

Media release

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Science Apéro: Photovoltaics in Switzerland

Solar power «in action»

For the Swiss energy market, as elsewhere, solar energy is becoming ever more lucrative. There is no shortage of suitable areas to install solar cells and there is enough sunshine in the country too. Thanks to governmental programs which provide financial subsidies, the Swiss market is currently picking up strongly - this was the conclusion of the 45th Science Apéro on the topic of Photovoltaics held recently in the Empa-Academy, which was full to the last place.

The field of photovoltaics is in its prime; the first solar modules were used more than fifty years ago to supply power on mini-satellites. Today, the largest solar power installation in Switzerland, on the roof of the «Stade de Suisse», generates 1.3 MW of electricity per year. Even in the Swiss "Mittelland", the lowlands, the average level of the sun's radiation is sufficient to allow efficient solar power production. "We have enough sunshine," explained Stefan Novak of the Swiss Federal Office of Energy (SFOE). Thanks to the government's new policy of financial support and the guaranteed reimbursement of excess solar energy supplied to the existing power network, the past few years have seen great progress in Switzerland in terms of new installations of photovoltaic systems. "By connecting solar systems to the existing mains network, thereby allowing excess current to be made available to other users, it is even possible to earn money in a sustainable manner." Between 24 to 30 square meters of solar collector surface is sufficient to supply the electricity needed by a family of four. According to Novak, it is only a question of time before the cost of solar power drops to the same level as that of conventionally produced electrical power.

Switzerland «takes off!»

In the internationally booming solar energy market, Switzerland enjoys the advantage of having a solid technical basis. But, as Stefan Novak says, this does not just apply to the export market. Taking into account future technical developments in the photovoltaics field, and the large area of unused roof surface available in the country, "then the potential to supply about 30 per cent of Switzerland's electric power requirements through solar energy is entirely plausible." Based on the sinking costs of acquisition and the special government subsidies available, he expects levels of solar power production to increase many times, as has similarly happened in neighboring countries. "Then things will take off in Switzerland too," maintains the energy specialist.

But apparently Mr and Mrs Schweizer still have a number of reservations about photovoltaics. This is the conclusion that energy engineer Adrian Kottmann, manager of the company BE Netz AG, has come to. His company, which specializes in the planning and installation of solar power systems, recently opened its first branch in Zürich. However it is only since January 2009, when the authorities began offering full compensation for excess renewable energy fed into the mains power network, has interest grown noticeably. "Producers of solar electricity are paid more than the market price for their electricity as a bonus for the ecological added value. This means that a photovoltaic plant can be amortized over a period of twenty-five years, including interest on the invested capital," explains Kottmann. Considering the fact that private households account for 30 per cent of Switzerland's power consumption, the idea of producing power on your own roof makes sense. Modern Energy-plus houses already today produce more than 2 1/2 times the energy they need themselves.

Furthermore, since the availability on the market of solar modules which are completely integrated into the roof surfaces, aesthetic arguments and building planning policies against photovoltaic systems are no longer valid. "These days you have to look very closely at a roof to see if what you're looking at are slate tiles or solar panels," says Kottmann. However, he says, one must remain realistic. "Photovoltaic systems can make a significant contribution, but we will not be able to cover the country's total electric power requirements using renewable energy sources alone," is the conclusion the engineer draws.

What else is on the horizon? Other high-tech alternatives

Empa researcher Frank Nueesch then discussed some future development possibilities in the field of photovoltaics, such as increasing the energy efficiency or creating novel thin-film technologies. "Although today it is the shiny blue sheen of silicon solar cells which dominate the appearance of solar power installations, there is a range of other technologies which have credible market potential," says Nueesch, who is head of the Functional Polymer Laboratory at Empa. There are, for example, other semiconductor materials than silicon which can be used, and even organic dyes, some of which can be manufactured using different, sometimes more economic processes. In addition, so-called thin-film cells boasts the advantage of requiring less material than silicon and their estimated potential market share lies between 20 to 30 per cent.

In addition to this silicon free thin-film technologies make completely new applications possible, such as flexible solar cells. A flexible solar cell developed at Empa currently holds the world record for energy efficiency, reaching 17.6 per cent. Laboratory prototypes based on polymers or organic dyes reach around 8 per cent efficiency, but here too the tendency is upwards. Another very promising concept is the idea of tandem cells which simultaneously absorb sunlight in two different energy regions, thus pushing up the efficiency. "Currently photovoltaic research in Switzerland is right at the forefront in international terms," according to Nueesch. "But if we want to maintain this lead in innovation in the future then we have to continue to actively support research and development in the field."

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„We have enough sunshine“, says Stefan Novak of the Swiss Federal Office of Energy (SFOE).



Adrian Kottmann, of BE Netz AG, presented this modern Energy-plus house in Lucerne. One must look very closely at the roof to distinguish the solar panels from the slate roofing tiles.



Thin-film photovoltaics: solar cells developed by Empa made from photographic dyes

The text and images are available in electronic form at redaktion@empa.ch