

Accelerating adoption

The photovoltaics industry is growing fast, but it still needs to bring down costs before it can reach its true potential. **Nadya Anscombe** talks to Winfried Hoffmann, president of the European Photovoltaics Industry Association, to find out more.

Why is so little of the world's electricity generated by solar power?

Cost is the one and only limitation this industry has had to its growth. Until recently, it simply has not been economical for the average householder to buy a solar-power system for electricity generation. But this will change dramatically in the next 20 years. The cost of generating power using solar cells has been decreasing by 5% every year, and I believe the industry is able to maintain this trend. In 1991, the electricity production cost from a 1-kW residential rooftop system under German sunlight conditions was €1.1 per kWh. Today, this is more like €0.40 per kWh. In 20 years time, electricity production costs will be comparable to those of a 500-MW clean coal power station, and this is when solar power will finally take a considerably larger market share of the energy market.

Can the industry survive without the heavy subsidies it receives at present?

There are already certain places in the world, such as California and Japan, where a liberalized utility market exists, and in these places an investment in solar power would pay off, even without subsidies. But at the moment, most of the industry is reliant on subsidies. This has been necessary to get volume up and to get us through the price–experience curve as quickly as possible so we can get to the next stage. All these subsidies are doing is speeding up the process. Without them, the industry would still have progressed, but more slowly. Germany is a particular success story. Ten years ago, there were about 5,000 people working in the photovoltaics industry in Germany. Today this figure is more than 40,000. It is predicted that in 20 years time, the photovoltaics industry will have a turnover similar to that of the semiconductor industry, so the German government has been wise to invest so heavily in this area.

But the subsidies cannot go on forever. The cost of electricity production from



Winfried Hoffmann is president of the European Photovoltaics Industry Association.

solar cells depends a lot on the amount of sunlight available in a particular location. In 5–8 years, sunny parts of the world will be able to survive without subsidies, but in other areas, such as the UK and Germany, this will take closer to 20 years. Once the cost of making electricity from solar cells is comparable to that from a large power plant, the industry will not need any subsidies.

How has the silicon shortage affected the photovoltaics industry?

When an industry is growing as fast as the solar-cell industry is, there will inevitably be shortages in some materials. The shortage in solar-grade silicon has been a huge challenge for the industry to overcome. Making polysilicon takes chemical expertise that cannot be learned overnight. Rectifying the shortage has taken 2–3 years of investment and over the course of 2008 much greater quantities of silicon feedstocks have become available. By 2010 we will have three times more

polysilicon than we had two years ago. Although the shortage has been painful, it has also had some good points. Necessity is the mother of invention and the industry's engineers have been very inventive during the shortage. A few years ago no-one would have believed that you can make solar cells with wafers just 200 μm thick, but today this is a reality.

Will silicon technology always dominate the market?

Other technologies, such as thin-film, polymer and III–V semiconductor systems, will take an ever-increasing market share in the future, but I believe crystalline silicon will continue to dominate the market over the next 20 years. Thin-film technologies are growing fast: every 5 years, they increase their market share by 5%. I have always believed it is the applications that choose the technologies and not the other way around. So if you have limited space but plenty of sunshine, silicon is the most appropriate technology to use. If the application is in partial shade or, for example, a photovoltaic system is being integrated into a semitransparent window, then thin-film technologies are more appropriate. Organic photovoltaics will be particularly suited to applications where their shorter lifetimes are not an issue. For example they can be used in mobile devices, where a lifetime of less than five years is not a problem. I believe that, while the efficiencies of silicon solar cells are continuously increasing, they will never match the efficiencies of III–V semiconductor multijunction systems. So, although these systems are expensive, for some applications they are the systems of choice because of their higher efficiency. It all comes down to the intelligent use of technology for each specific application, but for the foreseeable future I believe silicon-based systems will still dominate the market.

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