Technology Collaboration Programme
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International Energy Agency
Photovoltaic Power Systems Programme

Task 1 Analysis & Outreach

PVPS

National Survey Report of PV Power Applications in SWITZERLAND

2024

PLANAIR
Energy transition engineers

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 Technology Collaboration Programme (TCP) was created with a belief that the future of energy security and sustainability starts with global collaboration. The programme is made up of 6.000 experts across government, academia, and industry dedicated to advancing common research and the application of specific energy technologies.

One of the IEA TCPs is the “Photovoltaic Power Systems Programme” (IEA TCP PVPS). It was established in 1993, and its mission 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.” 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.

The 27 IEA PVPS participating countries are Australia, Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, India, Israel, Italy, Japan, Korea, Malaysia, Morocco, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Turkiye, the United Kingdom and the United States of America. The European Commission, Solar Power Europe and the Solar Energy Research Institute of Singapore 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 2024. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

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COVER PICTURE

3S Solar Facade on Glacier 3000, © 3S Swiss Solar Solutions AG

INTERNATIONAL ENERGY AGENCY
PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

National Survey Report of PV Power Applications in Switzerland 2024

IEA PVPS
Task 1
Strategic PV Analysis & Outreach

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1 INSTALLATION DATA

The PV power systems market comprises all nationally installed (terrestrial) PV applications with a 40 W or more PV capacity. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries. This report does not consider other applications, such as small mobile devices.

For this report, PV installations are included in the 2024 statistics if the PV modules were installed and connected to the grid between January 1 and December 31 2024, although commissioning may have taken place later.

1.1 Applications for Photovoltaics

The first photovoltaic installation in Switzerland dates back to 1992, but the country had to wait until 2011 to observe a significant growth in the yearly installed capacities. It has been developing rapidly ever since.

The installations are mainly set in industries and residential areas. Nearly 90% of new installations are in residential areas, but industrial area systems make up 40 % of the capacity installed (Figure 1 and Figure 2).

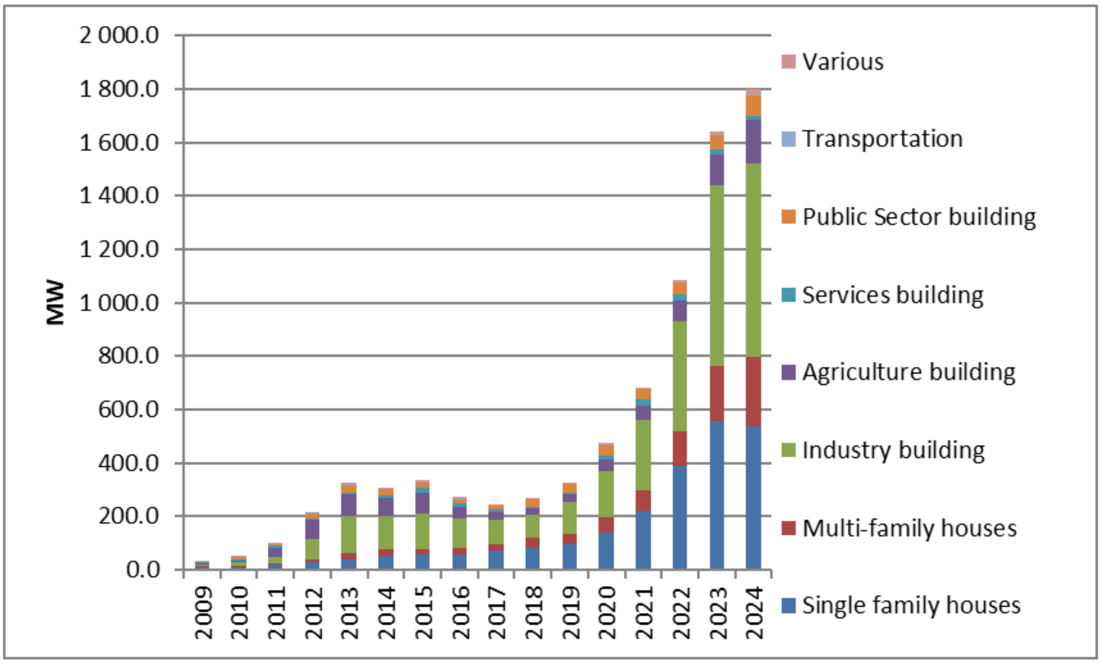


Figure 1: Photovoltaic installed capacity per sector [1]

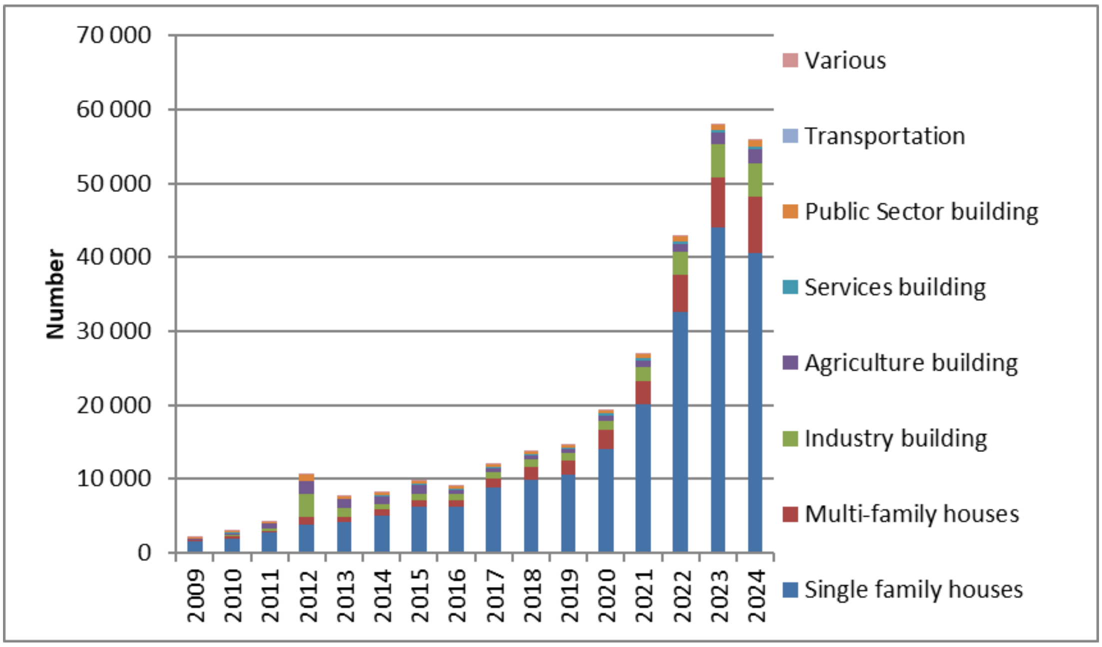


Figure 2: Number of photovoltaic systems installed per sector [2]

With almost 1800 MW installed in 2024, rooftop grid-connected is the primary application of PV in Switzerland. Off-grid installations remain very marginal, with 1.2 MW installed in 2024. Façade application began in 2020, in 2024, 6.4 MW have been installed (0.36% of installed capacity).

Ground-mounted projects are slowly announced and planned. Agricultural PV is still at the demonstrator stage, and progressing slowly. Notably, the law stipulates that PV installations must not prevent a terrain from being cultivated and should even have positive effect on agricultural production.

Switzerland has stringent heritage protection laws requiring the use of BIPV in numerous cases. It represents around 8.3% of the 2024 installed capacity for installations under 100 kW [3]. This development is still slow, even if we notice technological advancements (colour & shape of modules) and increasing awareness of architects to use PV as a building element (thanks to policies making PV compulsory in new buildings).

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: "Statistiques de l'énergie solaire: Année de référence 2024" [1]. The study is based on a survey of 512 companies active in the photovoltaic and solar thermal market. About 95% of installers, importers/distributors and manufacturers are estimated to be involved in this annual market survey.

In 2024, 1'799 MWp of photovoltaic capacity was installed, compared to 1'640.9 MWp in 2023. While this represents a 9.6% increase on the previous year, it is well below the exceptional growth recorded during the last four years: +46.2% in 2020, +43.4% in 2021, +58.5% in 2022 and +50.8% in 2023.

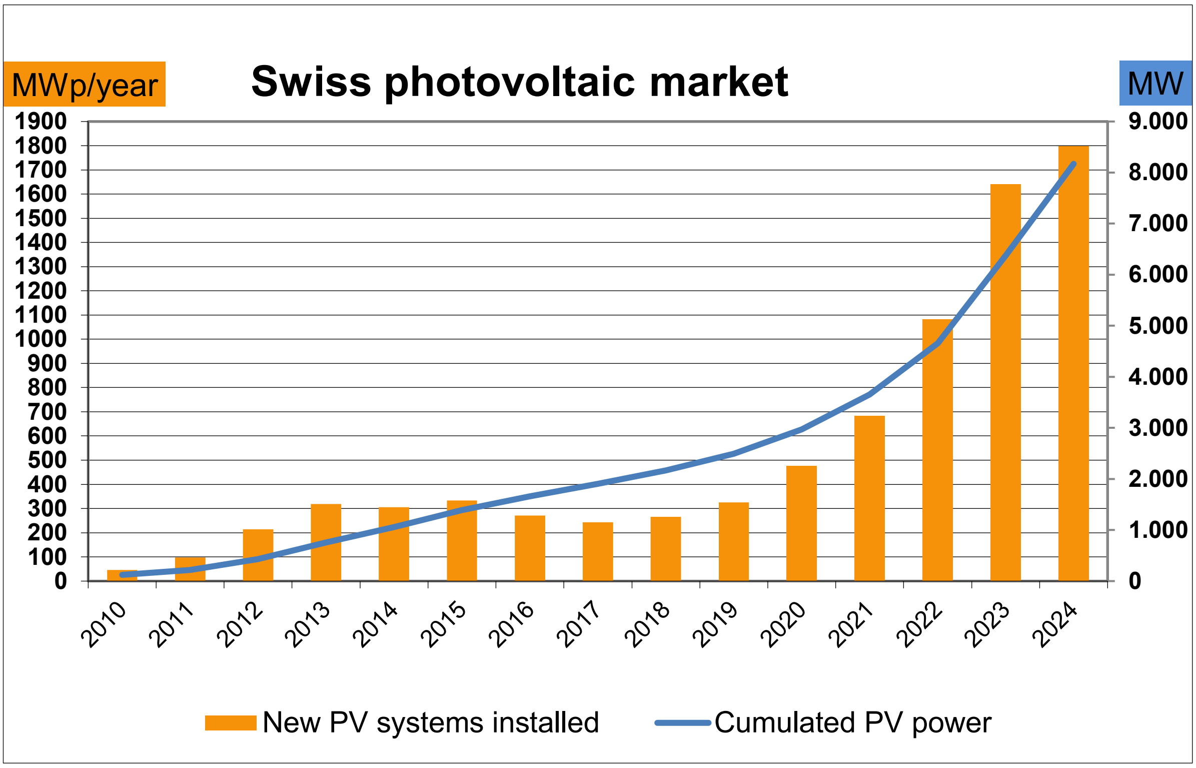


Figure 3: Installed PV capacity per year

Table 1: Annual PV power installed during calendar year 2024

		Installed PV capacity in 2024 [MW]	AC or DC
	Decentralized	1797.8	DC
	Centralized	0	DC
	Off-grid	1.2	DC
	Total	1799	DC

Table 2: PV power installed during calendar year 2024

			Installed PV capacity [MW]	Installed PV capacity [MW]	AC or DC
Grid-connected	BAPV	Residential	1,717.60	570.10	DC
		Commercial		321.00	DC
		Industrial		826.50	DC
	BIPV	Residential	80.20	51.30	DC
		Commercial		28.90	DC
		Industrial		0	DC
	Utility-scale	Ground-mounted	0	0	DC
		Floating		0	DC
		Agricultural		0	DC
Off-grid		Residential	1.2	0	DC
		Other		1.2	DC
		Hybrid systems		0	DC
Total			1799		DC

Table 3: Data collection process

If data are reported in AC, please mention a conversion coefficient to estimate DC installations.	All the installation capacities collected are DC powers, which are the cumulative STC powers of the installed modules.
Is the collection process done by an official body or a private company/Association?	The data collection process is realized by Swissolar (Swiss Solar Professional Association) on behalf of the Swiss government. It is based on a questionnaire sent to all importers, installers and manufacturers. It is estimated that about 95% of the market is covered by this survey. Data have been validated with compulsory registration for systems above 30 kVA since 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. Thanks to this extensive experience and the efforts of the installers and distributors who kindly completed the annual questionnaire, data quality has been maintained. The Swiss Federal Office of Energy published the report in July 2024, which also serves as the basis for the annual renewable energy statistics.
Link to official statistics (if this exists)	**Solar Energy market survey (DE/FR)** Thomas Hostettler. « Statistiques de l'énergie solaire - Année de référence 2024 ». Swiss Federal Office of Energy, 10 July 2025. https://www.swissolar.ch/fr/services/actualites-et-medias/faits-et-chiffres/statistique-de-l-energie-solaire. Lionel Bloch et Yannick Sauter. « Observation des prix de marché photovoltaïque 2024 ». Swiss Federal Office of Energy, 10 July 2025. https://pubdb.bfe.admin.ch/fr/publication/download/12226 **Electricity Statistics (DE/FR):** « Statistique de l'électricité 2024 », Swiss Federal Office of Energy, 1st July 2025, https://www.bfe.admin.ch/bfe/fr/home/approvisionnement/statistiques-et-geodonnees/statistiques-de-lenergie/statistique-de-l-electricite.html. This statistic includes self-consumption as a final electricity consumption. **Overall Energy Statistics (DE/FR):** « Statistique globale suisse de l'énergie 2024 ». Swiss Federal Office of Energy, 3rd July 2025. https://www.bfe.admin.ch/bfe/fr/home/approvisionnement/statistiques-et-geodonnees/statistiques-de-lenergie/statistique-globale-de-l-energie.html.
	The quality and accuracy of the data are expected to be better than +/- 10%.

Table 4: The cumulative installed PV power in 4 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	0.72	4.1		4.82
1993	0.88	5.1		5.98
1994	1.04	6.1		7.14
1995	1.2	7.1		8.3
1996	1.4	8.42		9.82
1997	1.6	9.74		11.34
1998	1.8	11.06		12.86
1999	2	12.38		14.38
2000	2.2	13.7		15.9
2001	2.2	16.1		18.3
2002	2.3	17.9		20.2
2003	2.4	19.5		21.9
2004	2.5	21.8		24.3
2005	2.6	25.7		28.3
2006	2.7	27.4		30.1
2007	2.9	34.5		37.4
2008	3	46.4		49.4
2009	3	76.5		79.5
2010	3	122.4		125.4
2011	3	219.9		222.9
2012	3	433.5		436.5
2013	3.2	752.4		755.6
2014	3.7	1056.9		1060.6
2015	3.9	1390.1		1394
2016	4	1660.2		1664.2
2017	4.1	1902.3		1906.4
2018	5.6	2167.6		2173.2
2019	6.1	2492		2498.1
2020	6.4	2967.1		2973.4
2021	6.6	3648.7		3655.3
2022	7.2	4729.5		4736.7
2023	7.9	6366.8		6374.7
2024	9.1	8161.1		8170.2

Table 5: Other PV market information

<table>
<tr><th></th><th>2024</th></tr>
<tr><td>Number of PV systems in operation in your country</td><td>Around 301’210 PV installations
Split per market Segment of PV systems
<table>
<tr><td>Market Segment</td><td>Share (N of installations)</td></tr>
<tr><td>Single-family homes</td><td>72%</td></tr>
<tr><td>Multi-family homes</td><td>14%</td></tr>
<tr><td>Industry, crafts</td><td>8%</td></tr>
<tr><td>Agriculture on buildings</td><td>3%</td></tr>
<tr><td>Agriculture on land (Agri-PV)</td><td><1%</td></tr>
<tr><td>Public sector</td><td>2%</td></tr>
<tr><td>Other services</td><td><1%</td></tr>
<tr><td>Transportation (e.g., parking, noise barriers)</td><td><1%</td></tr>
<tr><td>Infrastructure (dams)</td><td><1%</td></tr>
<tr><td>Ground-mounted PV installations</td><td><1%</td></tr>
<tr><td>Others</td><td><1%</td></tr>
</table>
</td></tr>
<tr><td>Decommissioned PV systems during the year [MW]</td><td>3.5</td></tr>
<tr><td>Repowered PV systems during the year [MW]</td><td>3.9</td></tr>
</table>

Table 6: PV power and the broader national energy market

	2023	2024
Total power generation capacities [GW]	26.97 GW total (16.6 GW Hydro; 2.97 GW nuclear; 7.4 GW Thermal & RE [4])	29.05 GW total (16.6 GW Hydro [5]; 2.97 GW nuclear [5]; 8.17 GW PV [1]; 0.1 GW Wind [6]; 1.21 GW thermal [7])
Total renewable power generation capacities (including hydropower) [GW]	23.45 GW total (16.6 GW Hydro, 6.37 GW PV, 88 MW Wind, …)	24.87 GW total (16.6 GW Hydro [5]; 8.17 GW PV [1]; 100 MW Wind [6];)
Total electricity demand [TWh]	56.0 TWh (-1.2%)	57.5 TWh (+1.4%) [5]
New power generation capacities installed [GW]	+ 1640.1 MW PV, + 1000 MW Hydro,	+ 1799 MW PV, + 30 MW Hydro, + 14.2 MW Wind
New renewable power generation capacities (including hydropower) [GW]	+ 1640.1 MW PV, + 1000 MW Hydro,	1799.2 MW PV, + 30 MW Hydro, + 14.2 MW Wind
Estimated total PV electricity production (including self-consumed PV electricity) in [GWh]	4’624 GWh	5’961 GWh
Total PV electricity production as a % of total electricity consumption	8.25%	10.36%
Average yield of PV installations (in kWh/kWp)	885 kWh/kW	820 kWh/kW

1.3 Key enablers of PV development

Table 7: Information on key enablers.

	Description	Annual Volume	Total Volume	Source
Decentralized storage systems In [MW, MWh or #]	+ 46% of added Capacity	Added capacity: 288.7 MWh (Including 0.243 MWh lead battery)	896 MWh	Statistiques de l'énergie solaire - Année de référence 2024 [1]
Residential Heat Pumps [#]	-	+ 22'066 added Systems (+4.9% increase from total in 2023)	469'815 Systems	Statistiques de l'électricité 2024, page 48 [5]
Electric cars [#]	In 2024 47'032 (19.3%) BEV and 19'278 (8.7%) PHEV have been registered	+ 66'310 cars	303'448 in total, 202'530 BEV (4.2% of the total cars), 100'918 PHEV (2.1% of total cars)	Kennzahlen Ladeinfrastruktur Schweiz [8]
Electric buses and trucks [#]	-	+ 127 buses + 421 buses	592 buses in total 1018 trucks in total	Swiss Emobility [9, 10]

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module prices

Table 8: Typical module prices

Year	Lowest price of a standard module crystalline silicon	Highest price of a standard module crystalline silicon	Typical price of a standard module crystalline silicon
2005	4.6	3.6	4.75
2006			
2007			
2008			
2009			
2010	2.2	3.6	3.25
2011	1.3	2.5	2.2
2012	0.85	1.3	1.19
2013	0.8	1	0.95
2014	0.57	0.95	0.86
2015	0.55	0.93	0.84
2016	0.5	0.9	0.8
2017	0.45	0.86	0.76
2018	0.4	0.75	0.66
2019	0.36	0.73	0.64
2020	0.36	0.73	0.41
2021	0.36	0.73	0.42
2022	0.36	0.57	0.48
2023	0.38	0.5	0.44
2024	0.22	0.33	0.27

The lowest price corresponds to the median module price for systems with a size between 300 and 1000 kWp, while the highest price corresponds to the median module price for systems with a size between 2 and 10 kWp. The typical price is a weighted average based on the installed capacity per power range. It is 0.27 CHF/W in 2024. There was a substantial change in the module price between 2023 and 2024.

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 1-5 kW	A stand-alone PV system is a system that is installed to generate electricity to a device or a household that is not connected to the public grid.	6
Residential BAPV 5-10 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected households. Typically roof-mounted systems on villas and single-family homes.	2.1 to 2.9
Residential BIPV 5-10 kW	Grid-connected, building integrated, distributed PV systems installed to produce electricity to grid-connected households. Typically, on villas and single-family homes.	2.3 to 4.3
Small commercial BAPV 10-100 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected commercial buildings, such as public buildings, multi-family houses, agriculture barns, grocery stores etc.	1.2 to 1.8
Small commercial BIPV 10-100 kW	Grid-connected, building integrated, distributed PV systems installed to produce electricity to grid-connected commercial buildings, such as public buildings, multi-family houses, agriculture barns, grocery stores etc.	1.3 to 2.7
Large commercial BAPV 100-250 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected large commercial buildings, such as public buildings, multi-family houses, agriculture barns, grocery stores etc.	0.9 to 1.4
Large commercial BIPV 100-250 kW	Grid-connected, building integrated, distributed PV systems installed to produce electricity to grid-connected commercial buildings, such as public buildings, multi-family houses, agriculture barns, grocery stores etc.	1 to 2.2
Industrial BAPV >250 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected industrial buildings, warehouses, etc.	0.7 to 0.8
Small centralized PV 1-20 MW	Grid-connected, ground-mounted, centralized PV systems that work as central power station. The electricity generated in this type of facility is not tied to a specific customer and the purpose is to produce electricity for sale.	-
Large centralized PV >20 MW	Grid-connected, ground-mounted, centralized PV systems that work as central power station. The electricity generated in this type of facility is not tied to a specific customer and the purpose is to produce electricity for sale.	-

Table 10: National trends in system prices for different applications

Year	Residential BAPV Grid-connected, roof-mounted, distributed PV system 5-10 kW **[CHF /W]**	Small commercial BAPV Grid-connected, roof-mounted, distributed PV systems 10-100 kW **[CHF /W]**	Large commercial BAPV Grid-connected, roof-mounted, distributed PV systems 100-250 kW **[CHF /W]**	Centralized PV Grid-connected, ground-mounted, centralized PV systems 10-50 MW **[CHF /W]**
2010	6.6-7.1	5.5- 6.6	5 - 5.5	-
2011	-	-	-	-
2012	4.6-50	3.4-4.6	3 - 3.4	-
2013	-	-	-	-
2014	-	-	-	-
2015	-	-	-	-
2016	-	-	-	-
2017	-	-	-	-
2018	2.6 - 3.6	1.4 - 2.6	1.2 - 1.4	-
2019	2.5 - 3.5	1.3 - 2.5	1.2 - 1.3	-
2020	2.4 - 3.1	1.3 - 2.4	1.0 - 1.3	-
2021	2.4 - 3.2	1.4 - 2.5	1.0 - 1.5	-
2022	2.6 - 3.6	1.5 - 2.1	1.0 - 1.5	-
2023	2.8 - 3.8	1.6 - 2.3	1.3 - 1.8	-
2024	2.1 - 2.9	1.2 - 1.8	1.0 - 2.2	-

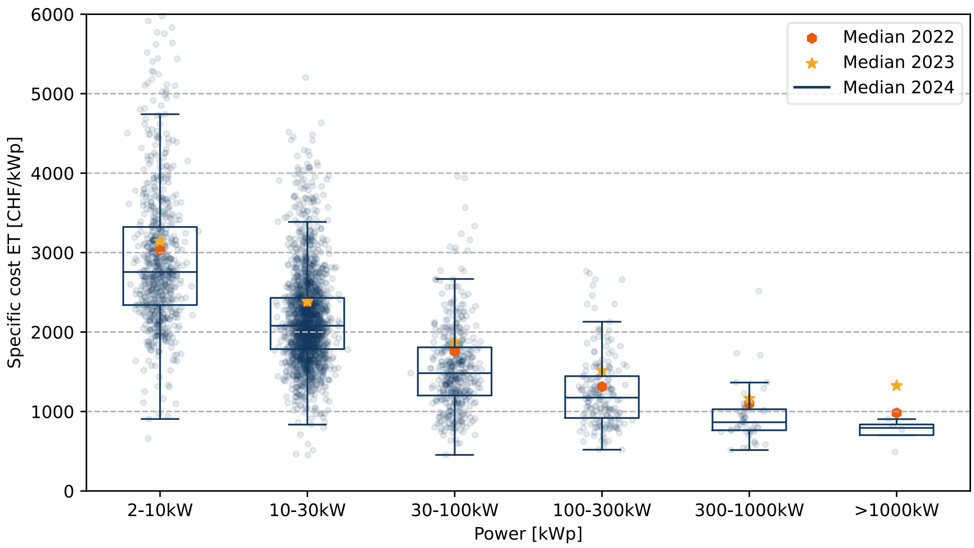


Figure 4: Specific costs of grid-connected PV systems [11]

2.3 Cost breakdown of PV installations

The cost breakdown of a typical 5-10 kW roof-mounted, grid-connected, distributed PV system on a residential single-family house installed in 2024 is presented in Table 11.

The cost structure is presented 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 represents the average cost for each cost category and is the average of the typical cost structure. The average cost takes the whole system into account and summarizes the average end price to the customer. The “low” and “high” categories represent the lowest and highest costs reported within each segment. These costs are for individual posts; the sum of these costs does not provide an accurate system price.

A comprehensive cost survey has been published for 2024 [11]. The results are presented in the pie charts below for the BAPV:

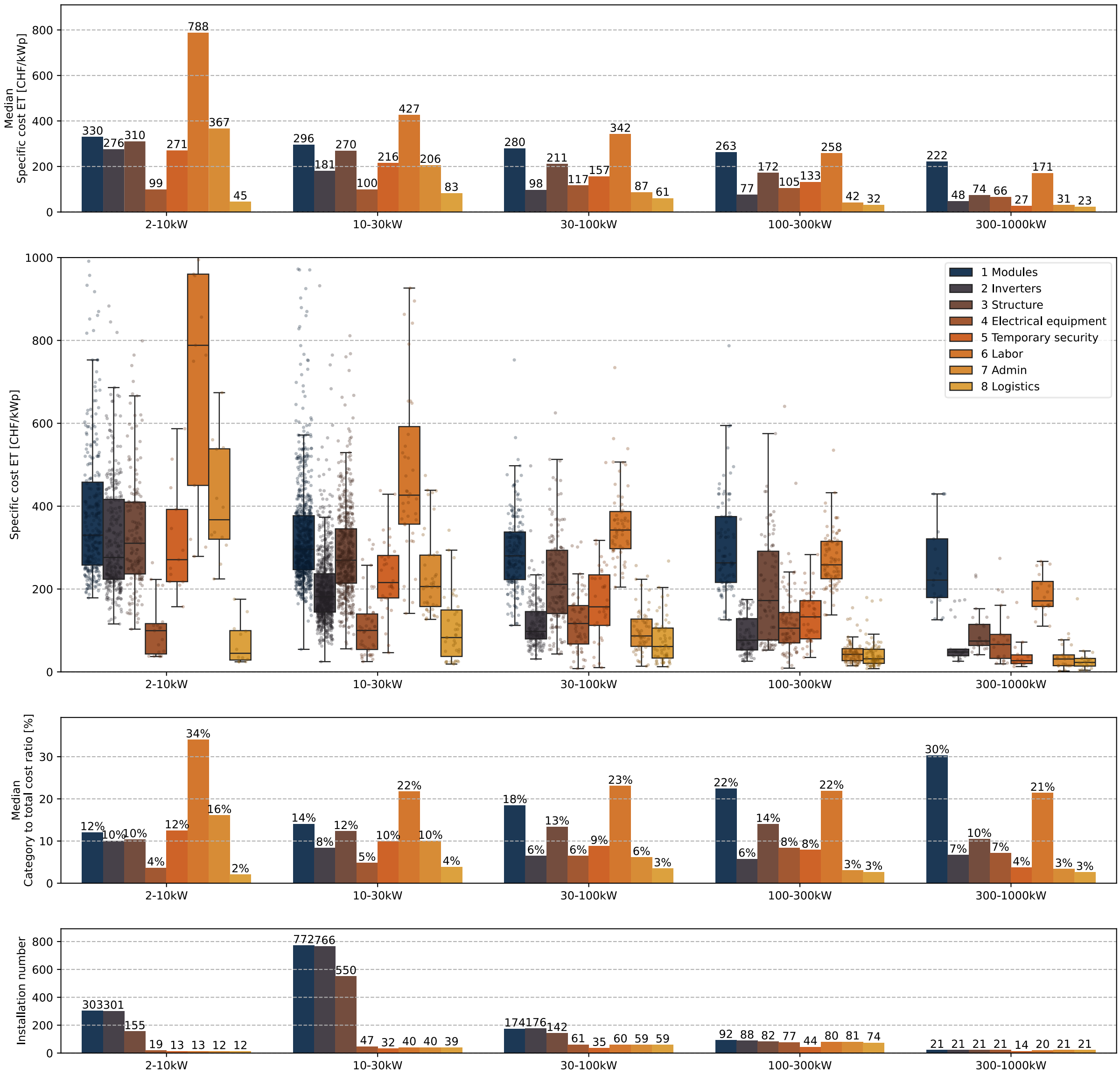


Figure 5: Cost breakdown of BAPV in 2024 [11]

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	0.33		
Inverter	0.276		
Mounting material	0.31		
Other electronics (cables, etc.)	0.099		
Subtotal Hardware	**1.015**		
Soft costs			
Planning	0.367		
Installation work	0.788		
Temporary security	0.271		
Shipping and travel expenses to customer	0.045		
Permits and commissioning (i.e. cost for electrician, etc.)	included in planning		
Project margin	Included above		
Other (self-consumption communities, AC work)	0.3		
Subtotal Soft costs	**1.77**		
Total (excluding VAT)	**2.79**		
Average VAT	8.1%		
Total (including VAT)	**3.01**		

2.4 Financial Parameters and specific financing programs

Table 12: PV financing information in 2024

Different market segments	Loan rate [%]
Average rate of loans – residential installations	3.25 (2024) *
Average rate of loans – commercial installations	3.75 (2024) *
Average cost of capital – industrial and ground-mounted installations	3.75 (2024) *

* Depending upon secured/unsecured, the specifics of the project and the duration (5-year fixed rate). A variable rate of 3.00% has been proposed for PV installations in 2024.

2.5 Specific investments programs

Table 13: 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 now have their own PV installation department.
Investment in PV plants against free electricity	While this investment scheme has been employed by some utilities (investment per m2 of modules, production corresponding to the investment is deducted from the electricity bill), it is not compatible with the regulation. If still employed, it is mainly against PV green certificates.
Crowdfunding (investment in PV plants)	Yes. Similar to the above, but usually mainly for green certificates in the niche market. For investment, mainly cooperative society and crowdlending.
Community solar	Yes, it is growing thanks to the new possibilities of collective self-consumption introduced in 2018. Community solar is increasing significantly for new residential buildings.Solar communities have been enlarged by the new law in 2024 (see chapter 3.4)
International organization financing	Not applicable

2.6 Merchant PV / PPA / CPPA

There are still not many large-scale PV installations above 1 MW in Switzerland. Therefore, merchant PV or PPA are scarce. In April 2024, Romande Energie, a Swiss DSO, signed its first CPPA to sell about 600 MWh/yr of a new agrivoltaic installation [12].

2.7 Additional Country information

Table 14: Country information

Retail electricity prices for a household [CHF /kWh]	0.321 (0.272 in 2023)
Retail electricity prices for a commercial company [CHF /kWh]	0.297 (0.253 in 2023)
Retail electricity prices for an industrial company [CHF/kWh]	0.245 (0.194 in 2023)
Liberalization of the electricity sector	Currently, only large consumers (>100MWh/year) have access to a liberalized electricity market.

3 POLICY FRAMEWORK

This chapter describes the support policies aiming directly or indirectly to drive the development of PV. Direct support policies have a direct influence on PV development by incentivizing or simplifying or defining adequate policies. Indirect support policies change the regulatory environment in a way that can push PV development.

Table 15: Summary of PV support measures

Category	Residential	Commercial and Industrial	Centralized (Ground)	AgriPV
Feed-in tariffs (govt mandated buyer)	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes
Feed-in premium (above market price - govt mandated buyer)	None, same as last year	None, same as last year	None, same as last year	None, same as last year
Contract for difference (govt mandated buyer)	None, same as last year	None, same as last year	None, same as last year	None, same as last year
Capital subsidies	Ongoing - Changed conditions	Ongoing - Changed conditions	Ongoing - Changed conditions	Ongoing - Changed conditions
Green certificates	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes
Renewable protfolio standards (RPS) with/without PV requirements	None, same as last year	None, same as last year	None, same as last year	None, same as last year
Income tax credits or other tax breaks (specify below)	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes
Self-consumption allowed (NO govt/utility buyer for excess)	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes
Net-metering (govt/utility/market buyer for excess)	None, same as last year	None, same as last year	None, same as last year	None, same as last year
Net-billing (govt/utility/market buyer for excess)	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes
Collective self-consumption and virtual net-metering	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes	Ongoing - No changes
Commercial bank activities e.g. green motgages promoting PV	Ongoing - No changes	Ongoing - No changes	None, same as last year	None, same as last year
Activities of electricity utility businesses (buyer, subsidies, other)	Ongoing - No changes	Ongoing - No changes	None, same as last year	None, same as last year
Sustainable building requirements	Ongoing - No changes	Ongoing - No changes	None, same as last year	None, same as last year

BIPV incentives (may include any of the above, specify below)	Ongoing - No changes	Ongoing - No changes	None, same as last year	None, same as last year
Merchant PV/PPA facilitating measures	None, same as last year	Ongoing - No changes	None, same as last year	None, same as last year

3.1 National targets for PV

The transformation of the Swiss energy system, as outlined in the "Energy Strategy 2050," is a long-term project. The Swiss electorate accepted a revised Federal Energy Law in 2017 in a popular referendum. This new legislation entered into force on January 1st 2018. The aims are to reduce energy consumption, increase energy efficiency, and promote the use of renewable energy [13].

Electricity production from photovoltaics is one of the key pillars in Switzerland's strategy for future electricity supply.

A forecast of renewable generation per year is shown in Figure 6

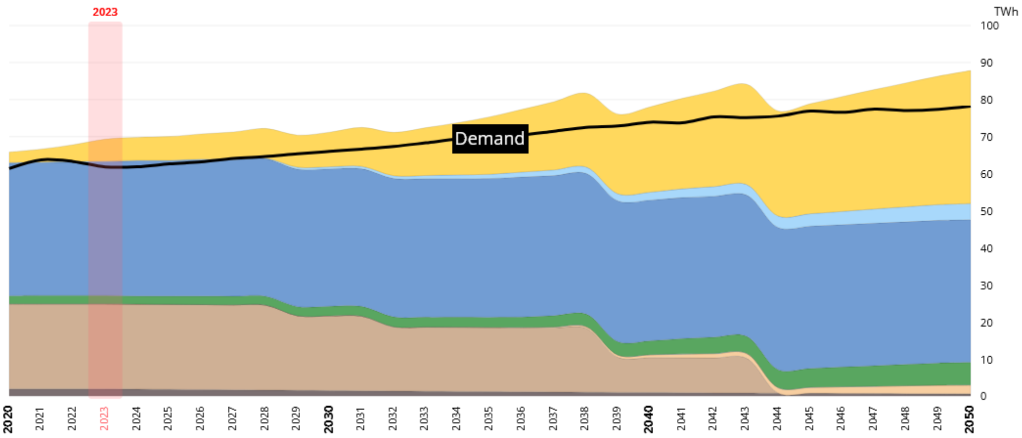


Figure 6: Annual Energy Mix as planned by the Energy Strategy 2050 (status 2024 [14])

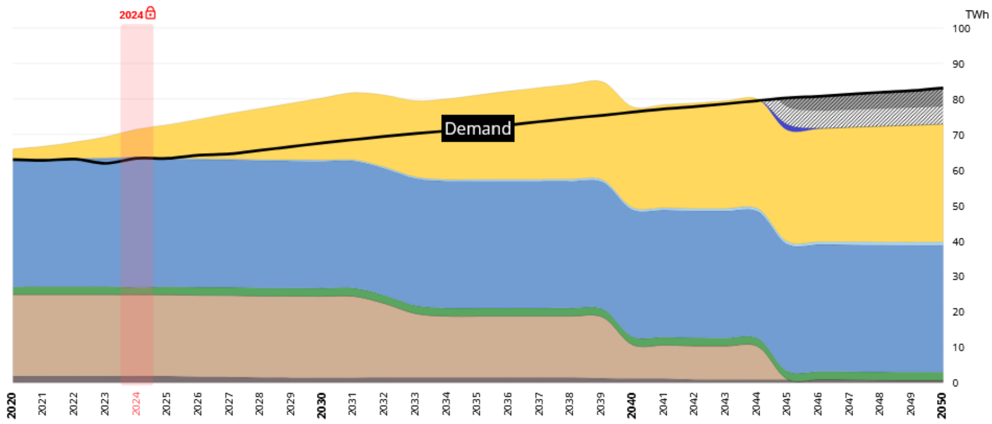


Figure 7: Annual Energy Mix evolving at the current pace if the rates are stable from 2020 on (status 2025 [14])

The latest study called 2050+ aims to generate 35 TWh from renewable energy in 2035 and 45 TWh in 2045 [15]. The 2024 installation rate of 1800 MWp/year is almost sufficient to reach this objective by 2050 without considering replacing the installed capacity. Given potential curtailment, the 2050 target is 39 GWp. Figure 7 underlines the necessity of increasing the installation rate, showing how imports would replace nuclear energy if a steady 1700 - 1900 MWp (based on 2024 new PV) is installed each year.

Switzerland is on the right track despite not reaching the steady-state rate. The extraordinary rhythm of new installation of the last years (more than 40% increase each year) has faded in 2025. There are approximately +10% new installations.

The Swiss Federal Office of Energy announced in September 2018 that the PV potential on the Swiss roof was about 50 TWh. The evaluation is based on national maps for PV roofs [16, 17] and the selection of the most suitable roofs. The tool is online for all of Switzerland and is translated into English. It is possible to evaluate the approximate PV potential of every roof in Switzerland. Since April 2019, it also includes the potential of façades. This potential was confirmed by a study conducted by ZHAW in 2022 [16]. Another analysis estimates the Swiss rooftop PV potential to be 24 ± 9 TWh [17, 18]. Therefore, the potential of façades and other surfaces (such as parking and floating PV) will likely need to be exploited.

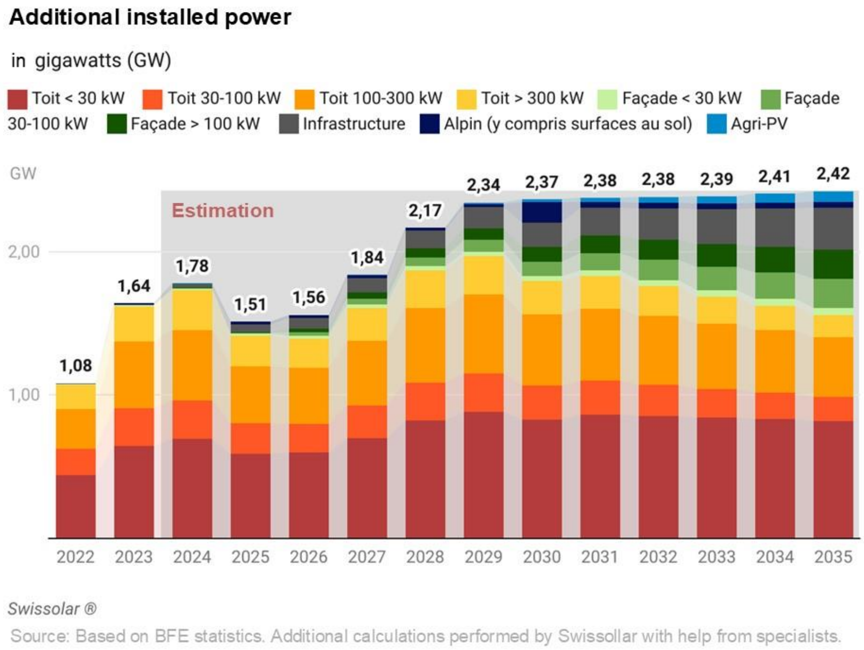


Figure 8: Installed PV capacity per year estimation from Swissolar [2]

Since 2024, Swissolar, the Swiss association of solar energy professionals, has been conducting a study on the Swiss market and providing estimates up to 2035, presented in Figure 8 [2].

The study forecasts a slight slowdown in installed capacity growth in Switzerland for 2025 and 2026. This is due to temporary uncertainties surrounding the new Electricity Act, which was passed in 2024. However, the trend is expected to continue at the current level thanks to the new Act. In particular, the Act provides for virtual aggregations in the context of self-consumption (RCPv) and local electricity communities (CEL), which are intended to promote the development of PV and its local valorisation.

They predict that the variety of installation types will increase in the long term. Alongside conventional roof-mounted installations, new applications are expected to become increasingly common, such as those on façades, infrastructure, or in combination with agricultural crops (agri-PV). These applications will offset a potential decline in roof-mounted installations, particularly from 2030 onwards.

3.2 Direct support policies for PV installations.

3.2.1 One-time remuneration with self-consumption

At the national level, the primary support measure is a one-time remuneration. This direct subsidy depends on the installed capacity. It allows reducing the investment cost by 20%-30%. This support measure is financed through a levy on electricity consumption. The one-time remuneration was updated in 2024 from 400 CHF/kW + 200 CHF to 380 CHF/kW for plants < 30 kW to incentivize investments in larger PV capacities and avoid waste of potential with half roof usage.

One-time remuneration as a function of the commissioning date [19]:

BAPV	01.04.2019 - 31.03.2020	01.04.2020 - 01.04.2021	01.04.2021 - 31.03.2022	Since 01.04.2022	Since 01.01.2023	Since 01.04.2024	Since 01.04.2025
Base contribution (CHF)	1400	1000	700	350	200 (2-5 kW) 0 (>5 kW)	0	0
Additional contribution (CHF / kW)							
< 30 kW	340	340	380	380	400	380	360
< 100 kW	300	300	290	300	300	300	300
> 100 kW	300	300	290	270	270	270	250

To be considered an integrated installation, a PV installation must be integrated into a building and fulfil a dual function, i.e., serve as weather protection, thermal insulation, or a fall protection device in addition to generating energy. The one-time remuneration scheme is approximately 10% higher for BIPV than BAPV for PV installations smaller than 100 kW. This difference is being reduced, especially from 2021 onwards.

In addition to the federal subsidies for BIPV, some communities also offer incentives for PV façades (e.g., a 50% bonus compared to rooftop installations).

Also, several innovative BIPV projects (such as using specifically designed modules for protected buildings or resulting in energy self-sufficient buildings) have been supported by a special fund for pilot and demonstrator projects from the government. Some cantons have generalized these programs after the pilot projects, offering a bonus for protected buildings [20]. BIPV projects are also incentivized by constraints imposed by the building permit process for buildings of cultural significance.

One-time remuneration as a function of the commissioning date [19]:

BIPV	**01.04.2019-31.03.2020**	**01.04.2020-01.04.2021**	**01.04.2021-31.03.2022**	**Since 01.04.2022**	**Since 01.01.2023**	**Since 01.04.2024**	**Since 01.04.2025**
Base contribution (CHF)	1400	1000	700	350	200 (2-5 kW) 0 (>5 kW)	0	0
Additional contribution (CHF / kW)							
< 30 kW	380	380	420	420	440	420	400
< 100 kW	330	330	320	330	330	330	330
> 100 kW	For systems larger than 100 kW, the one-time remuneration is the same as the one for BAPV						

3.2.2 One-time remuneration without self-consumption

For PV installations without self-consumption, the remuneration amount is 450 CHF/kW for installations with a capacity of less than 150 kW.

For PV installations with a capacity of more than 150 kW and without self-consumption, an incentive is available under the name of the high one-time payment (RUE in French) introduced in 2024. It covers up to 60% of the investment costs of the reference installations. The subsidies are awarded through auctions and organised by Pronovo [31].

All the electricity produced must be delivered to the grid for at least 15 years; self-consumption is not permitted. Producers are responsible for marketing. During auctions for the high one-off payment, bids must be made in francs per kW of power. The SFOE sets a maximum authorised bid value for each auction session. If a tender is awarded, the proposed payment rate plus any bonuses will be paid after commissioning.

To participate, the installation must be ready for construction, with the necessary permits. After submission, Pronovo evaluates the offers and grants provisional awards to the most competitive ones. Successful projects must provide a guarantee equivalent to 10% of the expected subsidy within 21 days of the award, otherwise, the offer will be rejected. Projects then have 24 months to complete commissioning. Once certification is obtained, the one-time payment and any applicable bonuses are issued within four weeks after verifying the installation's compliance. The auctions were successful: during 2024, 534 offers were adjudicated for a total volume of approximately 143.7 MW. In 2023, 163 MW were adjudicated.

3.2.3 Bonus

In addition to BAPV or BIPV remuneration, several bonuses are offered to incentivize specific applications. Those bonuses are also one-time remuneration based on the STC power capacity and apply to installations with or without self-consumption.

Tilt bonus

This bonus, introduced in 2022, incentivizes installation with a tilt angle of 75 degrees or greater. In 2024, the bonus amount was 100 CHF/kW for BAPV and 250 CHF/kW for BIPV. This bonus is intended to incentivize installation with a higher share of winter production.

Altitude bonus

This bonus is also intended to incentivize installation with a higher share of winter production. It was introduced in 2023 and promotes installations with a capacity of 150 kW or more, located at an altitude of more than 1 500 m. To be eligible for this bonus, the installation must be located outside building zones and must not have been added to or integrated into a building. The bonus amount was 250 CHF/kW in 2024.

Carport bonus

A new bonus was introduced in 2025 to incentivize photovoltaic carports with a capacity of 100 kW or higher.

3.3 Self-consumption measures

Table 16: Summary of self-consumption regulations for small private PV systems in 2024

PV self-consumption	1	Right to self-consume	Yes, since 2014
	2	Revenues from self-consumed PV	Savings on electricity bills (the retail tariffs are 2-3 times higher than the feed-in tariffs). Almost 90% of the bill is directly or indirectly related to energy (cts/kWh), making self-consumption very profitable. In 2024, the median retail tariff for households was 32 cts/kWh. The average feed-in tariff was around 15 cts/kWh, with a large spread from 6 to 25 cts/kWh.
	3	Charges to finance Transmission, Distribution grids & Renewable Levies	No, some DSOs charge for installing a bi-directional energy meter.
Excess PV electricity	4	Revenues from excess PV electricity injected into the grid	"Depending on DSO (range of 6-25 cts/kWh), often including the revenue for green certificates. http://www.vese.ch/pvtarif/
	5	Maximum timeframe for compensation of fluxes	Real time (standard metering timeframe of 15 minutes)

	6	Geographical compensation (virtual self-consumption or metering)	Individual or collective self-consumption, usually measured by the same meter.
Other characteristics	7	Regulatory scheme duration	The compensation scheme for excess electricity is adjusted every year (with the exception of the national feed-in tariff, which is fixed over 15 to 25 years)
	8	Third-party ownership accepted	Yes, most utilities are now active, and PV contracting and self-consumption are being offered to their residential and industrial customers.
	9	Grid codes and/or additional taxes/fees impacting the revenues of the prosumer	Until 2018, some utilities applied a different tariff structure for prosumers (power metering). Since 2018, only one tariff structure is allowed for prosumers with an annual consumption smaller than 50 MWh and with a connection to the grid below 1 kV
	10	Regulations on enablers of self-consumption (storage, DSM…)	No specific regulation on system flexibility. 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. Industries commonly use DSM to avoid power peaks, but it can also be utilized to optimize self-consumption. Thanks to the increasing availability of solutions for DSM, more and more single household owners with PV systems are taking an interest in them to increase self-consumption. Specific recommendations exist for the connection and metering of storage systems.
	11	PV system size limitations	There is no limit on the size of PV installations, but some projects can be delayed due to grid capacity constraint.
	12	Electricity system limitations	None

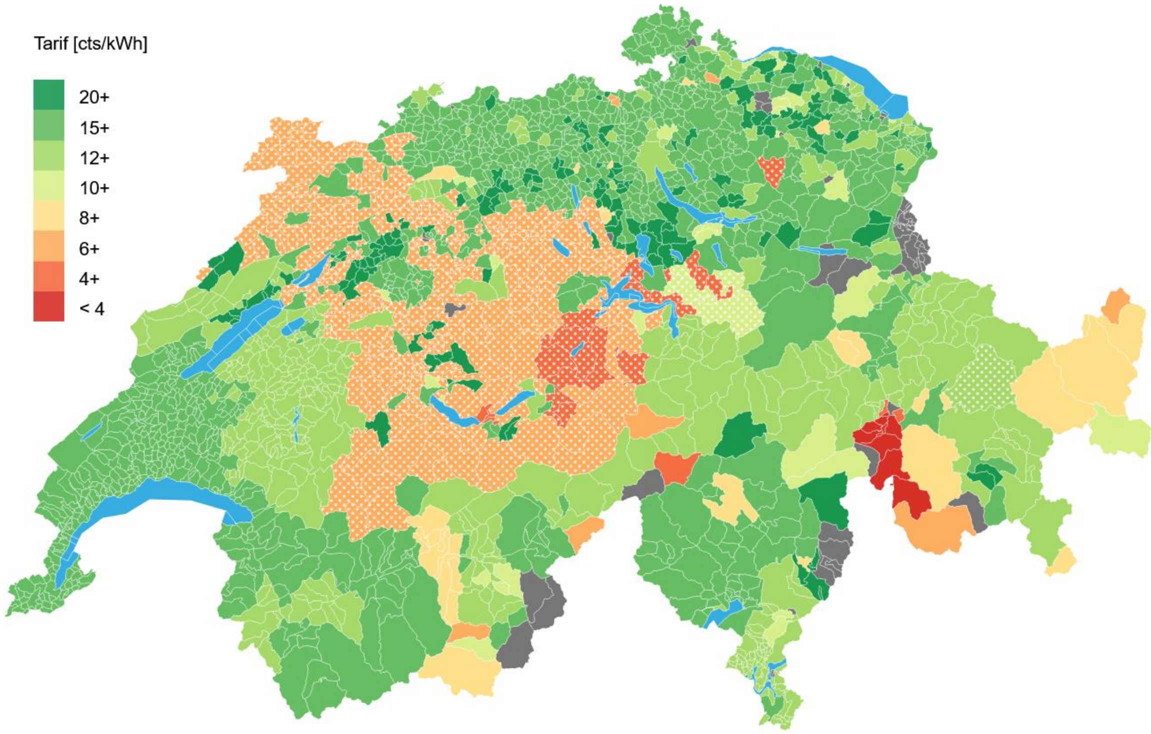


Figure 9: Feed-in tariffs across Switzerland in 2024 [21]

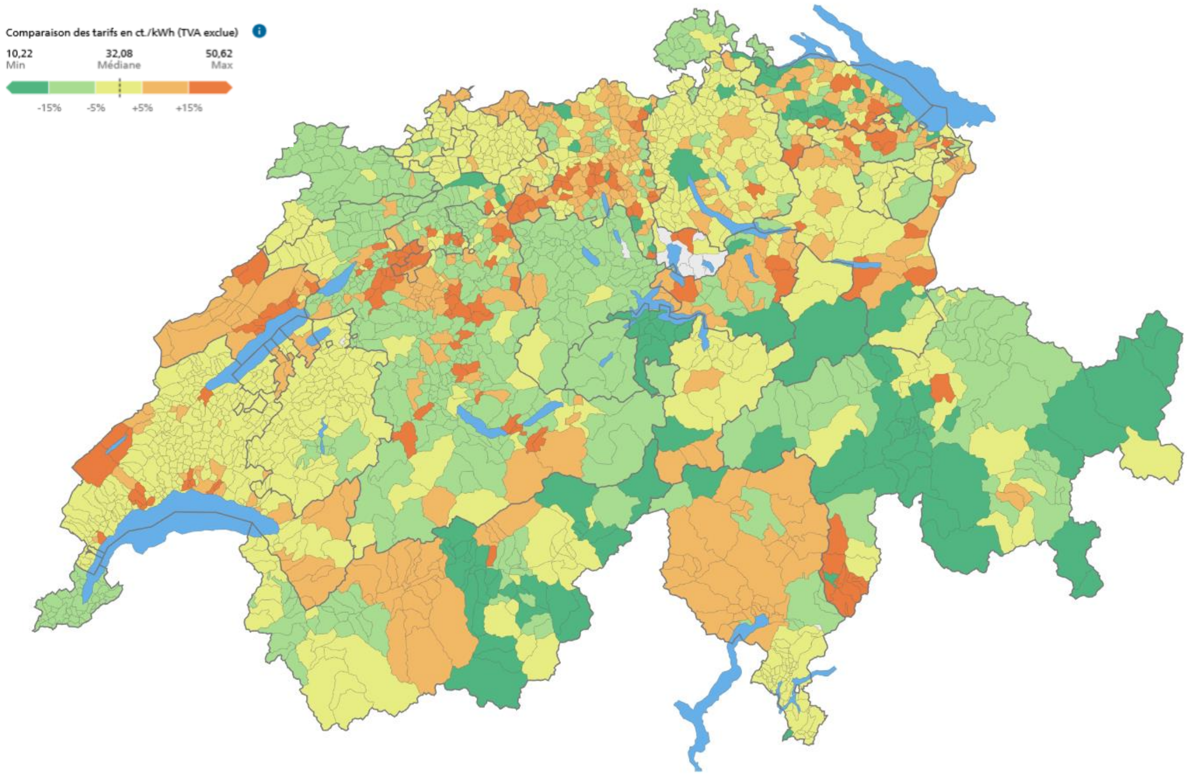
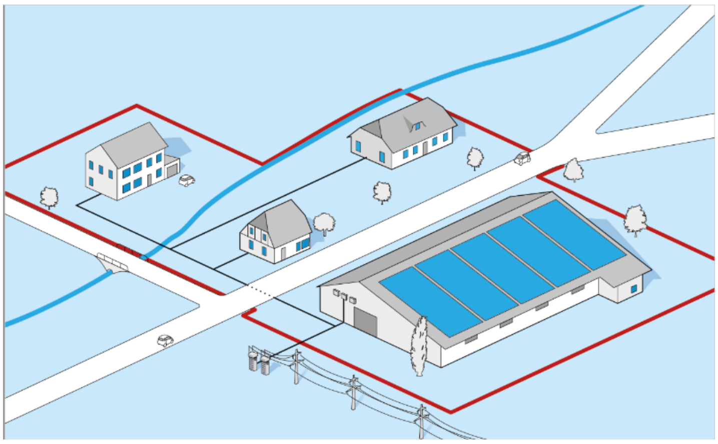


Figure 10: Retail tariffs for households across Switzerland in 2024.

3.4 Collective self-consumption, community solar and similar measures

Collective self-consumption has been allowed by most DSOs (Switzerland has around 630 DSOs in 2023) since 2014, but it used to be restricted to consumers of the same building or within the same perimeter of land. In this context, the DSO was also responsible for billing every customer.



In January 2018, collective self-consumption opportunities had improved significantly [22]. End-consumers can form a community as long as their land is contiguous and the public grid is not used, i.e., it is a single grid connection, acting as a unique connection point towards the DSO. In January 2023, the contiguous land condition was removed, but the DSO grid should still not be used for collective self-consumption [23].

Internal metering is then the responsibility of the community. An additional incentive for collective self-consumption communities is the possibility of accessing the free electricity market if their consumption exceeds 100 MWh/year. However, this incentive was negative in 2022, as the skyrocketing market price offset the usual household prices, which remained stable. 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 cases where a building is occupied by tenants (under specific conditions, the tenant must purchase the collective PV electricity).

Two types of collective self-consumption communities are available in Switzerland. The RCP (Regroupement de consommation propre) and the CA (Communauté d’autoconsommation). New opportunities will become available in the coming years, following the change in law approved by popular vote in 2024, which expands the range of possibilities. These will be described in future reports as they are implemented.

The Table below details the difference between these two options:

	RCP	**CA**
Number of consumers (seen by the DSO)	One	Many
Internal pricing for PV self-consumption	Strict rules	No rule
Minimum PV capacity	10% of the grid connection power	-
Consumers can leave the community whenever they want	No	Yes
Solidarity debtors	Owner	Consumers

Interests for the DSO		Data for each consumer
Interests for the consumer	Better prices Access to the free electricity market (if the RCP reaches a consumption of > 100’000 kWh/year	

More general information and examples can be found on the Suisse Energie platform [24], the Swissolar guide [25] or the information platform on local electricity production [26].

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

On October 1, 2022, parliament decided to amend the Energy Law to rapidly secure electricity supplies during the winter ("solar offensive"). Parliament has made it easier to authorize large-scale photovoltaic plants by amending the Energy law and has set a one-off remuneration of up to 60% of investment costs. These reductions will remain in effect until the new facilities achieve an annual national production of 2 TWh. At its meeting on March 17, 2023, the Federal Council decided to modify these ordinances, effective April 1, 2023, to simplify the application of the amendments [27].

Amount of one-off payment: an application for a one-off payment can be submitted once an enforceable building permit has been obtained. The subsidy amounts to 60% of the chargeable investment costs. Eligibility is conditional on the plant injecting at least 10% of the expected output of the entire plant, or 10 GWh, into the electricity grid by the end of December 2025. At the latest, Full commissioning must occur by December 31, 2030.

3.7 Social Policies

Public buildings are often considered for PV installations. It is mainly because the law or recommendation requires public authorities to put themselves in the spotlight and provide examples.

There isn't any specific subsidy for low-income electricity consumers.

3.8 Retroactive measures applied to PV

No retroactive measure was applied in 2024.

3.9 Indirect policy issues

3.9.1 Rural electrification measures

No specific rural electrification measures are in place in Switzerland, as 100% of the population has access to the electricity grid.

3.9.2 Support for electricity storage and demand response measures

There is no national-level support scheme for electricity storage. However, some cantons (Thurgau, Appenzell Ausserrhoden, and Vaud) have introduced, for some time, direct subsidies for local storage solutions. The support scheme in Vaud and Appenzell ended in 2020.

There are ongoing discussions among some DSOs about introducing new tariff designs that would allow for partial recovery of investment costs if the storage system owner is willing to let the DSO manage the storage unit. Increasingly, utilities are also offering solutions for virtual storage. For a fee (fixed or per kWh), the owner of a PV system can utilize the DSO's grid as virtual storage for their PV production and use it later (basically a net-metering solution).

3.9.3 Minimum share of renewable energy for new buildings

Within the framework of the MoPEC "modèle de prescriptions énergétiques des cantons," some cantons have chosen to impose a minimum requirement for renewable energy production in new buildings. For instance, in the canton de Vaud, 20% of the normalized electricity needs of new buildings should be directly covered by local renewable energy production, such as photovoltaics.

3.9.4 Support for electric vehicles (and VIPV)

For regions and municipalities: SuisseEnergie supports municipalities up to CHF 5’000 and regions up to CHF 10 000 in the implementation of electric mobility projects (in all cases, max. 40% of project costs)[28].

Fully electric vehicles have been subject to the 4% automobile duty since 2024. Since they do not run on fossil fuels, there is no petroleum tax to. Electric vehicles also often pay reduced vehicle taxes, but there are significant differences from one canton to another.

On September 11 2018, the Swiss Government launched a tender for installing fast-charging stations on 100 service stations along motorways. The government will pre-finance the grid connection, which the operator will repay through concession fees. The first fast-charging station was unveiled in mid-2020, and 21 more charging points have been installed. By 2023, 50 more service stations are to be equipped, and all 100 installations are scheduled to have their charging stations by 2030 [29, 30].

There are various ways of fostering EVs, which are applied by some cantons and cities. Some will subsidize the pre-equipment (all electricity work up to the charging station, excluding the charging station itself) of a communal car park in a residential building to accommodate charging stations. Other municipalities will install charging stations, such as the Neuchatel canton, which funds the installation of charging points for up to 800 CHF per parking place. Others focus on vehicles, such as the industrial services city of Delémont in Jura, which pays up to 15% of the price of electric cars when buying a new one. There are more general measures; for instance, the region of Tessin decided to allocate 3 million CHF for eMobility in 2019 and continued the program in 2021, providing an additional 11 million CHF.

A more comprehensive list of financial aids can be found on the Swiss eMobility website [33], which is available in both French and German.

3.9.5 Winter electricity production policy

With the amendments to the Energy Law adopted on September 30 2022 (urgent measures to ensure a rapid supply of electricity during the winter, solar offensive), parliament is making it easier to authorize large-scale photovoltaic plants. It is setting a one-off payment of up to 60% of the investment costs for such plants. These reductions will remain in effect until the new facilities can generate a maximum of 2 TWh per year nationwide. These changes to the Energy Law will remain in effect until 2025.

The facilities must achieve a minimum annual production of 10 GWh and a specific production during the winter half-year (October 1 - March 31) of 500 kWh per 1 kW of installed capacity. If these conditions are met, the one-off remuneration will correspond to the uncovered costs (as calculated by the profitability analysis) but will not exceed 60% of the chargeable investment costs. To qualify for the subsidy, the plant must inject at least 10% of the expected production of the entire planned plant, or 10 GWh, into the electricity grid by the end of 2025. Full commissioning must take place by December 31 2030 at the latest. Projects that do not meet these criteria may be required to pay the standard one-off remuneration.

3.9.6 Support for encouraging social acceptance of PV systems

Unlike other renewable energies, particularly wind power, photovoltaics is well accepted in Switzerland. This is particularly true for installations on roofs or other infrastructure (dams, motorway barriers, etc.).

The 60% subsidy of investment costs, detailed in Chapter 3.6, encourages planning utility-scale ground-mounted installations in the Alps. These could help to reduce the winter production deficit. Still, the acceptance of such a plant is likely to be lower, particularly due to the need to protect the landscape, flora, and fauna.

A study conducted in 2021 [35] revealed that a majority would be in favour of developing alpine photovoltaics. However, on September 10, 2023, 53.9% of voters in the canton of Valais rejected a decree that would have expedited authorization procedures for major solar projects in the Alps [32].

3.9.7 Other support measures

Minergie, a leading building standard organization supported by the cantons, the Swiss Federal Office of Energy, and the building industry, revised its building standards. PV has become quasi-mandatory to fulfil the requirements for the nearly zero-energy standards. Since for a Minergie labelled building, only 40% of the grid-injected electricity can be counted for the overall energy requirements, there is an additional incentive to optimize self-consumption (DSM, battery).

These voluntary building standards helped pave the way for the new building standards defined 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 cantons. These regulations should include a requirement for PV in every new building. In most cantons, a requirement to include about 10 W PV per square meter of heated area for new buildings has already been implemented. It is also recommended that 10% renewable energy be included when the heating system has to be retrofitted. PV can be an option, among others.

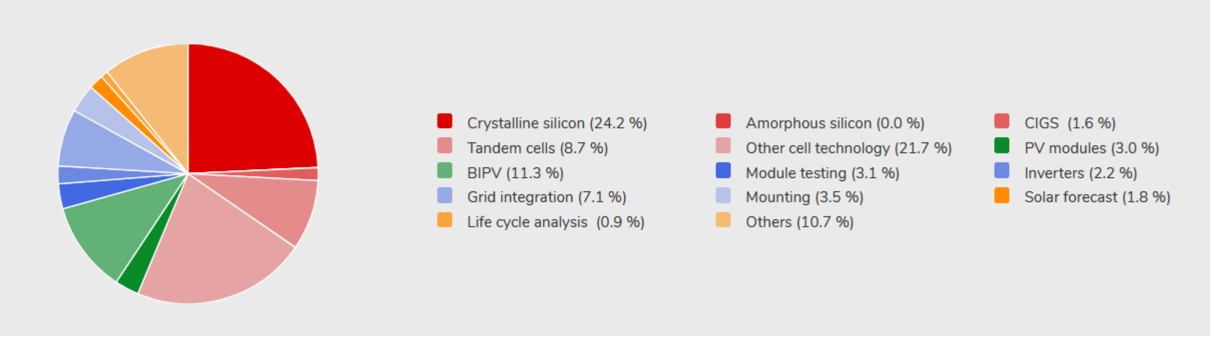
A negative measure hindering PV development is the restrictions on installing PV systems in some cities (for example, for places listed as UNESCO World Heritage), enforce restrictions on installing PV systems on roofs (colour of modules/frames, module layout) and sometimes purely reject ridge, orientation, or even pure rejection), which also hinders PV development.

Several measures have been taken in recent years to lighten the administrative burden of installing PV. Smaller installations are free of some of the previously needed authorization, and systems in industrial and agricultural zones no longer require a building permit under some conditions.

National research

The Swiss Federal Office of Energy (SFOE) operates a photovoltaic RTD program [37] that involves numerous stakeholders. The programme is part of the long-standing coordinative activities of the SFOE to support research and development of energy technologies in Switzerland, where funds are deployed in a subsidiary manner to fill gaps in Switzerland's funding landscape. Grants are awarded to private entities, including the domain of the Swiss Federal Institutes of Technology (ETH), universities of applied sciences, and universities.

The focus of the photovoltaics programme lies on RD&D, ranging from basic research to applied research, product development, pilot, and demonstration projects. The total amount of funding for these 91 ongoing projects is 35.0 million Swiss francs (projected for one year). The percentages in the graph below refer to the number of projects in a specific thematic area compared to the total number of ongoing projects. In the area of «solar cell technology» roughly 19.7 million Swiss francs (56.3 %), in the area of «modules and building integrated photovoltaics (BIPV)» roughly 5 million Swiss francs (14.3 %), in the area of «system technology» roughly 5.6 million Swiss francs (15.9 %), and in the area of «other (LCA, solar resources...)» roughly 4.7 million Swiss francs (13.4 %) are spent on current subsidies.



3.10 Financing and cost of support measures

National PV incentives (one-time remuneration and feed-in tariff) are financed by a network surcharge paid on a kWh-basis by all electricity consumers. Under certain conditions, companies for which electricity cost exceeds 10% of their gross value can be reimbursed. The network surcharge is 2.3 cts/kWh for financing all renewables levies (not only solar). This corresponds to a burden of 103.5 Swiss francs per year for an average household consuming 4'500 kWh.

In 2024, the following amount was paid for the two incentive measures[33]:

- One-time remuneration: In the 2024 financial year, a total of CHF 612 million was granted to 66,465 operators of small-scale photovoltaic plants and 2800 operators of large-scale photovoltaic plants. A further 148 project operators of large-scale photovoltaic plants were promised a subsequent one-off payment. This exceeded the previous year's level of 374 million euros.

3.11 Grid integration policies

3.11.1 Grid connection policies

Photovoltaic production in 2024 was equivalent to 10.36% [1] of the country's electricity consumption. This ratio is reasonable by international standards [34]. Despite this, in a growing number of cases, DSOs can’t accept electrical connection requests for a new photovoltaic installation without taking action. DSOs must identify the most economically attractive solution for connecting the installation. Currently, in most cases, this involves reinforcing the grid. This can lead to delays in commissioning of up to several years.

The DSO bears the costs of reinforcement up to the point of common coupling, and the project owner pays for the rest. The increase in reinforcement costs will be reflected in the price of electricity for all consumers, which should further increase the incentive for self-consumption.

This cost allocation is currently being discussed in the revision of the Federal Electricity Supply Act. For facilities over 50kW, the costs of reinforcement from the boundary of the plot to the point of common coupling will be borne by the national transmission grid company.

3.11.2 Grid access policies

Grid access in Switzerland is regulated by the Federal Electricity Supply Act and administered by Swissgrid, the national transmission system operator. The policy ensures non-discriminatory access to the grid for all market participants, including renewable energy producers.

The transport share of the electricity cost is usually energy-based for small consumers and mixed for large consumers. This component has a relatively low impact on the development of the PV market. The feed-in tariff is fully energy-based, incentivizing self-consumption.

PV curtailment is not required; however, the DSO may choose this option if it is financially advantageous. It is, however, mandatory to get the producer agreement and define the terms and conditions for remuneration.

4 INDUSTRY

4.1 Production of feedstocks, ingots and wafers (crystalline silicon industry)

There is no feedstock, ingots, and 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 Table below.

Table 17: PV cell and module production and production capacity information for 2024

Cell/Module manufacturer (or total national production)	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					
Megasol *	Mono Perc	-	No data provided (37 MW in 2021)	-	400 MW
3S Swiss Solar Solutions SA **	Mono Perc	-	No data provided	-	240 MW
Wafer-based PV manufactures					
-	-	-	-	-	-
Totals		-	-	-	**640**

* Megasol also has a production facility with a capacity of 700 MW in Ningbo, China, for standard high-performance modules. In Switzerland, they own a production line of 400 MW. This production line is specialized in glass-glass modules and small series / custom-made products (size, shape, and colour).

** 100% BIPV und 100% Swiss made certified. 3S Swiss Solar Solutions SA (previously Meyer Burger) produces its Megaslate module (a roofing material consisting of roof tiles, PV tiles, and thermal tiles.) as well as hybrid (PV and solar thermal) collectors. Due to a growing number of complaints related to the glare of PV installations, 3S Swiss Solar Solutions SA has developed wa special glare-free module (MegaSlate Satinato). They have a new product since 2024 called Tera Slate [35] and Tera Slate Satinato [36]. They have a complete EPD (European Product Declaration) for the new Teraslate products.

4.3 Manufacturers and suppliers of other components

Inverters

- **ABB** - String and central inverters
- **Belenos** - Module integrated micro-inverter
- **Studer Innotec AG** - Inverters/chargers and MPPT charge controllers

Junction Boxes/Connectors

- **Leoni Studer AG** - Solar cables, junction boxes, and plug-in connections
- **Stäubli AG** - Electrical connectors for PV

Cables

- **Huber+Suhner AG** - Photovoltaic solar cables and connectors
- **Leoni Studer AG** - Solar cables

Supporting Structures

- **Urs Buehler Energy Systems and Engineering** - PV mounting system
- **Alustand** - Supporting structures for PV systems
- **PLIASYS AG** - PV mounting system for flat roofs
- **Montavent AG** - Lightweight PV substructure for flat roofs
- **PREFA Schweiz** - PV mounting system
- **Wagner System AG** - Mounting system for PV façades
- **Ernst Schweizer AG** - PV mounting systems
- **Soltop Schuppisser AG** - Mounting system for large PV systems on flat roofs
- **Tritec AG** - Photovoltaic mounting systems
- **PVInteg AG** - PV mounting systems for flat roofs
- **Sun2wheel** - Carport system with integrated photovoltaic roof
- **Turn2watt** – Vertical PV mounting systems

Storage Batteries

- **Innovenergy GmbH** - ZEBRA battery storage for PV plants
- **ABB** - Energy storage systems
- **Studer Innotec AG** - Inverter/chargers and storage solutions

Components for Customized PV Modules

- **Solaxess SA** - Nano technology film for photovoltaic panels
- **Solaronix SA** - Materials/components for dye solar cells and perovskite solar cells
- **Metalor Technologies SA** - Precious metals and advanced materials
- **Perovskia SA** - Perovskite solar cells
- **Sefar AG** - Fibre and fabric for photovoltaic applications
- **Kromatix Glass Tech SA** - Nano-deposition technology for solar glass
- **Meyer Burger Technology AG** - Equipment for cell connection technology (smart wire)
- **Lightswing Solar** - Vertical bifacial photovoltaic supports

This classification helps organize the companies based on their primary products or services in the solar PV sector. These actors in the PV research & Technology in Switzerland are shown in Figure 10.

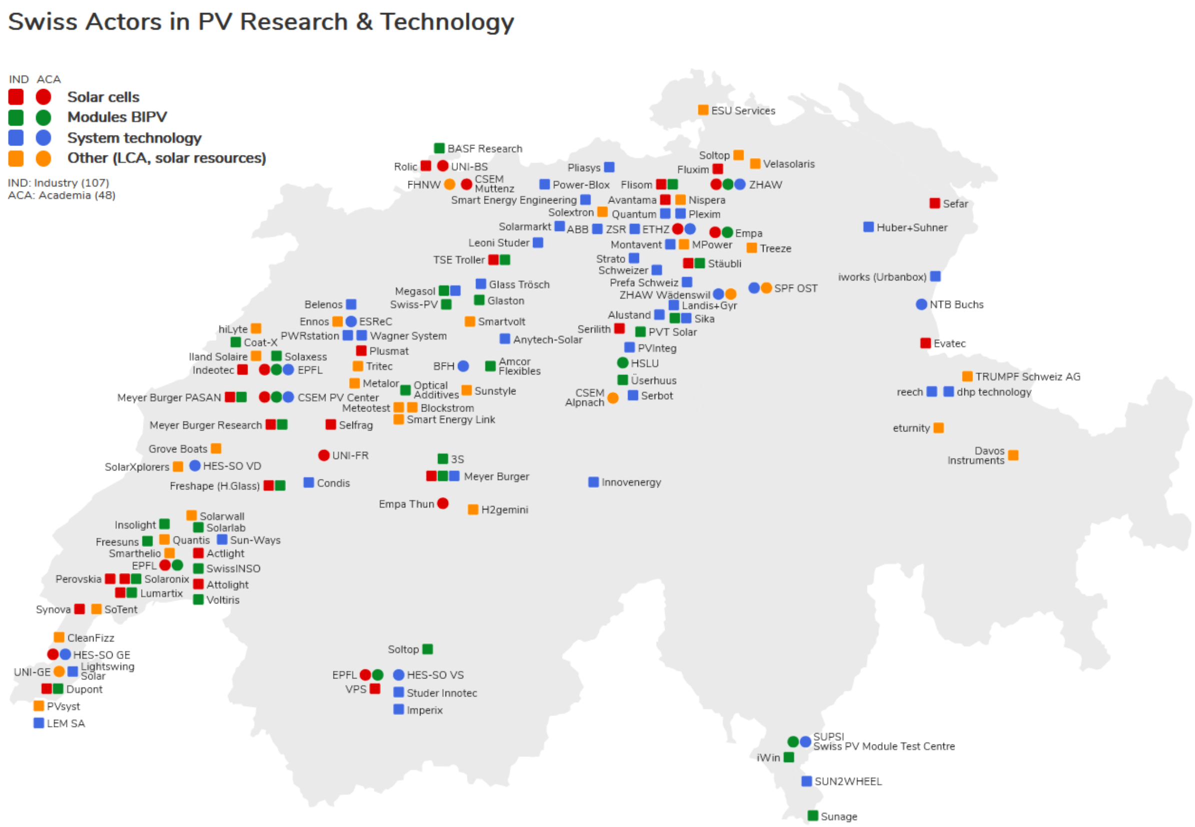


Figure 11: locations of the Swiss actors in PV Research and technology in Switzerland[39]

5 PV IN THE ECONOMY

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

5.1 Labour places

Table 18: Estimated PV-related full-time labour places in 2024

Market category	Number of full-time labour places
Research and development (not including companies)	200 (estimation)
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	11096 (Swissolar estimation)
Distributors of PV products and installations	
Other	500 (estimation)
Total	11796

For the first time in Switzerland, Swissolar has studied [2] the labour places in the solar industry in 2024. You can see hereunder some parts translated, describing the market:

Page 14: "*Until now, the solar industry has lacked comprehensive information on its skilled labour requirements. To identify these requirements more precisely, Swissolar evaluated various sources, including company surveys and expert estimates, to analyse the labour requirements for installing PV systems. In 2023, the demand for skilled workers was around 10,000 full-time equivalents (FTEs), and we estimate that this figure will rise to around 11,000 FTEs in 2024.*

The realistic target of increasing electricity production from PV to 28 TWh by 2035 will require 19,000 FTEs in the medium term, corresponding to an average annual increase of around 800 new full-time professionals."

5.2 Business value

Table 19: Rough estimation of the value of the PV business in 2024 (VAT is excluded)

Sub-market	Capacity installed [MW]	Average price [CHF/W]	Value	Sub-market
Off-grid	1.2	6	7’200’000	7’200’000
Grid-connected distributed	1797.7	1.6 (Figure 12)	2’876’320’000	2’876’320’000
Grid-connected centralized	0	0	0	0
Value of PV business in 2024				2’883’520’000

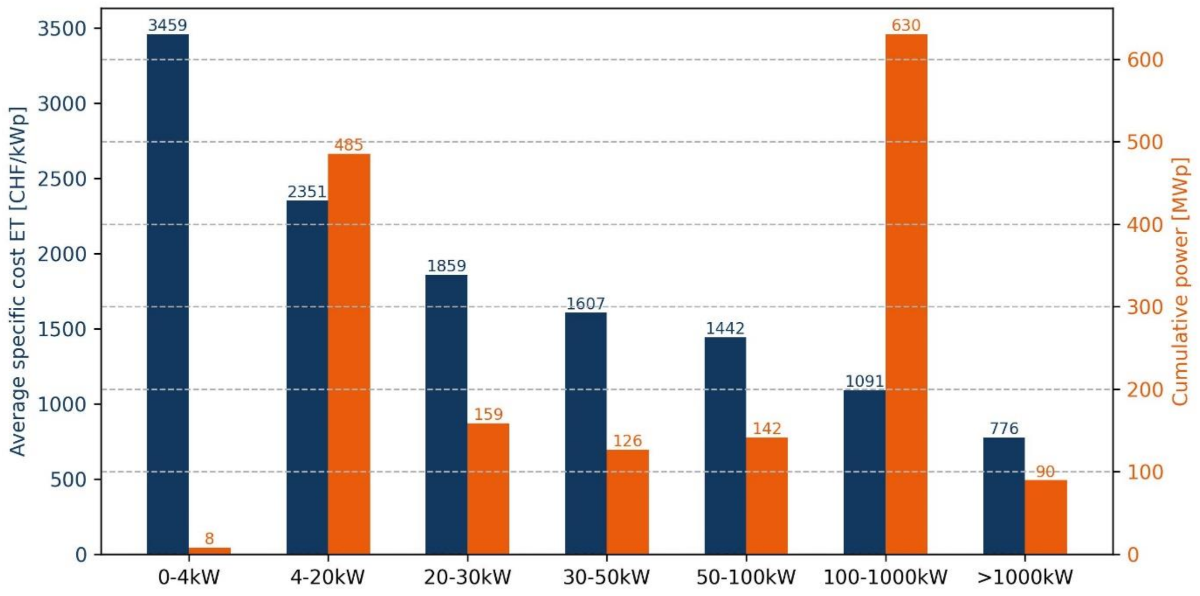


Figure 12: Average specific cost and cumulative power for each power category (data compilation from "Statistiques de l’énergie solaire: Année de référence 2024" and “Observation des prix du marché photovoltaïque 2024”)

6 INTEREST FROM ELECTRICITY STAKEHOLDERS

6.1 Structure of the electricity system

The electricity system in Switzerland is divided into seven network levels, ranging from the high-voltage transmission network (level 1) to the low-voltage distribution network serving the end consumer (level 7).

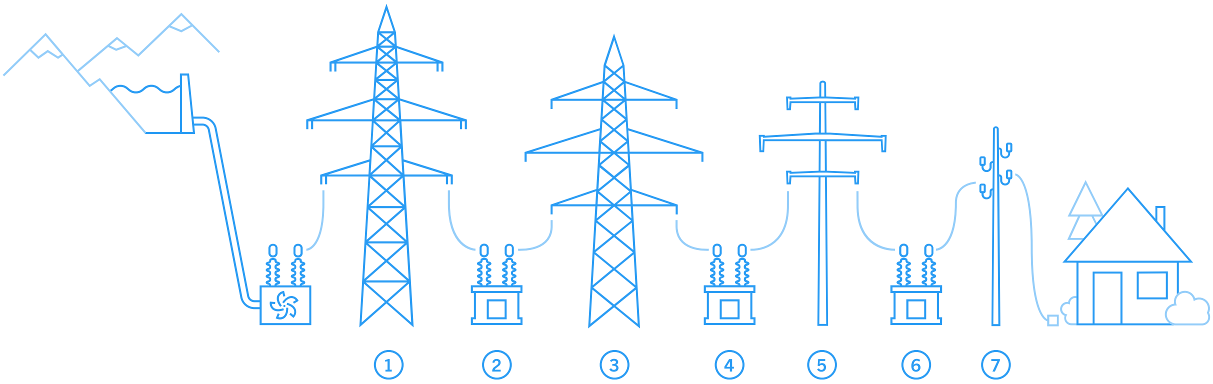


Figure 13: Network level scheme [40]

Swissgrid is the national transmission grid operator at level 1 (380 kV and 220 kV transmission lines) and is responsible for grid stability and frequency control.

Around 630 DSO companies make Switzerland's electricity supply to end-users. 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 customers, while others have more than 100’000 customers.

There are national regulations and recommendations regarding PV grid interconnection, but each DSO may have specific technical interconnection conditions. There is, however, a tendency for harmonization 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 50 MW, and a minimal tariff must be paid, calculated based on the DSOs procurement and generation cost.

6.2 Interest from electricity utility businesses

An increasing number of electricity utilities are entering the PV business. Especially larger utilities that 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 well seen by the traditional PV installing 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 the acquisition of PV installation 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 at district level and EV charging stations

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 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 are becoming increasingly aware of their vast potential (on infrastructure owned by the local government, such as schools, public buildings, etc.) and, therefore, invest themselves in PV power plants. On the other hand, they can create favourable conditions (simplified administrative procedures, for example) and grant additional local subsidies for solar, storage, or EV to push the development. Swiss energy also pushes for better energy management of cities through its program “2000 Watts Society”

Municipalities are often also pushing collective self-consumption and promoting it for new urban developments.

A label called “Energy City” and “Energy Municipality” is awarded to cities and municipalities that live and implement a sustainable municipal energy policy. Energy cities promote renewable energies and environmentally friendly mobility and rely on the efficient use of resources. There are 460 Energy Cities in Switzerland.

Most of the cantons have energy policies favourable to photovoltaics. An example is the canton of Geneva, which has targeted to produce 100 GWh of PV electricity by 2025.

Another example is the canton of Basel-Landschaft, which has published its 2022 energy plan with a strong increase in photovoltaic energy. If the expansion were to take place on buildings alone, 66 % to 77 % of the potential available on roofs and façades would have to be utilized. These percentages are reduced if other surfaces are also used for the expansion (e.g. car parks and other infrastructure facilities).

7 HIGHLIGHTS AND PROSPECTS

7.1 Highlights

Focus on hail resistance

Following several hailstorms, particularly in Lugano in 2023 where hailstones measured 5–7 cm, the importance of resistance requirements has increased. In Switzerland, the requirements for the hail resistance of building components, including solar thermal collectors and photovoltaic modules, are defined in the load-bearing structure standard (SIA 261/1:2020). This standard specifies the hail resistance class that solar elements installed on a certain category of building in a given region must meet. For single-family homes, most regions in Switzerland currently require a hail resistance class of HW 3, meaning components must withstand hailstones with a diameter of 3 cm. Since 2019, MétéoSuisse has been directing the ‘Hail Climatology’ project. This has resulted in an updated ‘Hail Risk’ map that considers changes in the frequency and intensity of hailstorms. The map will formally be incorporated into the ordinances, meaning that higher hail resistance classes will apply to different regions.

New solar installer apprenticeship programme

The solar sector in Switzerland is experiencing remarkable growth. However, this rapid expansion has highlighted a significant challenge: the shortage of skilled labour. Recognising this issue, the Swiss solar energy association Swissolar has partnered with the national training centre Polybau to launch two new initial training programmes: the solar installer CFC (Federal Certificate of Competence, equivalent to a full professional qualification) and the solar installer AFP (Federal Professional Certificate, a shorter, more practical course).

These courses, which are due to begin in summer 2024, have already attracted significant interest: more than 90 apprenticeship contracts have been signed in just a few months, and this figure is expected to exceed 120 in the near future. This development is particularly noteworthy when you consider that, just two years ago, there were no specific vocational training courses for solar energy in Switzerland. The sector has thus taken the crucial step of structuring its initial training in record time, going from zero to around 100 apprenticeship places.

Nevertheless, a recent study highlights that considerable further action is needed: to achieve the objectives of the national energy strategy by 2035, the number of solar professionals will need to almost double from around 11,000 full-time equivalents (FTEs) to nearly 20,000 FTEs. This equates to the creation of around 850 new skilled jobs per year — an ambitious yet essential pace to support the energy transition. This case study clearly demonstrates a medium-sized country's ability to swiftly address skills shortages in strategic sectors. It also demonstrates that the energy transition depends not only on technology and financing, but also on significant investment in human capital to achieve climate targets.

Residential batteries on the rise

In Switzerland, the growth of residential storage is accelerating at an impressive pace, driven by technological, economic, regulatory and behavioural developments. In 2024, almost half of the new residential photovoltaic installations were equipped with a battery, representing a significant increase from the 15–20% observed in 2017 [1]. The annual installed capacity has increased from 28,300 kWh in 2020 to 288,677 kWh in 2024. This growth is being driven by a significant decrease in battery costs and an increase in the difference between the electricity retail and feed-in tariffs.

Figure 14 shows that the median battery-specific cost has decreased from 849 CHF/kWh to 654 CHF/kWh between 2023 and 2024 [41].

The regulatory environment has undergone significant changes. The abolition of cost-based remuneration (RPC) in 2021 encouraged owners to favour self-consumption over reselling surplus energy, as feed-in tariffs became significantly less attractive. New rules are accelerating this transition, planned for 2026, including the introduction of dynamic tariffs and a floor price, which further increases the appeal of storage in avoiding the sale of electricity to the grid at low prices.

Beyond self-consumption, these batteries already play a key role in stabilizing the grid, reducing peak loads, providing balancing energy, and improving the security of supply. Current legislation, particularly the Electricity Act, provides a basis for these uses. However, further action is needed, according to Swissolar, such as defining incentive price indicators, facilitating access to batteries for the regulation services market, encouraging decentralized neighborhood storage ('front-of-the-meter'), and removing barriers to data exchange via harmonized interfaces.

and is being reinforced by the prospect of utilising second-life batteries from electric vehicles.

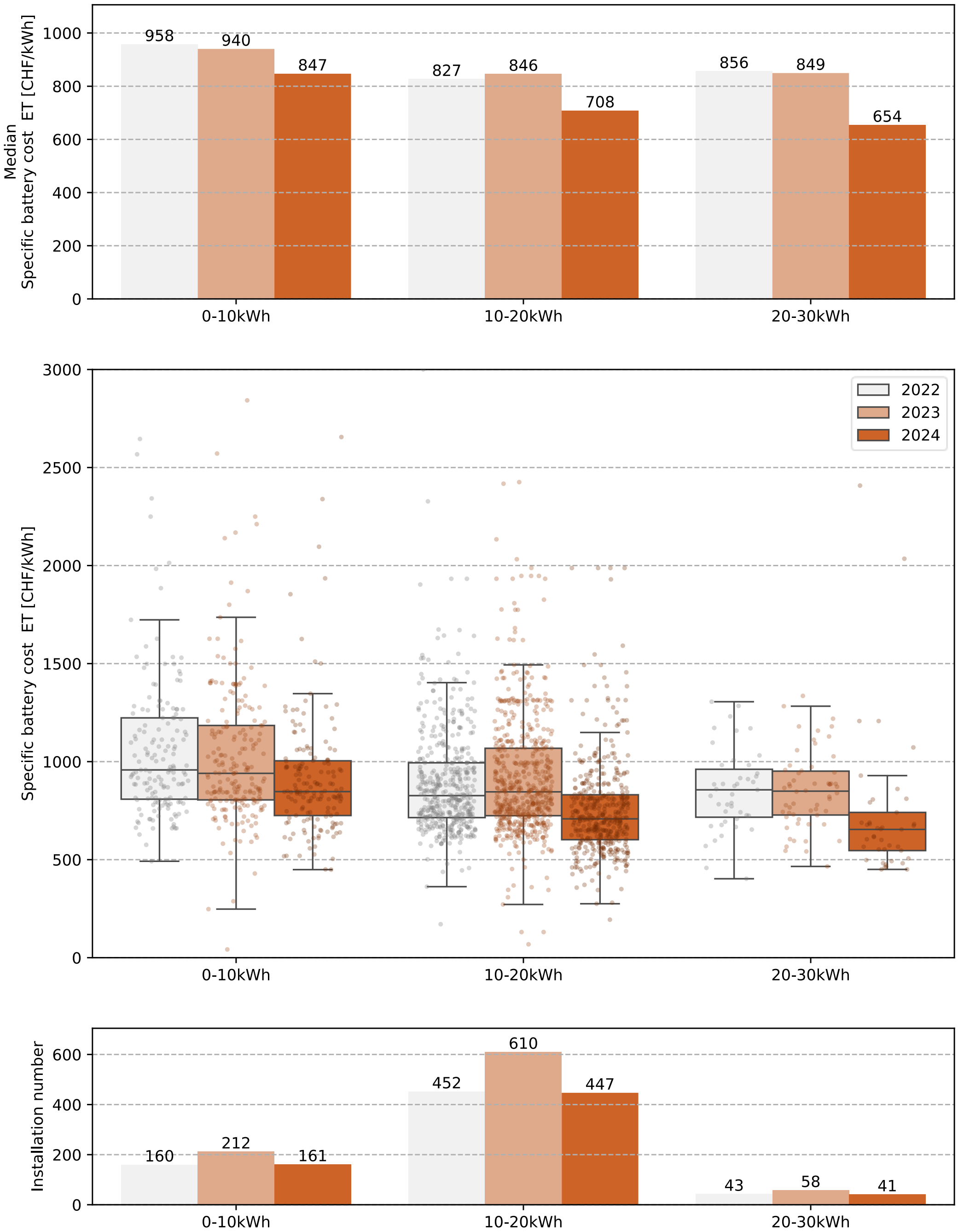


Figure 14 : End-consumer specific cost of battery system

7.2 Prospects

Application of the Swiss Electricity Act

The Swiss Electricity Act, adopted in 2024 ('Electricity Act'), introduces a structured and innovative regulatory framework to support the growth of photovoltaics, to generate 35 TWh of electricity from new renewable energies by 2035 — nearly 80% of which will come from solar energy, or approximately 28 TWh. To achieve these ambitions, the Federal Council has introduced two sets of implementing ordinances:

1. **First set (effective 1 January 2025)**:
   - Promotes **virtual self-consumption groups (RCP-v)**, enabling solar electricity to be shared between neighbours via smart meters and existing lines.
   - Introduces **targeted bonuses** in the one-off remuneration to encourage **façade installations** (more regular and winter production) and on **car park roofs**, which are particularly useful for charging electric vehicles.
   - Introduces a **network compensation** of up to CHF 50 per kW for photovoltaic installations larger than 50 kW, facilitating installations on agricultural roofs in particular.
2. **Second phase (effective 1 January 2026)**:
   - Introduces a **minimum remuneration** for solar electricity fed into the grid, based on the **average quarterly market price**, protecting the profitability of farms even when prices are low. Specific thresholds are set (e.g. 6 ct./kWh for installations up to 30 kW).
   - Regulates **local electricity communities (CEL)**, which allow locally produced electricity to be sold at a reduced rate (40% discount on network charges).
   - Allows **dynamic network tariffs** differentiated by time or zone, encouraging flexible consumption (e.g. via batteries or electric vehicles).
   - Provides for the **reimbursement of network charges** for storage systems with final consumption (stationary batteries, bidirectional electric vehicles, etc.) to optimize the integration of solar energy into the energy system.
   - Involves **transparent billing**, clearly separating measurement and network usage costs and providing access to individual consumption data.

Why are these ordinances important?

- They provide **security and confidence to investors** by guaranteeing a minimum revenue base and reducing uncertainty related to market price fluctuations.
- They promote the **de-institutionalisation of the centralised model** by encouraging shared self-consumption (via RCP-v and CEL), decentralised energy flexibility (through batteries and vehicles), and a reduction in grid expansion costs.
- They encourage diversified photovoltaic configurations, such as solar façades and car parks, by enhancing their economic attractiveness through specific incentives.

Overall, these new regulatory tools position Switzerland as a proactive and innovative player in the solar transition, combining ambitious climate targets with concrete incentives for the large-scale deployment of photovoltaic technologies of all sizes.

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