Task 1

Exchange and dissemination of information on PV power systems

National Survey Report of PV Power Applications in Switzerland 2009

Prepared by
Nova Energie GmbH
Schachenallee 29
CH-5000 Aarau

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On behalf of
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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 system 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 2009. 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

Pius Hüsser, Nova Energie GmbH, Aarau

1 EXECUTIVE SUMMARY

Switzerland PV installations boomed again in 2009 with the set in force of the feed in tariffs scheme at the beginning of the reporting year.

Swiss PV industry (mainly equipment manufacturer) had a small reduction in their export statistics but over all did again very well and kept their leading roll in certain areas along the value chain (wire saws, laminators etc.)

Installed PV power

Installed PV Power increased by 120% compared to 2008 and quadrupled compared to 2007.
Installed capacity per capita reached almost 10 Wp.
In total approx. 1900 systems have been installed in 2009.

The average size of the systems increased also considerably from 10kW to 14 kW.

1.1 Costs & prices

The system prices dropped following the global market trend but less than in Germany. This is due to the fact that the feed in tariff in Switzerland was very attractive for small as well as for large systems. (Swiss government lowerd the FiT by an extra 10% starting Jan 1st 2010).

1.2 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 module production in the Megawatt scale. Pramac started it's thin film module production with newly installed equipment of Oerlikon solar.

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 structures resp. module framing (Solrif).

Manufacturing equipment:
The leading companies for wire saws are both situated in Switzerland (HCT, Meyer Burger). Oerlikon Solar exported several production lines for its thin film technology process.. 3-S is a leading manufacturer of laminators and other equipment and could increase it's turnover compared to 2008 remarkably.

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 and all installation and control components for modules, inverters.

For the purposes of this report, PV installations are included in the 2009 statistics if the PV modules were installed between 1 January and 31 December 2009, 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 plants, built mostly on the roofs of buildings. Larger installations (> 50 kW) are usually flat-roof mounted on commercial buildings, offices etc. A new market developed in 2009 with tilted roof installations on farmhouses with sizes ranging from 30 up to more than 100 kW.

The size of residential systems increased from a de facto standard in earlier years of 3 kW to up to 10 kW. This has been support also be direct subsidies from Swiss government and certain cantons for system sizes up to 10kW per house.

2.2 Total photovoltaic power installed

The numbers are derived from the `Markterhebung Sonnenenergie 2009´. For further information see www.swissolar.ch

Table 1: PV power installed during calendar year 2009 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 2009 (kW)	200 (estimation)		25 500	0	25 700

A summary of the cumulative installed PV Power, from 1992-2009, 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 2009																	
Sub-market	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
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	4 000
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	67 040
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	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	73 600

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

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

1. Following the Feed in tariff starting Jan. 1st 2009 the market more than doubled to more than 25 MW installed 2009.

2. The PV industry turnover comes close to 2 Billion Swiss francs (1 800 Million CHF) due to the fact that the global industry slow down in 2009 was not that strong for the Swiss PV industry and the strong demand in the second half of 2009 from Germany helped the BOS components manufacturers to ramp up production again.

2.4 Highlights of R&DD

(Excerpts from the PVPS annual report Switzerland)

Switzerland has a dedicated national photovoltaic RTD programme which involves a broad range of stakeholders in a strongly coordinated. This national photovoltaic programme focuses on R&D,D in a system and market oriented approach, from basic research, over applied research, product development, pilot and demonstration projects all the way to accompanying measures for market stimulation.

As indicated above, activities in pilot and demonstration projects continued to be limited during 2009. On the technical level, thin film solar cells and building integration are the foremost topics of priority. The programme is organised along the entire value chain and addresses the critical gaps from technology to the market place. Thorough component – in particular for photovoltaic modules and inverters – and system analysis aims at increasing efficiency and performance. Accompanying measures to raise the quality and reliability of photovoltaic power systems include work on standards and design tools. Finally, the programme places emphasis on information and communication in order to raise the awareness for opportunities involving photovoltaics.

Through the bias of Task 9 of the IEA PVPS Programme, the subject of technology co-operation with developing countries continues to be expanded. During 2009, the interdepartmental platform for the promotion of renewable energy and energy efficiency in international co-operation – REPIC – started the second year of its present 3-year term (www.repic.ch). This platform supported different photovoltaic projects of Swiss entities in developing countries.

RESEARCH, DEVELOPMENT AND DEMONSTRATION

In the second year of the present RTD master plan, overall 55 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. Innovative solutions, market orientation, cost reduction, industrial viability and transfer as well as increased efficiency and reliability are the main objectives of the technical R&D. 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 and organic solar cells). During 2009, emphasis on transfer from R&D to industrial processes, manufacturing and products continued. Work on thin film silicon at the Swiss Federal Institute of Technology (EPFL) in Neuchâtel concentrated on the efficiency and

reproducibility of micromorphous solar cells as well as the rapid large area deposition of its individual layers of amorphous and microcrystalline silicon, including work on transparent conductive oxides (TCO) and intermediate reflector layers. Work increased in the area of heterojunction silicon solar cells. In the area of thin film silicon, strong co-operation with the companies VHF-Technologies and oc oerlikon continued. During 2009, a new R&D laboratory in cooperation with Roth&Rau was inaugurated. With regard to CIGS solar cells, the Swiss Federal Laboratories for Materials Testing and Research EMPA focused the work on high efficiency flexible CIGS cells on plastic and metal foils. During 2009, the spin-off company FLISOM, active in this solar cell technology, continued its efforts towards an industrial product. For dye-sensitised solar cells, work continued at EPFL on new dyes and electrolytes as well as high temperature stability of the devices. Exploratory work was undertaken on new solar cell concepts (organic and extremely thin absorber (ETA) cells) at EMPA.

An increasing interest for photovoltaic technology can be observed for various research institutions as well as from industry. In line with the international trend to a broader scientific and technological base, increased activities take place in the fields of nanotechnology, chemistry and numerical modelling.

On the part of application oriented research, emphasis continues to be given to building integrated photovoltaics (BIPV), both for new solutions involving thin film solar cells as well as for new mounting systems and structures for sloped roofs and facades. A dedicated website deals with the topic of BIPV (www.bipv.ch) and includes information about available products. With the ongoing market development, quality assurance and reliability of products and systems, as well as standardisation, continue to be of high priority.

The Swiss centres of competence at the Technical Universities of Burgdorf and Lugano carefully evaluate products such as PV modules, inverters and new systems. The test infrastructure is continuously expanded (Fig. 2 and 3) and recently includes the largest solar simulator for inverter testing up to 100 kW capacity (Burgdorf) as well as new laboratory equipment for IEC module certification (Lugano). Long term experience with the operation of photovoltaic power systems is carefully tracked for a number of grid-connected systems, ranging between 10 and 25 years of operation.

Continuous development of system solutions has resulted in a number of industrial products well positioned in the export market. Visionary projects such as the solar powered airplane SolarImpulse (www.solar-impulse.com) by Bertrand Piccard and the solar powered boat PlanetSolar (www.planetsolar.org), both of which plan to travel around the world by air respectively on water in the coming years, have strongly progressed in their construction phase.

International co-operation continues to form a strong pillar of the R&D activities with 10 projects running in the 6th and 7th framework RTD programmes of the European Union during 2009. During 2009, a second joint call was launched together with other European PV RTD programmes in the field of grid integration of photovoltaics. The co-operation within the IEA PVPS programme has remained a further strategic activity. On the programme level, international co-operation is also taking place through the European PV-ERA-NET project (www.pv-era.net) and the European Photovoltaic Technology Platform (www.eupvplatform.org).

Please refer also to the Photovoltaic Programme Edition 2010, Summary Report, Project List,

Annual Project Reports 2009 (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 3: 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 900 tonnes	Aprox. 1000 tonnes/y	Export	n/a
Swisswafers	mc-Si ingots			Export	n/a
Swisswafers	sc-Si wafers	Aprox 120 MW	Aprox. 145 MW/year	Export	n/a
Swisswafers	mc-Si wafers			Export	n/a

Swiss Wafers AG is is specialized in manufacturing silicon wafers for photovoltaic applications (solar cells).

It converts silicon raw material of various specification to mono- and multi-crystalline silicon wafers and supplies them to solar cell producers worldwide. In the photovoltaic industry Swiss Wafers AG is one of few independent producers of solar silicon wafers. Since its foundation the company has grown continuously at a fast pace.

All numbers are estimates, more and detailed information is available from the homepage of Swiss wafers: www.swisswafers.ch

3.2 Production of photovoltaic cells and modules

There are only few companies manufacturing modules in Switzerland. Production as well as capacity is limited. Productes are mostly sold in niche markets.

Table 4: Production and production capacity information for 2009 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	-	0.7 (estimates)	-	n/a
2 SES, Société d Energie Solaire SA	sc-Si	-	n/a	n/a	n/a
3 3S Swiss Solar Systems AG (merged in Jan 2010 with Meyer Burger AG)	sc-Si, mc-Si	-	1,5	-	n/a
4 Sunage SA, Mendrisio	sc-Si	*n/a*		*n/a*	
Total					
Thin film manufacturers					
5 Pramac Suisse SA, Riazzino	a-Si	*n/a (11 MW until May 2010 in total)*		*30 MW*	
6 VHF Technologies SA (Thin Film)	a-Si	0.82 MW		10 MW	
TOTALS		**n/a**		**n/a**	

Notes on manufacturers:

No.1: Solterra SA produces a range of PV modules.

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 is an equipment manufacturer for the global PV industry and, as a side business, 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: SUNAGE SA was founded in October 2007 in Switzerland . The SUNAGE technology relies upon the certified and reliable process of monocrystalline silicon. The basic module supplies by 220 through 250 Wp in 7 power classes at nearly 50 volts and 5 amps.

No. 5 Pramac produces Micromorph Silicon Module since 2009 with technology from Oerlikon solar.

No.6: 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.

3.3 Module prices

Table 6 provides year 2009 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 5: Typical module prices for a number of years

Module prices are not surveyed specifically.
These numbers are estimates based on overall system prices.

Year	2004	2005	2006	2007	2008	2009
Standard module price(s): Typical, depending on System size	4.30	4.80	5.20	5.00	5.00	3.80
Best price, large systems	4.10	4.60	5.00	4.80	4.80	3.30

3.4 Manufacturers and suppliers of other components

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 a survey done by a majority of Swiss PV installers.

Table 6: **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	12.75
OFF-GRID >1 kW	Alpine dairy farms	11.40
ON-GRID Specific case	For example: 1-3 kW roof-mounted system, if available	8.80
ON-GRID up to 10 kW	Farmhouse, big residential house, roof-mounted system	7.95
ON-GRID >10 kW	Industry, Farmhouse	7.25
GRID – CONNECTED (centralized, if relevant)		5.60

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	2009
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	7.25
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	8.80

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 2009

Table 7: Estimated PV-related labour places in 2009

Research and development (not including companies)	250
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	1 500
Distributors of PV products	100
System and installation companies	650
Utilities and government	100
Other: Equipment anufaturer along the value chain	5 500
Total	**8 100**

There was not much decrease in turnover by the main group of PV related equipment manufacturer. Companies with the value chain could take a profit from the high demand in Germany in the second half of 2009.

Since the Swiss market more than doubled in 2009 also new labour places have been created on the installer side.

3.7 Business value

The value of PV business was approximately the same as the year before with an increase on the installer side and a decrease on the equipment manufacturer side.

Total value of PV related equipment: approx. 1 300 Mio CHF

Total value of ingots, wafers, cells, modules and BOS components: approx. 400 Mio CHF.

The total end financial value of PV plant installed is estimated at around CHF 200 Million. This is estimated on the basis of PV power installed in 2009 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 120 to 130 million.

Table 9: Calculation of value of PV business

Sub-market	Capacity installed *in 2009* (kW)	Price per W (estimated average)	Value	Totals
Off-grid domestic	*100*	*12.75*	*1 275 000*	
Off-grid non-domestic	*100*	*12.75*	*1 275 000*	
Grid-connected distributed	*25 500*	*8.00*	*204 000 000*	
Grid-connected centralized			*0*	
Total installed PV				*Ca. 206 000 000*
Export of PV products				*1 700 000 000**
Change in stocks held *(no information available)*				*0*
Import of PV products *(estimate)*				*80 000 000***
Value of PV business				***1 826 000 000***

* Inverters, BOS components, manufacturing equipment
(HCT, Oerlikon, Meyer Burger, 3S, Multi Contact, Huber & Suhner, Komax etc.)

** Modules and BOS for Swiss PV installations

4 FRAMEWORK FOR DEPLOYMENT (NON-TECHNICAL FACTORS)

Table 9 summarizes **PV support measures** in place during 2009:

Table 8: PV support measures

	On-going measures	Measures that commenced during 2009
Enhanced feed-in tariffs		Starting in 2009, the Feed in Tariff system is similar to that from Germany with different prices for small and bif systems and the art of installation, BIPV, roof mounted, ground mounted. Duration of payment: 25 years Cap: Approx. 30 MW Under revision in 2010 see also www.swissgrid.ch
Direct capital subsidies		Due to some financial crisis support schemes there were direct subsidies on a federal level CHF 2 900/kWp in total CHF 20 Mio as well as direct subsidies in some cantons which comes up to the same amount in total as on the federal level. Installations with direct subsidies are not allowed for the enhanced feed in tariff for at least 3 years.
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

The Plus Energy House is recognized as a building standard of the future with examples already realized in the last couple of years. Since this is done by combining PV with a low energy house with heat pump system more and more advanced architects and engineers start to integrate PV into their building design.

It is expected that grid parity for residential systems will be reached within the next decade thus open the marked for a million roofs in Switzerland.

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.

Installers have been trained in new course offered by Swissolar, the Swiss solar industry association. The collaboration with the federal electricity board (ESTI) is well established.

5 HIGHLIGHTS AND PROSPECTS

The introduction of the Feed in Tariff January 1st 2009 for all new renewable and additional direct subsidies in support of the economical slow down due the global financial crisis led to a strong demand for PV. The installed capacity more than doubled to 25 MW (>3 W/capita).

To avoid a downturn in the coming years the parliament started the debate over a revision of the existing legislation in order to increase the levy per kWh. The signals are positive towards more funds for PV starting 2011 acknowledging the faster than expected decrease in system prices.

The Swiss industry also had to struggle with the lower global demand but still could maintain it's leadership in certain areas of the value chain as well as manufacturing equipment (wire saws etc.).

The overall perception for PV in Switzerland is still positive as more and more house owners are thinking about installing a system on there roof. The discussion is on whether PV can supply a substantial of the Swiss electricity needs already within this decade (until 2020). It is more or less accepted that the long term potential for PV also in Switzerland can be remarkably high.

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%.

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 (household) in 2009: approx. CHF 0, 16 / kWh

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

Low period: CHF 0.08 – 0.12 per kWh

Peak: CHF 0.14 – 0.25 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 5 400 kWh per household in the year 2008. Households account for 30,5% of Swiss electricity consumption in 2008.

Total per capita electricity consumption in 2008: ca. 7 500 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 2007: CHF 108 000

5) Typical mortgage interest rate in 2009: 2,75%

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) 1.65 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)