arnstadt site in Thuringia together with ersol. Approximately 530 million euros is to be invested to this end by 2012, creating 1,100 new jobs. ■