Swiss Photovoltaics Program by SFOE

Stefan Oberholzer
Photovoltaics domain manager at the
Swiss Federal Office of Energy (BFE)

3rd Gen Photovoltaics,
CleanTech Day at CSEM Basel, August 19, 2009
Photovoltaics in actual energy scenarios

BLUE Map scenario:

minus 50% energy related CO₂ in 2050 compared to 2005

Costs: 200 - 500 $/tCO₂

R&D crucial

source: Energy Technology Perspectives 2008
Potential for photovoltaics in Switzerland

- 1 m² ~ 100 - 150 kWh / year
- 3 kW ~ 24 - 30 m² / family home
Potential for photovoltaics in Switzerland

potential for renewable energies in Switzerland (electricity)

BIPV-production / electricity consumption in various countries

- 2010: 0.1 - 0.3%
- 2020: 1 - 3%
- 2030: 5 - 10%

source: Swiss Energy Perspectives for 2035 (SFOE)

source: IEA-PVPS Task 7 (2002)
World Market: total installed PV power: ~ 8 GW

- Installed PV power (GW) (~ 90% grid-connected)
- Average growth rate: >30% / year
- Capitalisation (2007): 10 billion €
- Jobs (2006): >60'000
- Energy: 7 TWh (0.01%)
- Consumption: 130'000 TWh
Swiss Market: total installed PV power: ~ 32 MW

- Turnover (2008): > 1 billion CHF (export)
- Jobs (2008): > 1'500
Installed PV power per capita
Cost development: experience curve for silicon PV modules

- Price of the technology has decreased by 20% for each doubling of cumulative installed capacity
- Driving forces are: market size, technology improvement, promotion programs

source: IEA PVPS and Fraunhofer Institute
Key figures and targets of PV technology over time

- Typical commercial flat-plate module efficiencies (%)
- Generation costs southern Europe (€/kWh)
- Turn-key system price (€/Wp)

Source: Strategic Research Agenda for Photovoltaic Solar Energy Technology European PV Technology Platform
Grid parity

In Switzerland around 2020

market support programs necessary:

source: Winfried Hoffmann (EPIA)
Key data of Photovoltaics history in Switzerland

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1982</td>
<td><strong>first grid-connected PV system</strong> in Europe</td>
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<tr>
<td>1985</td>
<td>Swiss Photovoltaics Program of the SFOE</td>
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<td>1989</td>
<td>Appearance of first building integrated PV-systems</td>
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<td>1991</td>
<td>„Burgdorf“-model: for 12 years CHF 1.00 / kWh</td>
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<td>1992</td>
<td>PV-demonstration program for schools</td>
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<tr>
<td>1995</td>
<td>Start „Solarstrombörse“</td>
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<tr>
<td>2003</td>
<td><strong>Growing industrialisation (tech. transfer)</strong></td>
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<tr>
<td>2008</td>
<td><strong>Cost-covering remuneration</strong> for feed-in to the electricity grid (KEV)**</td>
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</tbody>
</table>
Swiss Photovoltaics Program

- One of the running programs of the Swiss Energy Research coordinated by the Swiss Federal Office of Energy

- **Objectives** of the photovoltaics programme are defined in the energy research concept 2008 - 2011 of the Federal Energy Research Commission (CORE). Detailed objectives and the program implementation are described in the Photovoltaic Concept 2008 - 2011.

- Main goals for period 2008 - 2011
  - **Lowering the costs**: CHF 3/Wp (module), CHF 5/Wp (systems) (2011)
  - **Increase efficiency** (solar cells)
  - **Lowering material and energy input**
  - **Simplification and standardisation** of electrical system technology
  - Increase of availability and variety of industrial products
Swiss Photovoltaics Research Program: actors & structure

- ~ **50 projects** (40 research & development, 10 pilot & demonstration)
- **Overall coordination by the Swiss Federal Office of Energy (SFOE)**
Public funding for PV-research

~ 11 Mio CHF (2008)

- Swiss Federal Office of Energy
- ETH domain
- Swiss National Science Foundation
- European Union
- State Secretariat for Education and Research
- CTI Innovation Promotion Agency
- Cantons & Communities

~ 11 Mio CHF (2008)
Swiss Photovoltaics Research Program: areas

- **Solar cells**
  thin film solar cells (silicon, compound semiconductors, dye sensitized)
  organic and polymer solar cells

- **Solar modules** and integration into buildings

- **Electrical systems technology**
  quality assurance / certification of products (inverters)

- **Related topics**
  instruments for planning and monitoring, environmental aspects
  combining photovoltaics with other form of energies (electric cars …)

- **Institutional co-operation at the international level**
  EU PV-Technology Platform, PV ERA-NET, IEA PVPS, EC, …
PV competences in Switzerland

- Solar cells
- System technology
- Modules & building integrated PV

F&E funding
- Public: ~ 11 Mio CHF
- Private: > 50 Mio CHF
Swiss industry along the PV value chain

Materials  Tooling  Deposition systems  Manufacturing  Components  Inverters  Software tools  Mounting systems

source: NET AG

turnover (2008) > 1 billion CHF
Summary

• **Swiss photovoltaics research and technology are at a high level** when considered at an international scale.

• Good **transfer of the results** of Swiss photovoltaic research into industry

• Photovoltaics offers very interesting opportunities for Switzerland as technology and industry location

• **Swiss photovoltaics industry is continuously increasing** (mainly export)

• **Home market conditions have to be improved** to tap the potential of photovoltaics as renewable energy source for Switzerland
More information

annual report 2008

Photovoltaic Concept 2008 - 2011

National PV Conference
4. & 5.2.2010, Winterthur

http://www.bfe.admin.ch/forschungphotovoltaik/
www.photovoltaic.ch
www.swissolar.ch
Thank you for your attention

Contact

Dr. Stefan Nowak (program manager, stefan.nowak@netenergy.ch)
Dr. Stefan Oberholzer (SFOE PV-research, stefan.oberholzer@bfe.admin.ch)
Urs Wolfer (SFOE PV-market, urs.wolfer@bfe.admin.ch)