Task 1

Exchange and dissemination of information on PV power systems

National Survey Report of PV Power Applications in Switzerland 2008

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Definitions, Symbols and Abbreviations

For the purposes of this and all IEA PVPS National Survey Reports, the following definitions apply:

PV power system market: The market for all nationally installed (terrestrial) PV applications with a PV power capacity of 40 W or more.

Installed PV power: Power delivered by a PV module or a PV array under standard test conditions (STC) – irradiance of 1 000 W/m^2, cell junction temperature of 25°C, AM 1,5 solar spectrum – (also see Rated power).

Rated power: Amount of power produced by a PV module or array under STC, written as W.

PV system: Set of interconnected elements such as PV modules, inverters that convert d.c. current of the modules into a.c. current, storage batteries and all installation and control components with a PV power capacity of 40 W or more.

Module manufacturer: An organisation carrying out the encapsulation in the process of the production of PV modules.

Off-grid domestic PV power system: System installed to provide power mainly to a household or village not connected to the (main) utility grid(s). Often a means to store electricity is used (most commonly lead-acid batteries). Also referred to as stand-alone PV power system . Can also provide power to domestic and community users (plus some other applications) via a mini-grid , often as a hybrid with another source of power.

Off-grid non-domestic PV power system: System used for a variety of industrial and agricultural applications such as water pumping, remote communications, telecommunication relays, safety and protection devices, etc. that are not connected to the utility grid. Usually a means to store electricity is used. Also referred to as stand-alone PV power system .

Grid-connected distributed PV power system: System installed to provide power to a grid-connected customer or directly to the electricity grid (specifically where that part of the electricity grid is configured to supply power to a number of customers rather than to provide a bulk transport function). Such systems may be on or integrated into the customer s premises often on the demand side of the electricity meter, on public and commercial buildings, or simply in the built environment on motorway sound barriers etc. They may be specifically designed for support of the utility distribution grid. Size is not a determining feature – while a 1 MW PV system on a rooftop may be large by PV standards, this is not the case for other forms of distributed generation.

Grid-connected centralized PV power system: Power production system performing the function of a centralized power station. The power supplied by such a system is not associated with a particular electricity customer, and the system is not located to specifically perform functions on the electricity grid other than the supply of bulk power. Typically ground mounted and functioning independently of any nearby development.

Turnkey price: Price of an installed PV system excluding VAT/TVA/sales taxes, operation and maintenance costs but including installation costs. For an off-grid PV system, the prices associated with storage battery maintenance/replacement are excluded. If additional costs are incurred for reasons not directly related to the PV system, these should be excluded. (E.g. If extra costs are incurred fitting PV modules to a factory roof because special precautions are required to avoid disrupting production, these extra costs should not be included. Equally the additional transport costs of installing a telecommunication systems in a remote area are excluded).

Field Test Programme: A programme to test the performance of PV systems/components in real conditions.

Demonstration Programme: A programme to demonstrate the operation of PV systems and their application to potential users/owners.

Market deployment initiative: Initiatives to encourage the market deployment of PV through the use of market instruments such as green pricing, rate based incentives etc. These may be implemented by government, the finance industry, utilities etc.

Final annual yield: Total PV energy delivered to the load during the year per kW of power installed.

Performance ratio: Ratio of the final annual (monthly, daily) yield to the reference annual (monthly, daily) yield, where the reference annual (monthly, daily) yield is the theoretical annual (monthly, daily) available energy per kW of installed PV power.

Currency: The currency unit used throughout this report is CHF

PV support measures:

Enhanced feed-in tariff	an explicit monetary reward is provided for producing PV electricity; paid (usually by the electricity utility) at a rate per kWh somewhat higher than the retail electricity rates being paid by the customer
Capital subsidies	direct financial subsidies aimed at tackling the up-front cost barrier, either for specific equipment or total installed PV system cost
Green electricity schemes	allows customers to purchase green electricity based on renewable energy from the electricity utility, usually at a premium price
PV-specific green electricity schemes	allows customers to purchase green electricity based on PV electricity from the electricity utility, usually at a premium price
Renewable portfolio standards (RPS)	a mandated requirement that the electricity utility (often the electricity retailer) source a portion of their electricity supplies from renewable energies (usually characterized by a broad, least-cost approach favouring hydro, wind and biomass)
PV requirement in RPS	a mandated requirement that a portion of the RPS be met by PV electricity supplies (often called a set-aside)
Investment funds for PV	share offerings in private PV investment funds plus other schemes that focus on wealth creation and business success using PV as a vehicle to achieve these ends
Income tax credits	allows some or all expenses associated with PV installation to be deducted from taxable income streams
Net metering	in effect the system owner receives retail value for any excess electricity fed into the grid, as recorded by a bi-directional electricity meter

	and netted over the billing period
Net billing	the electricity taken from the grid and the electricity fed into the grid are tracked separately, and the electricity fed into the grid is valued at a given price
Commercial bank activities	includes activities such as preferential home mortgage terms for houses including PV systems and preferential green loans for the installation of PV systems
Electricity utility activities	includes green power schemes allowing customers to purchase green electricity, large-scale utility PV plants, various PV ownership and financing options with select customers and PV electricity power purchase models
Sustainable building requirements	includes requirements on new building developments (residential and commercial) and also in some cases on properties for sale, where the PV may be included as one option for reducing the building s energy foot print or may be specifically mandated as an inclusion in the building development

Foreword

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD) which carries out a comprehensive programme of energy co-operation among its 23 member countries. The European Commission also participates in the work of the Agency.

The IEA Photovoltaic Power Systems Programme (IEA-PVPS) is one of the collaborative R & D agreements established within the IEA and, since 1993, its participants have been conducting a variety of joint projects in the applications of photovoltaic conversion of solar energy into electricity.

The 21 participating countries are Australia (AUS), Austria (AUT), Canada (CAN), Denmark (DNK), France (FRA), Germany (DEU), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Malaysia, Mexico (MEX), the Netherlands (NLD), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey, the United Kingdom (GBR) and the United States of America (USA). The European Commission and the European Photovoltaic Industry Association are also members.

The overall programme is headed by an Executive Committee composed of one representative from each participating country, while the management of individual Tasks (research projects / activity areas) is the responsibility of Operating Agents. Information about the active and completed tasks can be found on the IEA-PVPS website www.iea-pvps.org

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of photovoltaic power systems. An important deliverable of Task 1 is the annual Trends in photovoltaic applications report. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the Swiss National Survey Report for the year 2008. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

The PVPS website www.iea-pvps.org also plays an important role in disseminating information arising from the programme, including national information.

This report has been prepared under the supervision of Task 1 by

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1 EXECUTIVE SUMMARY

Switzerland PV installations boomed in 2008. In March 2008 the federal government announced the new feed in tariff scheme to be set into force by Jan. 1. 2009.

Registration started by 1. May 2008 and with 48 hours the allotted amount of PV installation within the legal framework was overbooked by 3 to 4 times.

Since projects holding a valid building and grid connection permit by April 30st 2008 where all eligible for a Feed in Tariff contract starting 1.1.2009, the PV installation market almost doubled compared to the previous year.

Swiss PV industry (mainly equipment manufacturer) benefit for the better time of the year from a very strong global demand for new manufacturing capacity along the value chain as well as a global increase in installed capacity by over 100%.

1.1 Installed PV power

Installed PV Power increased by 80% compared to 2007 and more than quadrupled compared to 2006. Installed capacity per capita reached 6 Wp.

One driving force behind this increase where a lot of farmers with the larges roofs in the (PV) size of 30 up to more than 100 kWp

1.2 Costs & prices

Switzerland is fully depending on the European module market. Since the module price stayed tough due to the strong demand from Spain also the system prices did not decrease considerably in the first 3 quarters of 2008.

1.3 PV industry

Along the value chain:
One manufacturer produces ingot and wafers for the global market (Swiss Wafers AG, approx. 100 MW). There are several small companies with modul production in the Megawatt scale.

BOS: Switzerland has a world top manufacturer of inverters (Sputnik engineering AG) and many companies with products for cabling (Huber & Suhner AG), Connectors (Multi Contact AG) and support structurs resp. module framing (Solrif).

Manufacturing equipment:
The leading companies for wire saws are both situated in Switzerland (HCT, Meyer Burger). Oerlikon Solar successfully exported several production lines for its thin film technology process. 3-S is a leading manufacturer of laminators and other equipment and more than quadrupled it's turnover compared to 2007.

2 THE IMPLEMENTATION OF PV SYSTEMS

The PV power system market is defined as the market of all nationally installed (terrestrial) PV applications with a PV capacity of 40 W or more. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries.

For the purposes of this report, PV installations are included in the 2008 statistics if the PV modules were installed between 1 January and 31 December 2008, although commissioning may have taken place at a later date.

2.1 Applications for photovoltaics

In Switzerland, the majority of PV Installations are grid-connected plant, built mostly on the roofs of buildings. Larger installations (> 50 kW) are usually flat-roof mounted on commercial buildings, offices etc.

The smaller grid-connected PV Installations (Typically around 2-5 kW) can normally be found on the roofs of single-family homes. Traditionally, off-grid installations for week-end chalets and alpine huts are relatively small (< 1 kW).

2.2 Total photovoltaic power installed

The numbers are derived from the "Markterhebung Sonnenenergie 2008" . For further information see www.swissolar.ch

Table 1: PV power installed during calendar year 2008 in 4 sub-markets.

Sub-market/ application	off-grid domestic	off-grid non-domestic	grid-connected distributed	grid-connected centralized	Total
PV power installed in 2008 (kW)	200 (estimation)		11 500	0	11 700

A summary of the cumulative installed PV Power, from 1992-2008, broken down into four sub-markets is shown in Table 2.

Table 2: The cumulative installed PV power in 4 sub-markets.

	Cumulative installed capacity as of 31 December 2008																
Sub-market	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Stand-alone domestic	1 540	1 675	1 780	1 940	2 030	2 140	2 210	2 300*	2 390*	2 480*	2 570*	2 740*	2 810*	2 930*	3 050*	3 200*	3 800
Stand-alone non-domestic	70	100	112	143	162	184	190	200*	210*	220*	230*	260*	290*	320*	350*	400*	
Grid-connected distributed	2200	2900	3 600	4 050	4 850	5 950	7 630	9 420	11 220	13 340	15 140	16 440	18 440	21 240	23 740	30 040	41 540
Grid-connected centralised	900	1 100	1 200	1 350	1 350	1 450	1 470	1 480	1 480	1 560	1 560	1 560	1 560	2 560**	2 560	2 560	2 560
TOTAL (kW)	4 710	5 775	6 692	7 483	8 392	9 724	11 500	13 400	15 300	17 600	19 500	21 000	23 100	27 050	29 700	36 200	47 900

*Author s estimates. Exact figures for the proportion of off-grid power for domestic and non-domestic applications are not available

**IN 2005 newly built 1 MWp System, ground mounted, in Geneva

2.3 PV implementation highlights, major projects, demonstration and field test programmes

1. Due to the new regulations for new renewable electricity production plants, the Swiss PV market boomed in 2008 to a record of newly installed capacity of more than 1.5Wp per capita.

2. The PV industry also increased their turnover by almost 50% to an estimated 1 450 000 000 Swiss francs (mainly for exports).

3. The outlook is uncertain for the coming years, 2009 will be again better than 2008 but because of the cap set by the Swiss parliament for the preferential feed in tariff scheme, their might be a dramatic decrease in new installed capacity by 2010.

4. Due to the federal cap as mentioned above some cantons start to think about their own preferential feed in tariff schemes.

2.4 Highlights of R&D

(Excerpts from the PVPS annual report Switzerland)

The Swiss Photovoltaic RTD Programme is based on a 4 year RTD master plan, covering the period 2008 – 2011. In the first year of this period, overall 50 projects, supported by various national and regional government agencies, the research community and the private sector were conducted in the different areas of the photovoltaic energy system. Lowering the Costs of solar cells and modules, increasing efficiency, lowering material and energy input, simplification and standardisation of technology as well as the increase of availability and variety of industrial products are the main objectives of the technical R&D. Due to the feed-in tariff for electricity from new renewable resources that was introduced during 2008, application oriented questions regarding photovoltaics became additionally important.

For solar cells, the main focus remains on thin film solar cells with projects in a wide variety of materials (amorphous and microcrystalline silicon, compound semiconductors, dye-sensitised cells). During 2008, emphasis on transfer from R&D to industrial processes and products continued. Work on thin film silicon at the University of Neuchâtel has started a new phase of project. The goals of this 4-year SFOE project include the further lowering of the costs of the cells. The project is defined along the four areas of materials, processes, components (devices) and reliability and includes the corresponding depositions systems as well as extensive analytical methods. In the area of thin film silicon, strong co-operation with the companies VHF-Technologies and Oerlikon solar continued. New on the scene as far as industrial partners are concerned is Roth&Rau company, which has gone into an extensive research partnership with the University of Neuchâtel.
The SFOE project “Large area flexible CIGS” examines the up-scaling of CIGS solar cells onto larger flexible substrates. On the one hand, the vacuum deposition equipment necessary is to be improved. On the other hand, the CIGS solar cells efficiency and reliability are to be improved, too. With regard to CIGS solar cells, the Federal Institute of Technology in Zurich focused the work on high efficiency flexible CIGS cells on plastic and aluminium.

For dye-sensitised solar cells, work continued on new dyes and electrolytes as well as high temperature stability of the devices. Exploratory work was undertaken on new solar cell concepts (organic solar cells) at the Swiss Federal Laboratories for Materials Testing and Research EMPA.

International co-operation continues to form a strong pillar of the R&D activities with 9 projects running in the 6th and 7th framework RTD programmes of the European Union during 2008, of which 3 are integrated projets. Swiss research groups are participating in the integrated projects FULLSPECTRUM, PV-ATHLET and PERFORMANCE.

The co-operation within the IEA PVPS programme has remained a further strategic activity. Founded in 2005, a national IEA PVPS pool receiving support from the electric utilities of the city of Zurich, the Cantons of Basel as well as Geneva, the Mont-Soleil Association and SWISSOLAR contributed to the Swiss expert participation in IEA PVPS. The support to Swiss IEA PVPS activities could thus be broadened, in particular for activities in Tasks 2 and 10.

2.5 Public budgets for market stimulation, demonstration / field test programmes and R&D

Table 3: Public budgets for R&D, demonstration/field test programmes and market incentives.

	R & D	Demo/Field test	Market incentives
National/federal	10,6	0,1	0,6
State/regional	4,0	0,1	2,4
Total	14,6	0,2	3,0

Please refer also to the Photovoltaic Programme Edition 2009, Summary Report, Project List,

Annual Project Reports 2008 (Abstracts) www.photovoltaic.ch

3 INDUSTRY AND GROWTH

3.1 Production of feedstocks, ingots and wafers

There is only one producer of ingots and wafers in Switzerland.

Table 4: Production and production capacity information for the year for silicon feedstock, ingot and wafer producers

Manufacturers	Process & technology	Total Production	Maximum production capacity	Product destination	Price
Swisswafers	sc-Si ingots.	Aprox 100 MW tonnes	Aprox. 120 MW/year	Export	n/a
Swisswafers	mc-Si ingots			Export	n/a
Swisswafers	sc-Si wafers	Aprox 100 MW tonnes	Aprox. 120 MW/year	Export	n/a
Swisswafers	mc-Si wafers			Export	n/a

More and detailed information is available from the homepage of Swiss wafers: www.swisswafers.ch

3.2 Production of photovoltaic cells and modules

Module manufacturing is defined as the industry where the process of the production of PV modules (the encapsulation) is done. The manufacturing of modules may only be counted to a country if the encapsulation takes place in that country.

Table 5: Production and production capacity information for 2008 for each manufacturer

Cell/Module manufacturer	**Technology** (sc-Si, mc-Si, a-Si, CdTe)	**Total Production (MW)**		**Maximum production capacity (MW/yr)**	
		Cell	Module	Cell	Module
Wafer-based PV manufactures					
1 Solterra	sc-Si	-	10 (estimates)	-	n/a
2 SES, Société d Energie Solaire SA	sc-Si	-	n/a	n/a	n/a
3 3S Swiss Solar Systems AG	sc-Si, mc-Si	-	1,5	-	n/a
Total					
Thin film manufacturers					
1 VHF Technologies SA (Thin Film)	a-Si	Less than 1	*Less than 1*	n/a	*n/a*
TOTALS		**Less than 1**	**12.5**	**n/a**	**n/a**

Notes on manufacturers:

No.1: Solterra SA produces a range of PV modules.
Figures on production are not available.

No.2: SES, Société d Energie Solaire SA, based in Geneva, produces and sells the "SUNSLATES", "SUNWALL" and "SUNSHADE" lines – standardised building elements for roofing and facades- as well as customer-specific modules. Figures on production are not available.

No.3: The 3S Swiss Sustainable Solutions company produces custom laminates up to sizes of 2 x 3.5 m using bought-in cells laminated onto glass. Also, appropriate roof and façade-mounting systems are developed and sold.

No.4: VHF Technologies produces thin-film amorphous cells on plastic foil (polyimide) substrate (Brand name "Flexcells"). Initial applications are in small electronics applications and various products are commercially available, including a charger for portable phones that can be rolled up. A pilot line for larger foil-modules is in operation, production figures are confidential. Large scale production shall start in 2009.

3.3 Module prices

Table 6 provides year 2008 PV **module prices** (excluding any VAT/TVA/sales tax): for small (or typical) and large (or best price) orders, if possible; OR an indicative national figure.

These numbers are derived from an survey done by a majority of Swiss PV installers.

Table 6: Typical module prices for a number of years

Year	2004	2005	2006	2007	2008
Standard module price(s): Typical	4.30	4.80	5.20	5.00	5.00
Best price	4.10	4.60	5.00	4.80	4.80

3.4 Manufacturers and suppliers of other components

Balance of system component manufacture and supply is an important part of the PV system value chain. This section comments on the nature of this industry in the country, paying particular attention to recent trends and industry outlook.

Switzerland has a strong industry for BOS-components. Among them are the following companies:

Inverters: Sputnik engineering is one of the world leading manufacturer of Inverters for grid connection applications. Besides this, Studer electronics manufactures Inverters for stand alone systems.

Junction Boxes/connectors: Multi Contact AG is the leading manufacturer of junction boxes , cables and connectors

Cables: Huber & Suhner has a variety of dedicated PV cables since 20 years

Roofing systems: Ernst Schweizer AG manufactures the Photovoltaic in-roof installation system solrif.

3.5 System prices

Table 7 gives turnkey system prices (excluding VAT/TVA/sales tax) per Watt for the various categories of installation. Prices do not include recurring charges after installation such as battery replacement (where applicable) or operation and maintenance. Additional costs incurred due to the remoteness of the site or special installation requirements are not included.

These prices are derived from an survey done by a majority of Swiss PV installers.

Table 7: **Turnkey Prices of Typical Applications**

Category/Size	Typical applications and brief details	Current prices per W
OFF-GRID Up to 1 kW	Week-end chalets and alpine huts	22.45
OFF-GRID >1 kW	Alpine dairy farms	16.70
ON-GRID Specific case	For example: 1-3 kW roof-mounted system, if available	10.20
ON-GRID up to 10 kW	Farmhouse, big residential house, roof-mounted system	9.55
ON-GRID >10 kW	Industry, Farmhouse	8.55
GRID – CONNECTED (centralized, if relevant)	(250 kW plant – 7.50 CHF/W)	8.20

Table 7a: National trends in system prices (CHF) for on-grid standard installations (Prices in CHF / W for 10 - 20 kW flat roof and 3 to 4 kW residential systems)

YEAR	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
10-20 kW	13.00	13.00	12.50	11.80	11.00	10.40	10.20	10.10	9.90	9.40	9.20	8.40	7.50	8.5	9.00	9.10	8.70
3-4 kW	13.40	13.30	13.20	12.80	12.60	12.30	12.30	11.90	12.50	12.20	11.00	9.25	9.10	10.00	10.0	9.65	9.80

EFH in Subigen, Foto 3-S

3.6 Labour places

No exact figures are available for the number of persons employed in the PV area. The following figures are an estimate based on installed power, PV industry turnover, imports and budgets for research and development in 2008

Table 8

Category	R&D	Cell / Module Manufacturing / Inverters	Planning / Installation	Manuf. facility suppliers, other BOS Components	Total
Labour places	around 200	around 800	around 500	around 5000	around 6 500

There was again an overall increase in labour places in Switzerland due to the strong world market. Mainly equipment manufacturer like Meyer & Burger, HCT (wire saws), 3S (laminators), oerlikon solar (thin film equipment) etc. had a very high production increase.

3.7 Business value

The value of PV business has increased at least by 50% from 2007 to 2008. This is due to a very competitive export industry of PC production equipment, inverters and other BOS components.

The total end financial value of PV plant installed is estimated at around CHF 100 Million. This is estimated on the basis of PV power installed in 2008 and average turn-key prices.

As practically all cells and the greater part of PV modules in Switzerland are imported, the added value figure is probably more interesting: This amounts to around CHF 40 to 45 million.

Table 9: Calculation of value of PV business

Sub-market	Capacity installed *in 2008* (kW)	Price per W *(from table 7)*	Value	Totals
Off-grid domestic	*100*	*20*	*200 000*	
Off-grid non-domestic	**100**	**20**	*200 000*	
Grid-connected distributed	**11 500**	**9.50**	*109 250 000*	
Grid-connected centralized			*0*	
Total installed PV				*Ca. 110 000 000*
Export of PV products				*1 400 000 000**
Change in stocks held *(including information from Tables 4 & 5)*				*0*
Import of PV products *(including information from Tables 4 & 5)*				*60 000 000***
Value of PV business				***1 450 000 000***

* Inverters, BOS components, manufacturing equipment (HCT, Oerlikon, Meyer Burger, 3S etc.)

4 FRAMEWORK FOR DEPLOYMENT (NON-TECHNICAL FACTORS)

Table 9 summarizes **PV support measures** in place during 2008:

Table 8: PV support measures

	National / Regional (State) / Local
Enhanced feed-in tariffs	National: CHF 0.15 for installations commissioned before 1.1.2006 Regional (utilities): up to CHF 0.75 -> solar stock exchange The revised Energy Act contains a package of measures aimed at promoting renewable energies and energy efficiency, the mainstay of which is the compensatory feed-in remuneration scheme for electricity generated from renewable energies. Start 1.1.2009 but installations back to 1.1.2006 will be eligible for this tariffs as well. Cap at approx. 25 – 30 MW.
Direct capital subsidies	Only in few cantons up to CHF 2000.- /kW
Green electricity schemes	Naturemade, certified renewable electricity scheme
PV-specific green electricity schemes	Solar stock exchange
Renewable portfolio standards (RPS)	Only on a voluntary basis by some utilities
PV requirement in RPS	Low, mostly hydro, wind and biomass
Investment funds for PV	none
Tax credits	yes
Net metering	Only with certain utilities due to the new FiT scheme
Net billing	Only with certain utilities due to the new FiT scheme
Commercial bank activities	low
Electricity utility activities	Solar stock exchange, RPS schemes
Sustainable building requirements	Yes

4.1 Indirect policy issues

With low and very low energy houses being already a standard in Switzerland, the next step goes toward plus energy houses.

For PV being literally the only source able to turn a single family house into a plus energy house there will be new market opportunities in the near future taking into account that also the system prices will decline much faster than in the previous years.

A 5 to 7 kW installation is, on an annual base, sufficient to cover the needs for heating (heat pumpe), hot water (heat pumpe) as well as household electricity.

4.2 Standards and codes

Switzerland is very actively engaged in the standardizing work for photovoltaic on a national as well as on a IEC level.

5 HIGHLIGHTS AND PROSPECTS

With the introduction of a preferential Feed in Tariff FiT scheme in Switzerland starting January 2009 and the fact that installations commissioned after Jan. 1st 2006 until April 30st 2008 are also eligible for this and further on that installations holding a valid building permit for the PV installations by the April 30st 2008 can be built with approx. 1 year Switzerland installed capacity has been almost doubled within one year.

2009 will also be a good market for PV with the expectations that the market will grow another 50%.

Since the cap for the FiT has been reached within days and weeks after start of registration May 1st 2008 for all renewable technologies (wind, solar, biomasse, hydro, geothermal) there will be a sharp decline in installed capacity in 2010.

It depends on the Swiss parliament whether the FiT cap target will be revised early enough in order to have at least for 2011 a recovery of the market.

ANNEX A: COUNTRY INFORMATION

The Data on PV Installations and plant presented in this report have been collected from federal institutions, manufacturers and their professional associations, engineering and consultancy offices and private and institutional initiators of building projects. Much data is taken from the annual reports of the Swiss Federal Office of Energy.

The Figures presented in this national report come from various sources and exhibit various degrees of accuracy. Key figures such as installed power are correct to about +/- 5%. Data concerning national R+D funding are exact. The figure for regional funding of market-oriented activities and subsidies is the sum on data from the 26 Swiss Cantons.

Price and market figures are based on information provided by manufacturers, and we can therefore not quote any percentages on the accuracy of these data.

As for our own estimates, we have quoted any base data sources and stated any assumptions made directly in the text of the report.

ANNEX B COUNTRY INFORMATION

1) Retail electricity prices (for "normal" power, i.e. not special quality such as hydropower or solar electricity). Average price for end users in 2007: CHF 0, 145 / kWh

Household: Varies greatly according to area and utility. Prices typically:

Low period: CHF 0.08 – 0.10 per kWh

Peak: CHF 0.14 – 0.22 per kWh

Commercial / Public institution: Strongly dependent on consumption and regional utility:

Low period: CHF 0.07 – 0.09 per kWh

Peak: CHF 0.12 – 0.16 per kWh

Industry can mostly negotiate electricity prices depending on demand / supply situation and own power production.

2) Typical household electricity consumption (kWh): Around 5 256 kWh per household in the year 2007. Households account for 30,5% of Swiss electricity consumption in 2008.

Total per capita electricity consumption in 2007: 7 538 kWh

3) Typical metering arrangements and tariff structures for electricity customers:

- Day-rate and off-peak tariffs for households.
- Special tariffs for interruptible supply (eg for heat pump installations)
- Net-metering for domestic PV installations until 31.12.2005
- Special rates for trade and industry as well as for large-scale consumers

4) Average household income 2003/2005: CHF 105 000

5) Typical mortgage interest rate: 3,00%

6) Voltage (household, typical electricity distribution network): 230V ac

7) Electricity industry structure and ownership: Heterogeneous with both vertically integrated and separate generation, transmission and distribution. Both municipal and state owned as well as private organisations are involved. Trend toward liberalisation and privatization. An electricity industry regulator is planned. Approx. 75% of the utilities are public owned.

8) price of diesel fuel (NC) 1.85 CHF

9) Typical values of kWh / kW for PV systems in parts of your country: 950 – 1050 kWh/kW for central plain. Higher in mountainous areas and in southern Switzerland.

(Sources: Swiss Statistical Yearbook, Swiss Federal Office of Energy, Association of Swiss Electricity Utilities, individual utilities, Swiss Solar Power Statistics)