IEA INTERNATIONAL ENERGY AGENCY

Task 1 Strategic PV Analysis and Outreach

PVPS

National Survey Report of PV Power Applications in Switzerland 2018

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PHOTOVOLTAIC POWER SYSTEMS
TECHNOLOGY COLLABORATION PROGRAMME

Cover picture:

The First church in Switzerland which is a Plus Energy Building (204%), in Bottighofen. *Picture source: www.solaragentur.ch*

WHAT IS IEA PVPS TCP

The International Energy Agency (IEA), founded in 1974, is an autonomous body within the framework of the Organization for Economic Cooperation and Development (OECD). The IEA carries out a comprehensive programme of energy cooperation among its 30 member countries and with the participation of the European Commission. The IEA Photovoltaic Power Systems Programme (IEA PVPS) is one of the collaborative research and development agreements (technology collaboration programmes) within the IEA and was established in 1993. The mission of the programme is to "*enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems*."

In order to achieve this, the Programme's participants have undertaken a variety of joint research projects in PV power systems applications. The overall programme is headed by an Executive Committee, comprised of one delegate from each country or organisation member, which designates distinct 'Tasks,' that may be research projects or activity areas. This report has been prepared under Task 1, which deals with market and industry analysis, strategic research and facilitates the exchange and dissemination of information arising from the overall IEA PVPS Programme.

The IEA PVPS participating countries are Australia, Austria, Belgium, Canada, Chile, China, Denmark, Finland, France, Germany, Israel, Italy, Japan, Korea, Malaysia, Mexico, Morocco, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, and the United States of America. The European Commission, Solar Power Europe, the Smart Electric Power Alliance (SEPA), the Solar Energy Industries Association and the Copper Alliance are also members.

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WHAT IS IEA PVPS Task 1

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to promote and facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of PV power systems. Task 1 activities support the broader PVPS objectives: to contribute to cost reduction of PV power applications, to increase awareness of the potential and value of PV power systems, to foster the removal of both technical and non-technical barriers and to enhance technology co-operation. 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 country National Survey Report for the year 2018. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

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DISCLAIMER:

Data for non-IEA PVPS countries are provided by official contacts or experts in the relevant countries.
Data are valid at the date of publication and should be considered as estimates in several countries due to the publication date.

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1 INSTALLATION DATA

The PV power systems 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. Other applications such as small mobile devices are not considered in this report.

For the purposes of this report, PV installations are included in the 2018 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2018, although commissioning may have taken place at a later date.

1.1 Photovoltaic Applications

The transformation of the Swiss energy system under the auspices of the "Energy Strategy 2050" is a long-term project. The Swiss electorate accepted a revised Federal Energy Act in 2017 in a popular referendum. This new legislation entered into force on 1 January 2018. The aims are to reduce energy consumption, increase energy efficiency and promote the use of renewable energy (www.energystrategy2050.ch).

Until the end of 2017, three elements characterized the national regulatory framework for photovoltaic power systems:

- a onetime investment subsidy for systems up to 30 kW
- a feed-in-tariff scheme for systems above 10 kW
- and since 2014, measures for self-consumption.

With the entry in force of the new Federal Energy Act since the 1st of January 2018, the support scheme for PV systems has changed:

- the onetime investment subsidy is extended to all sizes of PV systems (from 2 kW to 50 MW)
- the feed-in tariff scheme (feed-in remuneration at cost (KEV)) is gradually replaced by a feed-in remuneration closer to the market requirements
- for systems below a capacity of 100 kW, only the onetime investment subsidy will be available
- although the original feed-in tariff support scheme (KEV) can be applied to PV systems until 2022, due to the long existing waiting list (of about 35'000 PV projects), only systems announced before June 30, 2012 are expected to benefit from the feed-in tariff support scheme.
- as a new element, different end consumers have the possibility to connect together and to act as a single consumer towards the local energy supplier (collective self-consumption based on physical grid infrastructure). This new measure allows for more flexibility for self-consumption and fosters the integration of PV in the local electricity grid.

Due to this new Energy Act, the number of newly installed PV systems increased by 12.4% to 271 MW in 2018.

While there is little to no market for ground-mounted or agricultural PV due to constraints on available land and the related potential loss of agricultural subsidies, an increasing number of building integrated and facade integrated PV projects can be observed. This development is gradual, despite technological advancements (colour & shape of modules) and the growing awareness of architects of PV as a building element. The latter is spurred by new policies making

PV compulsory in new buildings. 2018 also saw the development of PV installations on carports. The vast majority of PV systems installed in 2018 are on-grid (99,5%).

Every year the Swiss Solar Prize (https://www.solaragentur.ch/fr/node/892) is awarded to innovative or highly remarkable PV projects like the church shown on the cover page of this report. Residential, commercial and industrial installations are featured, as well as Plus Energy Buildings. Two other examples for 2018 are given below:

Figure 1: 1.05MW PV installation at Pilatus Aircraft Company, Stans (left) and 840 kW on top of a highway tunnel in Stansstad (right). © Solaragentur

1.2 Total Photovoltaic Power Installed

On behalf of the Swiss Federal Office of Energy, Swissolar is mandated to survey the Swiss solar market and publish the annual installed capacity in the Report: “Le recensement du marché de l’énergie solaire en 2018”. The data therein is based on a survey amongst 646 companies active in the PV and solar thermal market. About 90% of installers, importers/distributers and manufacturers are covered in this annual market survey.

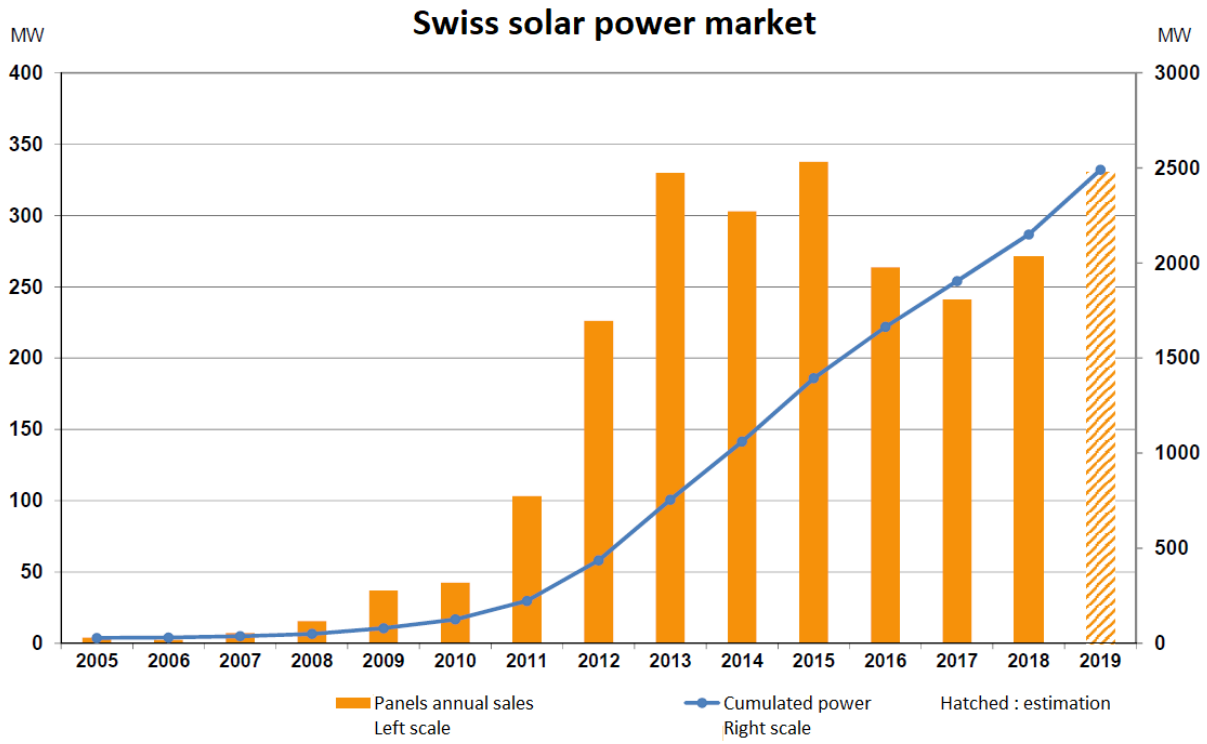


Table 1: Annual PV power installed during calendar year 2018

		Installed PV capacity in 2018 [MW]	AC or DC
PV capacity	Off-grid	1.68	DC
	Grid-Connected Distributed (BIPV,etc)	269	DC
	Grid- Connected Centralized	no distinction between centralized and decentralized systems is made	DC
	Total	270.7	DC

Table 2: PV Power installed during calendar year 2018

			Installed PV capacity in 2018 [MW]	Installed PV capacity in 2018 [MW]	AC or DC
Grid-connected	BAPV	Residential (<30kW)	231.1	107.4	DC
		Commercial (30kW-100kW)		43.0	DC
		Industrial (>100kW)		80.7	DC
	BIPV	Residential (<30kW)	37.9	17.6	DC
		Commercial (30kW-100kW)		7.1	DC
		Industrial (>100kW)		13.2	DC
	Utility-scale	Ground-mounted	-	-	DC
		Floating		-	DC
		Agricultural		-	DC
Off-grid		Residential	1.7		DC
		Other			DC
		Hybrid systems			DC
Total			270.7		DC

Table 3: Data collection process

If data is reported in AC, please mention a conversion coefficient to estimate DC installations.	Data is collected in DC
Is the collection process done by an official body or a private company/association?	The data collection process is done by Swissolar (the Swiss professional association in solar) on behalf of the Swiss government. It is based on a questionnaire sent to all importers, installers and manufacturers. It is estimated, that about 90% of the market is covered with this survey. To validate the data, there is a compulsory registration for systems above 30 kVA since the beginning of 2013 (Guarantees of origin and electricity labelling). The Swiss Federal Office of Energy has been surveying the solar market in Switzerland for more than 20 years. Due to this long experience the quality of the data has been maintained, thanks as well to all the installers and distributers who are willing to complete the annual questionnaire. The report has been published by the Swiss Federal Office of Energy in July 2018 and also serves as a basis for the annual renewable energy statistics.

Link to official statistics	Solar Energy market survey 2018 (DE/FR): https://www.swissolar.ch/fr/lenergie-solaire/faits-et-chiffres/enquetes-de-marche/ Electricity Statistics 2018 (DE/FR): https://www.bfe.admin.ch/bfe/fr/home/approvisionnement/statistiques-et-geodonnees/statistiques-de-lenergie/statistique-de-l-electricite.html Overall Energy Statistics 2018 (DE/FR): https://www.bfe.admin.ch/bfe/fr/home/approvisionnement/statistiques-et-geodonnees/statistiques-de-lenergie.html
Additional comments	The quality and accuracy of the data is expected to be better than +/- 10%.

Table 4: The cumulative installed PV power in 3 sub-markets

Year	Off-grid [MW] (including large hybrids)	Grid-connected distributed [MW] (BAPV, BIPV)	Grid-connected centralized [MW] (Ground, floating, agricultural…)	Total [MW]
1992	1.6	3.1	data not available	4.7
…	…	…	…	…
2000	2.6	12.7	data not available	15.3
…	…	…	…	…
2005	3.3	23.8	data not available	27.1
…	…	…	…	…
2010	4	107	data not available	111
2011	4	207	data not available	211
2012	4	433	data not available	437
2013	4	752	data not available	756
2014	4	1’057	data not available	1’061
2015	4	1’390	data not available	1’394
2016	4	1’660	data not available	1’664
2017	4	1’902	data not available	1’906
2018	5	2’168	data not available	2’173

Table 5: Other PV market information

	2018 Numbers
Number of PV systems in operation in your country (a split per market segment is interesting)	Around 87’000
Capacity of decommissioned PV systems during the year [MW]	< 0.5 MWp (estimates)

Capacity of repowered PV systems during the year [MW]	0.5
Total capacity connected to the low voltage distribution grid [MW]	Approx. 95% Normally up to 1 MVA can be connected to the low voltage grid
Total capacity connected to the medium voltage distribution grid [MW]	Approx. 5%
Total capacity connected to the high voltage transmission grid [MW]	0%

Table 6: PV power in the context of the Swiss national energy market

	2017	2018
Total power generation capacity [GW]	**20.8 GW total** (3.33 GW nuclear, 14.81 GW hydro, 2.70 GW new RE & thermal)	**21.62 GW total** (15.36 GW hydro, 3.33 GW nuclear, 2.93 GW thermal & RE)
Total renewable power generation capacity (including hydropower) [GW]	**17.47 GW total** (14.81 GW hydro, 1.91 GW PV, 75 MW wind, 211 MW waste)	**18.29 GW total** (15.36 GW hydro, 2,17 GW PV, 75 MW wind, 211 MW waste)
Total electricity demand [TWh]	58.5 TWh	57.6 TWh (-1.4%)
Total energy demand [TWh]	849 790 TJ	830 880 TJ (-2.2%)
New power generation capacity installed in 2018 [GW]	+ 242 MW PV + 545 MW hydro	+ 271 MW PV + 186 MW hydro
New renewable power generation capacity installed in 2018 (including hydropower) [GW]	+ 242 MW PV + 545 MW hydro	+ 271 MW PV + 186 MW hydro
Estimated total PV electricity production (including self-consumed PV electricity) in [GWh]	1’683 GWh	1’945 GWh
Total PV electricity production as a % of total electricity consumption	2.9%	3.38%

1.3 Key Enablers of PV Development

Table 7: Information on key enablers

	New Capacity 2017	New Capacity 2018	Additional Information	Source
Decentralized storage systems	**Storage capacity:** 10'325 kWh (95% Li-ion, 5% lead-acid battery) **Number of systems:** 1'260 (97% Li-ion, 3% lead-acid battery)	**Storage capacity:** 14'645 kWh (97.6% Li-ion, 2.4% lead-acid battery) **Number of systems:** 1'590 (98.4% Li-ion, 1.6% lead-acid battery)	+93.6% of total capacity compared to 2017	https://www.swissolar.ch
Residential Heat Pumps [#]	20'000 (+8% compared to 2016)	+22'000 (+10%)	More than half of all installed heat pumps fall in the range of 5-13 kW.	http://www.fws.ch
Electric cars [#]	16'803 (+ 19% compared to 2016)	20'751 (+23.5%)	2018: this corresponds to 6.9 % of newly registered cars (5'109 EV and 15'642 Hybrids)	http://old-emobility.onflow.online/de/aktuelles/Neuzulassungen-2018.php
Electric buses and trucks [#]	A support program has been put in place until at least 2030 to encourage the use of hybrid or electric buses with national CO2 certificates			https://www.myclimate.org/fr/

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module Prices

Table 8: Typical module prices in the Swiss market 2005-2018, in CHF/Wp.

Year	Typical price of a standard module crystalline silicon for small systems (3 to 10 kWp)	Average price for large systems (> 100 kWp)
2005	4.80	4.60
…	…	…
2010	3.60	2.20
2011	2.50	1.30
2012	1.30	0.85
2013	1.00	0.80
2014	0.95	0.57
2015*	0.93	0.55
2016*	0.90	0.50
2017*	0.86	0.45
2018**	0.75	0.4

* The strong Swiss Franc had a positive effect on module cost
** A clear decrease in prices has been observed in 2018

2.2 System Prices

Table 9: Turnkey PV system prices of different typical PV systems

Category/Size	Typical applications and brief details	Current prices [CHF/W]
Off-Grid Up to 1 kW (SHS)	Holiday houses, with battery and approx. 3d autonomy, only DC consumers (no inverters) Cost is mostly driven by battery and not PV module capacity	10 to 15
Off-Grid > 1kW scale	Mostly alpine huts (chalets) in the range of maximum up to 10-20 kW, including inverters and batteries for approx. 3d autonomy Cost is mostly driven by battery and not PV module capacity	8 to 17
Grid-connected Rooftop up to 5-10 kW (residential BAPV)	Residential houses, BAPV	2.2 to 3.5
Grid-connected Rooftop from 10 to 250 kW (commercial BAPV)	BAPV	1.0 to 2.5

Grid-connected rooftop above 250kW (industrial BAPV)	BAPV	0.7 to 1.3
Grid-connected ground-mounted above 10 MW	No market in Switzerland	N/A
Floating PV	Only demonstration plants	N/A
Agricultural PV	No market in Switzerland	N/A
Residential BIPV (tiles, or complete roof, 5-10 kW).	+5-10% for new buildings, otherwise + 30-50% compared to BAPV	2.4 to 4.9
Commercial BIPV (10-250 kW)	+5-10% for new buildings, otherwise + 30-50% compared to BAPV	1.4 to 2.9

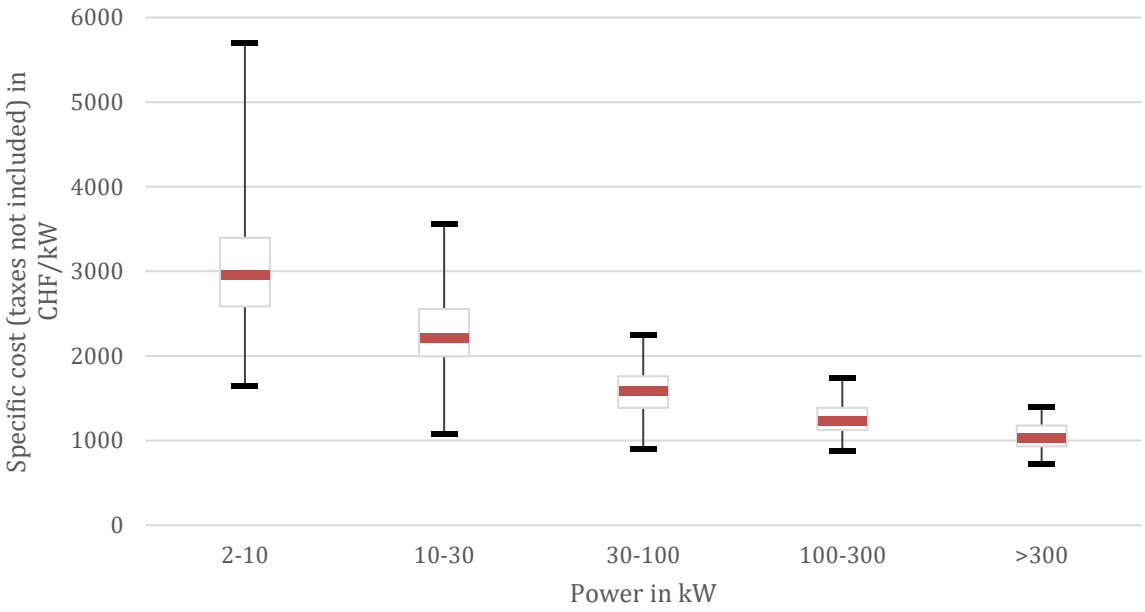
Table 10: National trends in system prices for different applications

Year	**Residential BAPV** Grid-connected, roof-mounted, distributed PV system 3-4 kW **[CHF/W]**	**Residential BAPV** Grid-connected, roof-mounted, distributed PV system 10-20 kW **[CHF/W]**
1995	12.8	11.8
2000	12.5	9.9
2005	10.0	8.5
2010	7.0	6.5
2015	3.0 - 5.0	2.2 - 3.5
2016	3.0 – 5.0	2.2 – 3.5
2017	2.8 – 4.5	2.1 – 3.3
2018	2.7 – 4.4	2.0 – 3.0

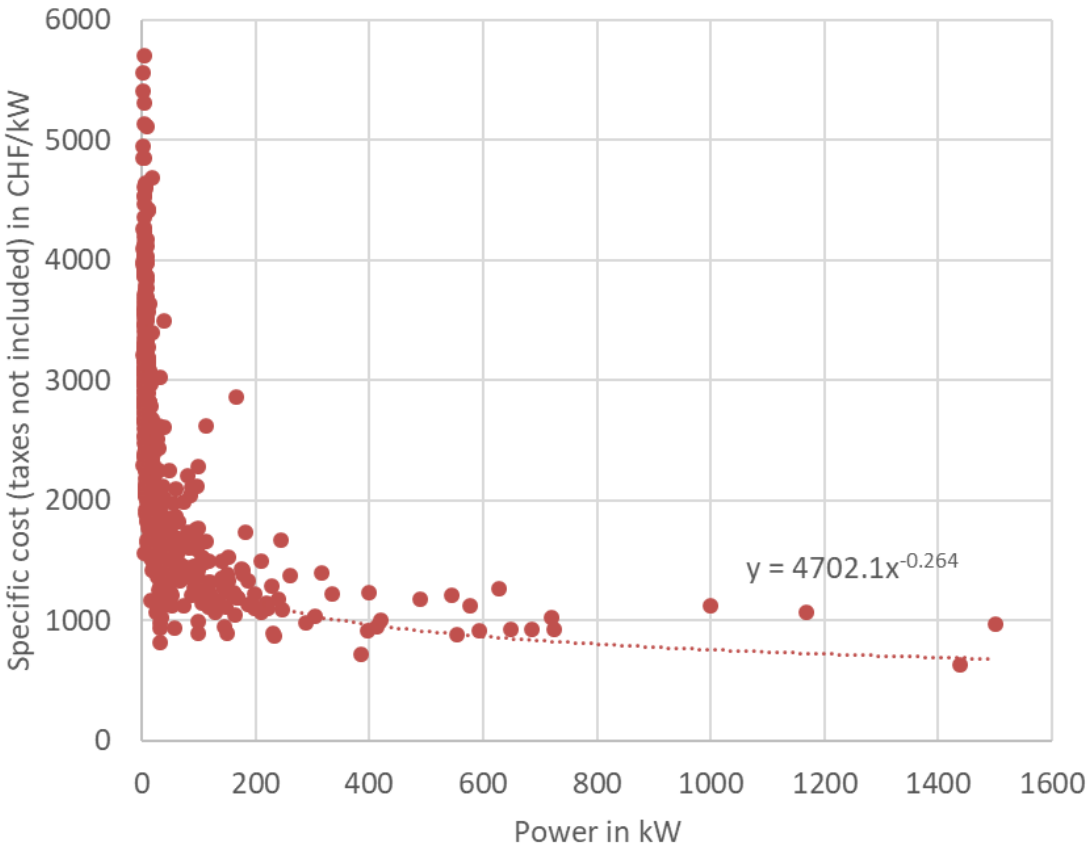
A survey, based on an investigation on 80 swiss installers and planers, was published in 2018. It analyses 745 quotes and bills for solar installations (BAPV only) and sort them according to their power range.

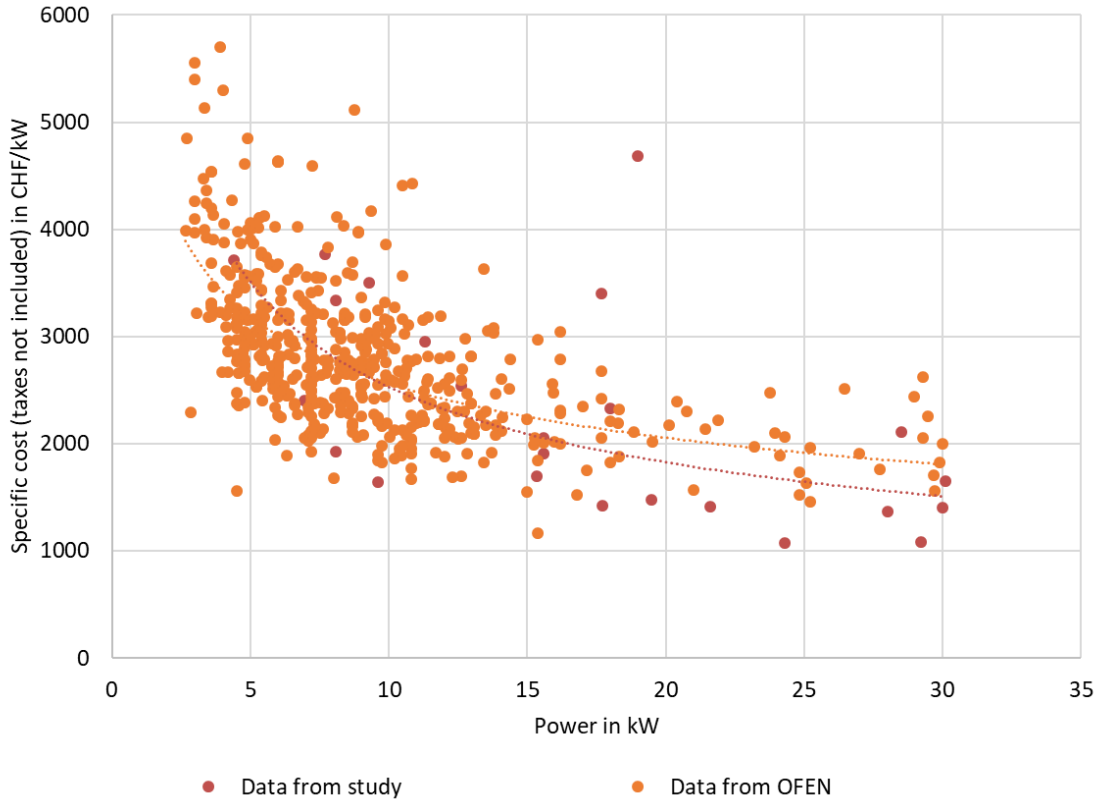
Power (kW)	Number of installations	Average Cost per kWp (CHF / kWp)	Min	25%	Median	75%	Max
2-10	366	2956	1558	2581	2953	3402	5698
10-30	179	2219	1070	1994	2214	2574	4684
30-100	119	1595	817	1377	1589	1787	3500
100-300	57	1296	875	1130	1236	1398	2857
>300	22	1000	634	927	1016	1165	1396

This table is illustrated graphically below:



The following are the scatter graphs of all the results (the bottom graph shows only the ones under 30 kWp)



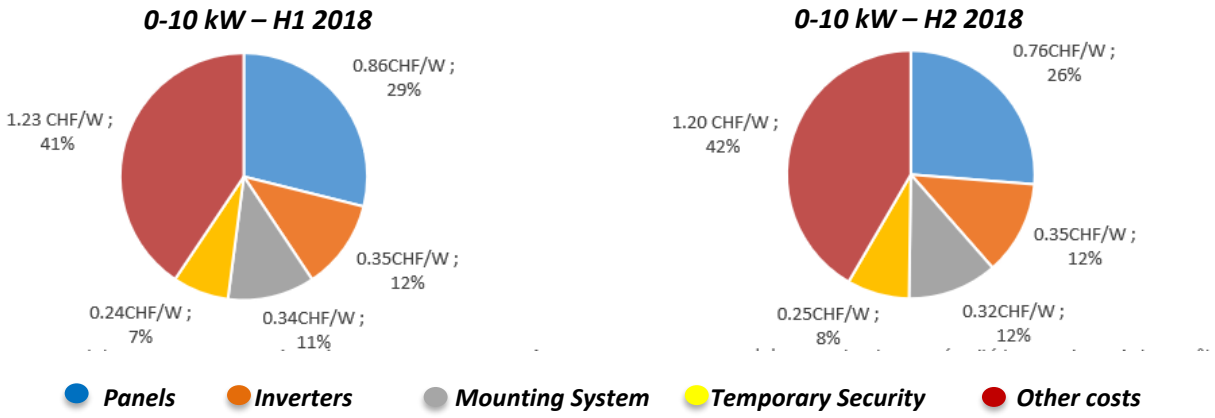


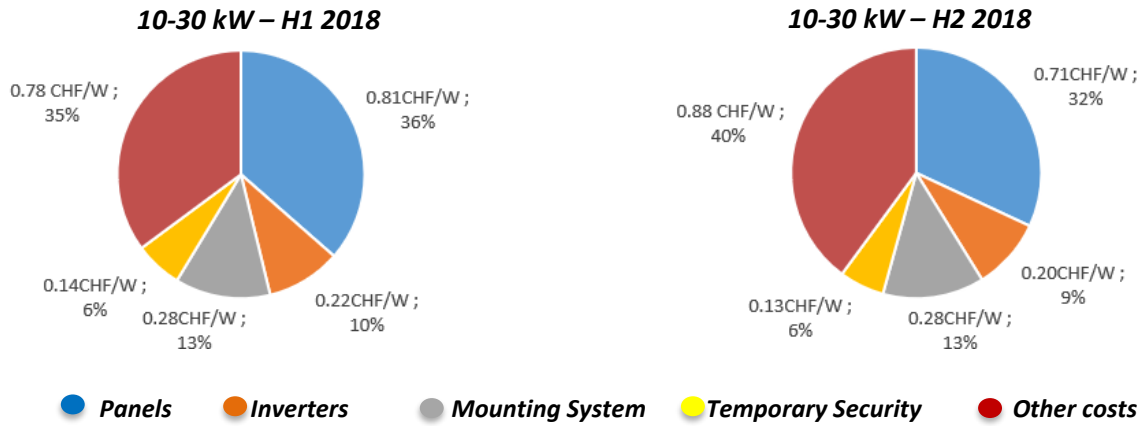
2.3 Cost Breakdown of PV Installations

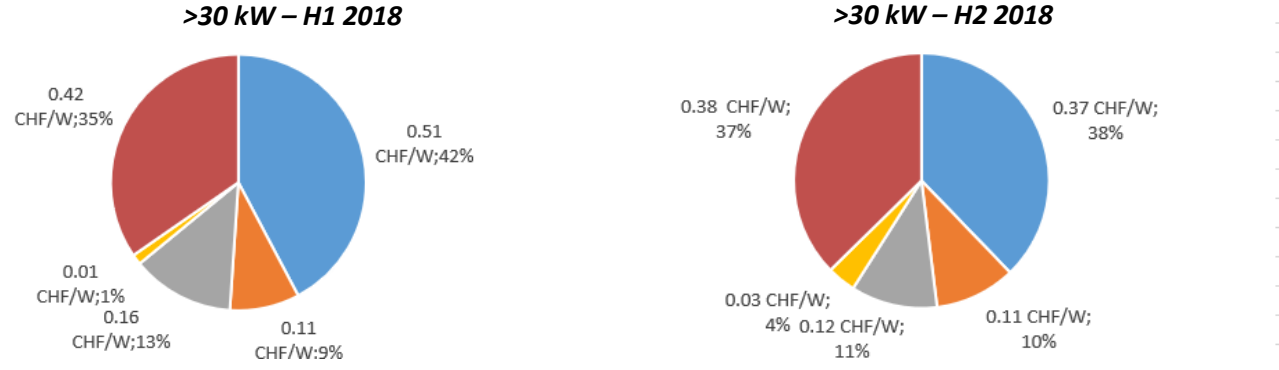
The cost breakdown of a typical 5-10 kW roof-mounted, grid-connect, distributed PV system on a residential single-family house and a typical >1 MW decentralized, grid-connected, roof top PV system at the end of 2018 is presented in Table 11 and Table 12, respectively.

The cost structure presented is from the customer's point of view. I.e. it does not reflect the installer companies' overall costs and revenues. The "average" category in Table 11 and Table 12 represents the average cost for each cost category and is the average of the typical cost structure. The average cost is taking the whole system into account and summarizes the average end price to customer. The "low" and "high" categories are the lowest and highest cost that has been reported within each segment. These costs are individual posts, i.e. summarizing these costs do not give an accurate system price. Notably the largest category of "other" costs includes the costs of installations, permits, scaffolding and other services.

For the first time, a comprehensive cost survey has been published for 2018. The results are presented in the pie charts below:







The indicative cost breakdown in the following tables is based on data for several offers for small and large systems received in 2018. For residential systems in particular, there is a significant variability of the cost due higher degrees of customization.

Table 11: Cost breakdown for a grid-connected roof-mounted, distributed residential PV system of 5-10 kW

Cost category	Average [CHF/W]	Low [CHF /W]	High [CHF /W]
Hardware			
Module	0.8	0.60	1.00
Inverter	0.25 – 0.45		
Other (racking, wiring, etc.)	0.20 – 0.45		
Subtotal Hardware	**1.5**		
Soft costs			
Planning	0.06 – 0.15		
Installation work (including scaffolding)	0.60 – 1.0		
Shipping and travel expenses to customer	-		
Permits and commissioning (i.e. cost for electrician, etc.)	0.3 – 0.5		
Project margin	5 - 10% of overall cost		
Subtotal Soft costs	**1.5**		
Total (excluding VAT)	**3.0**		
Average VAT	7.7%		
Total (including VAT)	**3.2**		

Table 12: Cost breakdown for a grid-connected PV system of >1 MW

Cost category	Average [CHF/W]	Low [CHF /W]	High [CHF /W]
Hardware			
Module	0.4	0.35	0.45
Inverter	0.10 – 0.15		
Other (racking, wiring, etc.)	0.15 – 0.25		
Subtotal Hardware	**0.7**		
Soft Costs			
Planning	0.05 – 0.06		
Installation work	0.15 – 0.30		
Shipping and travel expenses to customer	-		
Permits and commissioning (i.e. cost for electrician, etc.)	0.05		
Project margin	Around 5% of overall cost		
Subtotal Soft costs	**0.3**		
Total (excluding VAT)	**1**		
Average VAT	7.7%		
Total (including VAT)	**1.1**		

2.4 Financial Parameters and Specific Financing Programs

Financing is not a critical issue in Switzerland. For small installations, most are made without loans due to the opportunity to receive tax benefits. For larger sizes, contracting (third party ownership) is proposed by the majority of PV installations companies, especially the Distribution System Operator (DSO) having adequate funding available.

Table 13: PV financing information 2018

Different market segments	Loan rate [%]
Average rate of loans – residential installations	0.9 – 1.9 % (if secured by mortgage)
Average rate of loans – commercial installations	1.2 - 3.8 %*
Average cost of capital – industrial and ground-mounted installations	1.2 – 3.8%*

* Depending upon secured/unsecured + specifics of the project

2.5 Specific Investment Programs

Table 14: Summary of existing investment schemes

Investment Schemes	Introduced in Switzerland
Third party ownership (no investment)	Yes. More and more companies and utilities offer contracting solutions for PV, either with a fixed contractual percentage of self-consumption (risk bared by the user) or without (risk bared by the investor)
Renting	No
Leasing	Yes. Various business models are explored including leasing options, even for households
Financing through utilities	Yes. Utilities are getting more active in the PV business. They finance PV installations either for their own portfolio or as contracting solutions for end-consumers. They are actively integrating PV in their business, including buying PV installation companies. Most utilities have now their own PV installations department
Investment in PV plants against free electricity	Yes. Some utilities still offer this possibility (investment per m2 of modules, production corresponding to the investment is deduced from the electricity bill) but it is mostly against PV green certificates
Crowd funding (investment in PV plants)	Yes. Similar to above but usually mainly for green certificates, niche market. For investment, mainly cooperatives and crowdlending
Community solar	Yes. Growing thanks to the new possibilities of collective self-consumption introduced in 2018. Community solar is growing particularly for new residential buildings. Another possibility are the cooperatives that invest in PV plants and repay the invested capital with a small dividend based on the annual performance
International organization financing	Not applicable

2.6 Additional Country Information

Table 15: Country information

Retail electricity prices for a household [CHF/W] (category: 4500 kWh / year)	17 - 26 cts/kWh*
Retail electricity prices for a commercial company [CHF/W] (category: 150 MWh / year)	14 – 24 cts/kWh*
Retail electricity prices for an industrial company [CHF/W] (category: 1'500 MWh / year)	11 – 22 cts/kWh*
Population at the end of 2018	8 542 300
Country size [km^2]	41 285
Average PV yield in [kWh/kW]	980 kWh/kWp
Name and market share of major electric utilities	Approx. 650 DSOs The 30 biggest DSOs provide electricity to 65% of consumers

* including energy, grid and various regional and national taxes

3 POLICY FRAMEWORKS

This chapter describes the support policies driving the development of PV directly or indirectly. Direct support policies have a direct influence on PV development by incentivizing, simplifying or defining adequate policies. Indirect support policies change the regulatory environment to incentivize PV development.

The main driver for PV deployment in Switzerland is the combination of:

- A direct subsidy valued at about 20-30% of the initial investment

The waiting period for receiving the subsidy is getting increasingly shorter. It has been reduced during 2018 from about 2 years to 1-1.5 years for small installations (< 100 kWp) and from 6 years to 2 years for larger installations (> 100 kWp up to 50 MWp).

- The right to self-consume

The right to self-consume the PV energy has been extended. In 2018, it was clarified that it is possible to self-consume even with neighbours from opposite side of the road, if the community has one single connection point to the grid. Given the complexity of group multiple existing buildings, new districts and neighbourhoods are now planned with one single grid connection, to facilitate collective self-consumption. PV is now an enabler for microgrids including sometimes hundreds of customers.

- The obligation for DSO's to buy PV electricity fed into the grid (excess PV production)

Distribution System Operators (DSO's) are obligated to buy renewable energy injected into the grid (for systems up to 3 MW). On the other hand, they have significant flexibility in deciding the injection price; the law only mentions that this price should be similar to the purchase price of similar energy. In 2018, this price varied significantly from one DSO to another and lies in the range of 0,04 to 0,15 CHF/kWh.

Table 16: Summary of PV support measures

	On-going measures in 2018 – Residential	Measures introduced in 2018 – Residential	On-going measures in 2018 – Commercial + Industrial	Measures introduced in 2018 – Commercial + Industrial	On-going measures in 2018 – Centralized	Measures introduced in 2018 – Centralized
Feed-in tariffs	Yes. Prices depend on the local DSO Generally above market price	New law mentioning the price should be similar to the purchase price of a similar energy	Yes. Prices depend on the local DSO Generally above market price	New law mentioning the price should be similar to the purchase price of a similar energy	n/a	n/a
Feed-in premium (above market price)	Yes, but with cap, huge waiting list	Further reduction of premium	Yes, but with cap, huge waiting list	Further reduction of premium	n/a	n/a
Capital subsidies	Yes, around 30% of investment cost	Extended to all sizes of PV systems (from 30 kW to 50 MW also)	Yes, around 30% of investment cost	Extended to all sizes of PV systems (from 30 kW to 50 MW also)	n/a	n/a
Green certificates	Yes. Most utilities pay between 0.8-5 ct/kWh for green certificates (so-called guarantee of origin)	Trend to include a share of PV certificate in the standard product of the captive customers (up to 100 MWh/year)	Yes. Most utilities pay between 0.8-5 ct/kWh for green certificates (so-called guarantee of origin)	Trend to include a share of PV certificate in the standard product of the captive customers (up to 100 MWh/year)	n/a	n/a
Renewable portfolio standards (RPS) with/without PV requirements	No	No	No	No	n/a	n/a
Income tax credits	Yes. Cost for PV system is deductible for house owners in existing building	No	No	No	n/a	n/a
Self-consumption	Allowed and encouraged		Allowed and encouraged		n/a	n/a
Net-metering	Few utilities	No	Few utilities	No	n/a	n/a

Net-billing	Few utilities	No	Few utilities	No		
Collective self-consumption and virtual net-metering	Allowed	Facilitated collective self-consumption	Allowed	Facilitated collective self-consumption		
Commercial bank activities e.g. green mortgages promoting PV	Few		Few			
Activities of electricity utility businesses	Utilities engage more and more in PV. Some have their own installation subsidiaries; others promote PV with attractive schemes for storing surplus production or through contracting solutions. The new rules for collective self-consumption allow for more potential businesses (metering and billing services within a self-consumption community)					
Sustainable building requirements	In some cantons: new construction must install 10W PV per square meter of heated area	Additional cantons applying the requirement	In some cantons: new construction must install 10W PV per square meter of heated area	Additional cantons applying the requirement		
BIPV incentives	Yes	Reduction of the incentive	Yes	Reduction of the incentive and limit to 100 kW		
Other: Storage	Some cantons subsidize localized storage		Some cantons subsidize localized storage			

3.1 National Targets for PV

The transformation of the Swiss energy system aimed at with the “Energy Strategy 2050” is a long-term project. Electricity production from photovoltaics is one of the key pillars in the strategy for the future Swiss electricity supply and should contribute – according to the official scenarios – with roughly half (11,1 TWh) of the net addition in renewable electricity production until 2050 (24,2 TWh).

The 2018 annual installations rate is almost sufficient to reach the 2050 goal, so the pressure to create new incentives for PV market is low.

The Swiss Federal Office of Energy has announced in September 2018 that the PV potential on Swiss roof was about 50 TWh. It represents about 90% of the annual consumption of Switzerland. The evaluation is based on the national maps for PV roofs (www.toitsolaire.ch) and on a selection of the most suitable roofs. The tool is online for all Switzerland and is translated in English. It is possible to have an evaluation of the approximate PV potential of every single roof in Switzerland. From April 2019, it also includes the potential of façades.

The communication of this potential by the government is a positive illustration of potential of PV the primary electricity source in Switzerland. However, it has also the consequence of pushing PV only on buildings, maintaining the status quo of limited opportunities for PV deployment on ground or on other infrastructure.

3.2 Direct Support Policies for PV Installations

3.2.1 Description of Support Measures

On a national level there are two main support measures:

- A one-time remuneration (direct subsidy) for installations between 2 kW_{DC} and 50 MW_{DC} covering around 30% of the initial investment. This is valued at approximately 300 CHF/kWp. This support scheme was introduced in 2014 for installations up to 30kW and extended in 2018 for those up to 50 MW.
- Feed-in tariffs for installations larger than 10 kW_{DC}. This support measure was introduced in 2009 (another support scheme called "Mehrkostenfinanzierung" existed previously). Due to limited funding it was decided that only projects announced before June 30, 2012 would be eligible for feed in tariffs. Projects announced after this date would however be eligible for the one-time remuneration.

Both support measures are financed through a levy on electricity consumption. In 2018, this network surcharge was increased from 1.5 ct/kWh to 2.3 ct/kWh.

In 2018, the following subsidies applied on a national level for Building Attached PV (BAPV):

Feed-in tariffs as a function of commissioning date (and is shown in CHF cents)

	1.4.2017-31.12.2017	**1.1.2018-31.3.2019**	**From 1.4.2019 onwards**
BAPV <100 kW	12.1	11.0	10.0
BAPV <1000 kW	11.5	11.0	10.0
BAPV >1000 kW	11.7	11.0	10.0

These feed-in tariffs are subject to limited availability, and most projects are now pushed to choose the one-time subsidy.

One-time remuneration as a function of commissioning date :

BAPV	1.4.2017-31.3.2018	1.4.2018-31.3.2019	From 1.4.2019 onwards
Base contribution (CHF)	1400	1400	1400
Additional contribution (CHF / kW)			
< 30 kW	450	400	340
< 100 kW	350	300	300
> 100 kW	350	300	300

3.2.2 BIPV Development Measures

From 2018 onwards the one-time remuneration scheme offers a premium of approximately 15% for building-integrated PV installations which are smaller than 100 kW. Before 2018, this premium was also given for the feed-in tariff. This premium for BIPV is being reduced over time.

In addition to the federal subsidies for BIPV, some communities give also incentives for PV on building façades (e.g. bonus of 50% compared to roof-top).

Several innovative BIPV projects, using specifically designed modules for historically protected buildings or resulting in energy self-sufficient buildings have been supported by a special fund for pilot and demonstration projects from the government. BIPV projects are also promoted by the constraint in the building permit process for buildings having a recognized historic or cultural value.

3.3 Self-consumption Measures

Table 17: Summary of self-consumption regulations for small private PV systems in 2018.

PV Self-consumption	1	Right to self-consume	Yes, since 2014
	2	Revenues from self-consumed PV	Savings on electricity bill (2-3 times higher than feed-in tariffs), almost 90% of the bill is directly or indirectly related to energy (kWh), making self-consumption very profitable.
	3	Charges to finance transmission, distribution grids & renewable Levies	No, some DSO charge for installing a bi-directional energy meter. However, it is discussed to include a larger part of the grid fee related to power, and not to energy, to increase the contribution of self-consumers to the grid.
Excess PV Electricity	4	Revenues from excess PV electricity injected into the grid	Depending on DSO (range of 5-15 ct/kWh, average price around 10ct/kWh) http://www.vese.ch/pvtarif/
	5	Maximum timeframe for compensation of fluxes	15 minutes (standard metering timeframe)
	6	Geographical compensation (virtual self-consumption or metering)	No
Other Characteristics	7	Regulatory scheme duration	Not defined, open end, and being reinforced every year.

	8	Third party ownership accepted	Yes, most utility are now active to propose PV contracting and self-consumption to their large customers.
	9	Grid codes and/or additional taxes/fees impacting the revenues of the prosumer	Some utilities applied a different tariff structure for self-consumption (power metering). From 2018 onward, only one tariff structure is allowed for consumers with a grid connection < 30 kVA, therefore special negative tariffs for small self-consumers are now forbidden.
	10	Regulations on enablers of self-consumption (storage, DSM…)	In some cases, heat pumps or resistive heating systems are remotely controlled by the DSO, but not necessarily in a way that optimizes self-consumption. DSM is common for industries to avoid power peaks, but can be used to optimize self-consumption as well. Thanks to more solutions available for DSM, more and more single household owners with PV systems take an interest in those in order to increase self-consumption. Specific recommendations exist for connection and metering of storage systems.
	11	PV system size limitations	No PV size limitations
	12	Electricity system limitations	No
	13	Additional features	No

3.4 Collective Self-consumption, Community Solar and Similar Measures

Collective self-consumption has been allowed by most DSOs, of which there are more than 500, since 2014. Previously, self-consumption was restricted to consumers in the same building or within the same perimeter of land. In this context, the DSO was also responsible for billing every customer.

With the new legislation that has come into force on January 2018, collective self-consumption is improved significantly: different end consumers have the possibility to connect together as long as their land is contiguous and that the public grid is not used i.e. it is a one single grid connection, acting as a unique connection point towards the DSO. The internal metering is then under the responsibility of the collective. This also allows the consumers to have access to the free electricity market, an additional strong incentive, if the new collective consumption is above 100 MWh/year Collective self-consumption becomes an enabler of a new step of market liberalization for small customers. It has also been improved to create investment security for third party ownership in case of a building occupied by tenants. Under specific conditions, the tenant has the obligation to purchase the collectively produced PV electricity.

These collective self-consumption models are being continuously improved. The Swiss solar association, Swissolar, published recommendations for collective self-consumption https://www.swissolar.ch/fr/rcp/. The framework providing a calculation method for a fair price for self-consumed electricity for the tenants, in comparison to the price for grid electricity, has been heavily debated and revised.

This new measure allows for more flexibility for self-consumption and fosters the integration of PV in the local electricity grid.

This measure is also an incentive for battery storage installations, and groupings of new buildings as self-consumption communities.

The previous model where collective self-consumption was managed by the DSO and every customer remains a customer for the public grid remains an option. It is sometimes chosen if no entity wants to carry the billing risk.

Several new buildings are however built with this new opportunity of being one single customer.

This building has 54 flats and consists of a single connection point to the grid.

The building has a 94 kWp PV installation and a 100 kWh storage system. The PV electricity is sold to every tenant at a lower price than the grid price, with a dedicated app enabling real-time monitoring.

More general information and examples can be found on the Suisse Energie platform: https://pubdb.bfe.admin.ch/fr/publication/download/7964

3.5 Tenders, Auctions & Similar Schemes

There are no tendering schemes for PV systems in Switzerland.

There are however several auction platforms for selling/buying green certificates (guarantee of origin). The price for those certificates has constantly dropped over the past years.

3.6 Other Utility-Scale Measures including Floating and Agricultural PV

No specific utility-scale measures are in place in Switzerland. One floating pilot plant on a high-altitude mountain reservoir of a hydro facility is under development in 2018.

3.7 Social Policies

Public buildings are often considered for PV installations. It is mainly due to the fact that the law recommends that public authorities should provide a positive example.

3.8 Retrospective Measures Applied to PV

The new energy act in force since January 2018 has also led to a certain number of retrospective measures for existing plants in contrast to the supportive measures for new deployments.

- Owners of existing large PV plants (above 500 kWp) have to sell their energy on the market instead of receiving a fixed feed-in tariff. The impact is however limited because a premium with respect to the average market price is calculated every 3 months. The main idea is that large PV installations should sell their energy to the market like other sources of energy.
- The existing PV plants in the waiting list for the feed-in tariff have to accept a 20% cut in the announced subsidy, or to choose the one-time renumeration. This makes some PV plants less profitable than previously expected. This decision was made to support a greater number of individual PV installations with the given amount of financial support available.
- Existing PV plants that have been registered for the waiting list for the feed-in tariff after June 30, 2012 will not be able to benefit from the feed-in tariff subsidy scheme. They can only receive the one-time direct subsidy. Some farmers who invested in PV installations suffer from this measure, because in this context self-consumption is not sufficient to pay off the PV plant investment.

3.9 Indirect Policy Issues

3.9.1 Rural electrification measures

No specific rural electrification measures are in place in Switzerland.

3.9.2 Support for electricity storage and demand response measures

There is no support scheme for electricity storage on a national level, however there are currently three cantons (Thurgau, Appenzell Ausserrhoden and Vaud) that have introduced direct subsidies for localized storage. It is expected that other cantons will follow.

In canton Vaud, 1.5 Million CHF was allocated for household storage solutions (small consumers) and 1 Million CHF for industrial storage solutions (medium to big consumers). The support covers 35% maximum of the investment cost (and max 50'000 CHF) and came with certain conditions: storage must not be connected to grid or used for mobility, must be a back-up solution in case of power outage, PV System must be big enough and storage not too big…

Some municipalities give additional subsidies corresponding to around 10% of the investment cost.

The situation regarding tax deduction is unfortunately different from one canton to another. In most cantons, the investment in batteries for increased self-consumption can be treated as a tax deduction if installed at the same time as the PV installation. Others allow deductions it even if the storage system is installed later.

There are ongoing discussions by some DSO's to introduce new tariff designs that would allow for a partial recovery of the investment costs if the owner of the storage system is willing to let the DSO manage the storage unit. More and more utilities are also offering solutions for virtual storage. For a fee, either fixed or per kWh, the owner of a PV system can use the DSOs grid as a virtual storage for their PV production and use it at a later stage. This is a variant on a net-metering solution.

3.9.3 Support for electric vehicles (and VIPV)

There is no direct national support scheme for electric vehicles in Switzerland.

Fully electric vehicles do not pay the automobile duty of 4% and of course, since they do not run on fossil fuels, there is not petroleum tax to pay (as such, EVs do currently not contribute to road infrastructure). Electrical vehicles also often pay reduced vehicle taxes, but there are large differences from one canton to another.

On the 11th of September 2018 the Swiss Government has launched a tender for the installation of fast charging stations on 100 service stations along motorways. Grid connection will be pre-financed by the government and repaid by the operator through concession fees.

Some communities give financial incentives for the installation of local charging stations (e.g. 20% subsidy). Since 2017, Swiss eMobility, the Swiss Association for Electric Mobility, awards each year a prize of a golden plug to communities and cities to recognize exceptional efforts to promote electric mobility.

https://thedriven.io/wp-content/uploads/2019/04/55164.fr_.en_.pdf

3.9.4 Curtailment policies

For PV installations over 3MWp or production over 5000 MWh per year, the DSO is not obliged to buy the injected energy, which restricts the number of such installations.

It is often difficult to obtain a permit to install PV systems elsewhere than on buildings because of the territory management laws currently in place,. This permitting challenge limits the size and number of the installations.

Grid reinforcement and curtailment policies are so far rarely necessary because most development is made with the goal of adequate self-consumption. As a result of this, many PV installations do not exploit individual building's full roof potential to optimize LCOE.

With a long-term perspective, policy advocates discuss how incentives such as the one-time renumeration, should shift focus toward promoting a reduction of the AC-DC ratio of PV installations, in order to reduce the need of complicated curtailment policies.

3.9.5 Other support measures

Minergie, a leading building standard organization for low energy consumption buildings, is supported by the cantons as well as the Swiss Federal Office of Energy and the building industry, it revised its building standards in 2016. PV has become quasi-mandatory to fulfil the requirements for the nearly zero energy standards. To qualify for a Minergy label, a building can only have 40% of its energy coming from the grid of its overall energy demand. This requirement creates an additional incentive to optimize self-consumption through demand side management and storage.

These voluntary building standards helped to pave the way for the coming new building standards de-fined by the cantons (10 Watt PV per square meter of heated area in new buildings).

Since 2015, the Swiss government has published a recommendation for the energy policies in the cantons. These regulations should include a requirement for PV in every new building. In some cantons (e.g. Vaud), requirement of including about 10 W PV per square meter of heated area for new buildings is already implemented, others are expected to adapt their cantonal energy acts

accordingly in the coming years. It is also recommended to include 10% renewable energy when the heating system has to be retrofitted. PV can be an option among others.

A negative measure hindering PV development are the restrictions on installing PV systems in some cities (for example for places listed as UNESCO World Heritage), enforcing restrictions on installing PV systems on roofs (based on the color of modules/frames, module layout) and sometimes simply a planning process rejection hindering PV development.

National research:

Among the early actions of the new energy strategy, an action plan for increased energy research throughout all relevant energy technologies has been launched in 2013: they defined eight national competence centres for energy research (SCCERs). In 2017 this program entered a second term for the period 2017 – 2020.

Two complementary national research programmes – NRP 70 "Energy Turnaround" (www.nfp70.ch) and NRP 71 "Managing Energy Consumption" (www.nfp71.ch) continued operating in 2018.

3.10 Financing and Cost of Support Measures

National PV incentives, the one-time remuneration and feed-in tariff, are financed by a network surcharge which is paid on a kWh-basis by all electricity consumers. Under certain conditions, large corporate consumers for whom electricity costs exceed 10% of their gross revenue can be reimbursed by the system operator.

On January 2018, the network surcharge has been increased from 1.5 ct/kWh to 2.3 ct/kWh. This corresponds to a burden of 103.5 Swiss francs per year (67.5 in 2017) for an average household with a consumption of 4'500 kWh.

In 2018, the following amount has been paid for the two incentive measures:

- One-time remuneration: 179 Million CHF
- Feed-in tariffs: 155 Million CHF (190 Million CHF – 35 Million CHF of electricity sales)

4 INDUSTRY

4.1 Production of Feedstocks, Ingots and Wafers (crystalline silicon industry)

There is no feedstock, ingots or wafers production in Switzerland

4.2 Production of photovoltaic cells and modules (including TF and CPV)

Module manufacturing is defined as the industry where the process of the production of PV modules (the encapsulation) is done. A company may also be involved in the production of ingots, wafers or the processing of cells, in addition to fabricating the modules with frames, junction boxes etc. The manufacturing of modules may only be counted to a country if the encapsulation takes place in that country.

Total PV cell and module manufacture together with production capacity information is summarised in the Table below.

Table 18: PV cell and module production and production capacity information for 2018.

Cell/Module manufacturer	Technology (sc-Si, mc-Si, a-Si, CdTe, CIGS)	Total Production [MW]		Maximum production capacity [MW/yr]	
		Cell	Module	Cell	Module
Wafer-based PV manufactures					
3S Solar Plus (Meyer Burger)	sc-Si, mc-Si	0	8.5 MW	0	45 MW
	PVT hybrid		75 kW		N/A
	Bifacial (Meyer)		NC		N/A
Megasol**	sc-Si, mc-Si	0	No data provided	0	80 MW**
Thin film manufacturers					
Flisom	Flexible CIGS		No data provided		*15 MW pilot line*
Totals		**0**	**8.6 MW**	**0**	**140 MW**

* 3S Solar Plus began taking over Meyer Burger's solar systems business on the 1st of June 2018

** Megasol did not provide any data on total production and production capacity. The production capacity stated is based on information found on their homepage. Since Megasol has increased their production capacity end of 2016 to approx. 80 MW, it can be assumed that their total production from 2018 was significantly higher than the years before.

a) There is no cell production in Switzerland, except for pilot lines for new technologies such as SmartWire connection Technology SWCT (Meyer Burger) or CIGS (Flisom)

b) Swiss manufactures are specialised in BIPV products. 3S Solar Plus (previously Meyer Burger) produces its famous Megaslate module (a roofing material consisting of roof tiles, pv tiles and thermal tiles.) as well as hybrid (PV and solar thermal) collectors, while Megasol produces at their manufacturing site in Switzerland custom-made special modules (size, shape and colour).

c) Megasol has also a production facility of 120 MW capacity in Ningbo, China, for standard high-performance modules.

In Switzerland they installed a production line (40 megawatts expanded to 80 megawatts in 2016) in Langenthal BE since 2013, which specializes in glass-glass modules and small series / custom-made products.

(Extract from the PVPS Annual report 2018)

Meyer Burger, one of the largest equipment suppliers for complete module manufacturing lines and advanced module technologies, communicated a successful return to profitability at net earnings level for the first half of 2018. The main focus today is on photovoltaic cell coating and module connection technologies. Also, starting 1st of June 2018, Meyer Burger's solar systems business, taken over from the company 3S in 2010, was transferred to the newly created company 3S Solar Plus AG (https://3s-solarplus.ch/) that focuses on the Swiss market with its MegaSlate product. Meyer Burger is currently relocating its production activities to Asia.

4.3 Manufacturers and Suppliers of Other Components

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

Inverters:

Studer Innotec manufactures inverters and chargers for stand-alone and storage solutions, mostly for remote sites without grid access all over the world.

Junction Boxes/Connectors:

Stäubli Electrical Connectors (former Multi Contact AG) is the leading manufacturer of cables and connectors for PV Systems. They claim that over 200 GW of PV is connected using their connectors and to have market share of 50% with module connectors.

Cables:

Huber & Suhner and Heiniger AG have been offering a variety of dedicated PV cables for several decades.

Supporting Structures:

Montavent offers mounting systems for profiled metal and corrugated roofs.

ALUSTAND has mounting structures for tilted and flat roofs.

Ernst Schweizer produces in-roof mounting systems (Solrif) as well as structures for flat and pitched roofs. They also produce solar thermal collectors for roof-top and façade applications.

Storage Batteries:

Leclanché develops and produces energy storage systems with large format lithium-ion cells and has specialised on storage systems based on Lithium titanate technology.

Components for customized PV modules:

Solaxess develops a nanotechnology-based film for producing white and coloured solar panels without visible cells or connections

SwissInso produces coloured solar glass (Kromatix ^{TM}) by plasma processes for Building integrated PV

5 PV IN THE ECONOMY

This chapter aims to provide information on the benefits of PV for the economy.

5.1 Labour places

Table 19: Estimated PV-related full-time labour places in 2018

Market category	Number of full-time labour places
Research and development (not including companies)	200
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	4 700
Distributors of PV products	
System and installation companies	
Electricity utility businesses and government	500 (estimated)
Others (including maintenance)	500
Total	**5500**

5.2 Business value

Table 20: Rough estimation of the value of the PV business in 2018 (VAT is excluded).

Sub-market	Capacity installed in 2018 [MW]	Average price [CHF/W]	Value (Million CHF)	Total (Million CHF)
Off-grid	*1.7*	*Around 13**	*22.1*	
Grid-connected distributed	269	1.95**	*520*	
Grid-connected centralized	-	-	-	
				542
Swiss PV Industry				416
Import of PV products				150
Value of PV business				**808**

* The price is approximative since is includes the batteries, which will differ in number from one installation to the other

**The average price does only partly reflect the downward trend in PV cost, since there is a continuous shift towards residential PV installations optimised for self-consumption

6 INTEREST FROM ELECTRICITY STAKEHOLDERS

6.1 Structure of the Electricity System

The electricity system in Switzerland is organised on 7 network levels, from the high-voltage transmission network (level 1) down to the low-voltage distribution to the end-consumer (level 7).

Swissgrid is that national transmission grid operator at level 1, comprising of 380 kV and 220 kV transmission lines. They are responsible for both grid stability and frequency control.

Switzerland's supply of electricity to end users is secured by more than 650 DSO companies. Many of them are also responsible for supplying water and gas. In some cantons and municipalities, a single vertically integrated company is responsible for these supply tasks, while in other cantons a variety of companies share this responsibility. Some of the utilities may have only a few hundred of customers, while others have more than 100'000 customers.

In terms of grid-interconnection of PV, there are national regulations and recommendations, but each DSO may have its specific technical interconnection conditions. There is however a tendency for harmonisation and simplification, both in administrative and technical terms.

DSOs are required to accept electricity from a PV power plant up to 3'000 MWh per year and there is a minimal tariff that has to be paid, calculated based on the DSOs procurement and generation cost.

6.2 Interest from Electricity Utility Businesses

Increasing numbers of electricity utilities are entering the PV business. Especially the larger utilities who have their own non-solar electricity production facilities, have been under increasing financial pressure, due to falling electricity prices on the European market, and are therefore expanding their business activities. Due to the private-public status of most of the utilities (they are typically owned by the communities and the cantons) this development is not always viewed positively by the incumbent PV installation companies

The following PV business models are implemented by electricity utilities:

- Investment in their own PV plants for their production portfolio
- Establishment of subsidiary units for engineering and installation services (sometimes including acquisition of PV installations companies)
- Offering contracting solutions for PV power plants, selling the PV electricity to the end-consumer
- Providing services for metering and billing within the newly possible (from 2018 onwards) self-consumption communities
- Virtual battery solutions, batteries on district level and EV charging stations

In order to intensify the exchange between the traditional solar sector (represented by Swissolar, the professional association) and the traditional grid stakeholders (represented by VSE/AES, the Swiss utility association), experts from both sectors meet regularly in working groups in order to revise recommendations for grid connections, metering requirements, battery exploitation schemes, etc.

6.3 Interest from Municipalities and Local Governments

Municipalities and cities are key stakeholders in pushing the development of PV in their jurisdiction. On the one hand, they becoming more and more aware of their own huge potential

(on infrastructure owned by the local government such as schools, public buildings, etc.) and decide to invest independently in PV power plants. On the other hand, they can create favourable conditions by simplifying administrative procedures, for example, and granting additional local subsidies for solar, storage or EV's promoting development.

Municipality are often pushing for collective self-consumption, and promoting it for new urban developments. There is a label called "Energy City" and "Energy Municipality" which is awarded to cities and municipalities that live and implement a sustainable municipal energy policy. Energy cities promote renewable energies, environmentally friendly mobility and rely on the efficient use of resources.

One example is the canton of Geneva that has set the target to produce 100 GWh of PV electricity by 2025.

7 HIGHLIGHTS AND PROSPECTS

In the *Energy Strategy 2050* the Federal Council of the Swiss government established new framework conditions for the Swiss electricity market. A revised Electricity Supply Act (Stromversorgungsgesetz) was submitted at the end of 2018, for a consultation until end of January 2019. The focus lay on security of supply, an efficient and fully open electricity market, as well as new network regulations designed to support the expansion of decentralized, renewable power production. In the context of climate policy and with respect to the reduction of fossil fuel consumption, the next stage of Swiss climate policy is under current discussion in the Parliament (revision of the CO2-Act).

Electricity production from photovoltaics is one of the key pillars in the strategy for the future Swiss electricity supply and should contribute – according to the official scenarios – with roughly half (11.1 TWh) of the net addition in renewable electricity production until 2050 (24.2 TWh). In 2017, the national power production was 61.5 TWh. A monitoring report of the "Energy Strategy 2050" in 2018 – sketching the situation until end of 2017, actually before the coming into force of the new legal measures – shows, that the increase in renewable power production in Switzerland is at the moment on track and the benchmark for 2020 with 4,4 TWh should be within reach. The contribution from photovoltaics is part of these long-term scenarios. This fact will be considered in the revision of the official scenarios for the *Energy Strategy 2050* starting in 2019.

PV can deliver a higher percentage of the existing target. The 11.1 TWh target in 2050 only corresponds to a stable annual market of 250/300 MW annually, the historical installation level of the past several years. The target lacks ambition for PV deployment in Switzerland.

The entry in force of the new Energy Act in 2018 had specific impacts on the development of photovoltaics in Switzerland. The surcharge on electricity consumption from the grid for the support of renewable energy and other measures has increased from 0,015 CHF per kWh to 0,023 CHF. The feed-in-tariff scheme established in 2009 is now time limited and new installations will be considered only until to 2022. Due to an existing long waiting list, no new photovoltaics installation will enter into the feed-in-tariff scheme. Installations with capacity smaller than 100 kW only receive a onetime investment subsidy of 30 % of the costs of a reference installation. The onetime investment subsidy is available for all systems with capacities from 2 kW to 50 MW.

At the end of 2018, the Swiss Federal Office of Energy announced a strong increase of the quotas for onetime investment subsidy for photovoltaic installations. With this measure, a large part (260 MW) of smaller installations (<100 kW) can be supported until end of 2019 with a total subsidy of 100 M CHF. Larger installations (150 kW to 50 MW) with pending subsidy requests and a total capacity of 502 MW will receive a guarantee for subsidies in 2019 with a total volume of 150 M CHF. While providing for financial security for partly already built PV systems, these changes in the regulatory framework should also bring an additional boost to the Swiss PV market in the coming years. This measure should help investors to consider the subsidies in the business models.

Together with additional new opportunities such as the collective grid connection of various end consumers to increase self-consumption and flexibility, should give a push to the yearly market development of photovoltaics in Switzerland, which has been stagnating around 250 MW in the recent past.