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sweet swiss energy research for the energy transition

Summary

Agri-photovoltaics (Agri-PV) in Switzerland has an electricity generation potential that significantly exceeds the additional future electricity demand in all established Swiss net-zero scenarios. This high potential contrasts with a very limited level of implementation to date: Agri-PV installations currently contribute less than 0.1 % to Swiss PV electricity production. Only a small number of installations have been realised so far, predominantly pilot projects, almost exclusively involving specialty crops such as berries and vines. This report addresses the gap between the available potential and its slow implementation.

The identification of drivers and barriers is based on a synthesis of ZHAW's practical experience in advising on and planning Agri-PV installations, complemented by previously published potential and feasibility studies for Switzerland and a targeted literature review, which together provided the conceptual framing. The empirical basis consists of feasibility studies for eight sites in the Canton of Zurich and the ongoing follow-up project covering 21 additional sites. The drivers and barriers listed below were identified (Chapter 2). Agri-PV is characterised by a strong site dependency: economic viability and feasibility are determined by the interplay of agricultural crop, grid connection, local electricity consumption, ownership structures and cantonal permitting practice. Individual factors therefore act as drivers or as barriers depending on the project.

Drivers:

- High profitability at suitable sites
- Hedging against future energy price fluctuations
- Substitution of existing crop protection measures
- Use of land with limited agricultural suitability
- Diversification of agricultural operations
- Additional protection of agricultural crops and climate adaptation
- Contribution to the energy transition
- Positive public perception and broad societalacceptance
- Contribution to low-greenhouse-gas food production

Barriers:

- Uncertain or insufficient profitability, particularly where local consumption is absent
- Strict regulatory requirements
- Limited investment capital
- Planning uncertainties and additional organisational complexity
- Restrictions on land use
- Leased land and ownership structures
- Lack of local acceptance in the immediate local environment

These drivers and barriers are examined in detail within the context of the framework conditions and background of Agri-PV in Switzerland (Chapter 3). The following recommendations, addressed to policymakers and executive authorities at the federal and cantonal levels as well as relevant industry associations, are provided to improve the deployment of Agri-PV in Switzerland (Chapter 4):

- Creating investment certainty
- Adaptation, simplification, and harmonization of the legal framework
- Enabling local ownership structures
- Developing advisory services
- Anchoring national expansion goals locally
- Reducing risks in early project phases

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1 Introduction

The energy transition requires a significant expansion of renewable electricity production in Switzerland. According to the Energy Act (EnG) Art. 2 para. 1, domestic electricity production from renewable energy sources excluding hydropower is to be increased to 35 TWh by 2035 and to 45 TWh by 2050. In recent years, the expansion of renewable electricity production has been dominated by photovoltaics (PV) (BFE, 2025). The lion's share of PV expansion has so far taken place on rooftops. According to the 2025 Solar Monitor by the industry association Swissolar (Swissolar, 2026), 98% of installed PV capacity is located on rooftops, 1% on infrastructure, and 0.4% on facades. Ground-mounted systems currently account for 0.1% of installed capacity, while Agri-PV systems account for 0.0%.

In 2025, photovoltaic systems with a cumulative rated capacity of 8.2 GW were installed in Switzerland, resulting in electricity production of 8.2 TWh (Swissolar, 2026). Assuming that photovoltaics will continue to be the driving force behind the expansion of renewable electricity production, an annual increase of approximately 2 to 2.5 GW in installed capacity would be required to achieve the 2035 targets set forth in EnG Art. 2, para. 1. This corresponds to a higher annual expansion rate than in the record year of 2024, when 1.8 GW was added (Swissolar, 2026). For the years 2025 through 2028, however, the industry association Swissolar forecasts a PV expansion of only 1.5 to 1.6 GW.

It remains to be seen whether the goals for expanding renewable electricity generation capacity – with a strong focus on rooftop surfaces – can be achieved, particularly because the potential of rooftop surfaces is not being exploited consistently enough under the current legal framework and incentive schemes. Studies by the ZHAW show that the potential of rooftop areas has so far been exploited inconsistently (Anderegg et al., 2022; Anderegg & Rohrer, 2025). A comparable result is also described in a report by EBP commissioned by the SFOE (Perch-Nielsen et al., 2024). It can be assumed that the low-hanging fruit – such as large roofs with a clear ownership structure, favorable irradiation, and suitable structural conditions – has already been largely realized. A rapidly increasing proportion of large roof areas, particularly in the industrial sector, is already being utilized with PV systems (Anderegg & Rohrer, 2025). In contrast, many building-integrated PV systems are designed for high self-consumption based on economic considerations during periods of low feed-in tariffs and thus often fail to realize their full potential (Anderegg & Rohrer, 2025). In the case of larger residential buildings, the often complex ownership structure likely slows down the rapid realization of potential. It therefore seems highly unlikely that the required pace of expansion can be achieved under current conditions without tapping into additional potential. Larger systems are crucial for the further expansion of photovoltaics, as they generally have lower levelized cost of electricity and are more attractive to investors. It would therefore be highly valuable to tap into new photovoltaic applications with significant untapped potential in order to achieve the necessary expansion pace for meeting Switzerland's climate and energy goals.

Agri-PV offers immense potential for electricity generation using large-scale PV systems. The theoretical potential amounts to approximately 323 TWh/year and spans an agricultural area of about 580,000 ha (Anderegg et al., 2024). Even when accounting for a maximum distance of 300 m to a potential grid connection point, a theoretical potential of 113 TWh/a remains. This corresponds to nearly double Switzerland's electricity demand in recent years and significantly exceeds the future electricity demand of various net-zero scenarios (BFE, 2021; VSE & Empa, 2022). Unlocking the Agri-PV potential would therefore be highly beneficial for the Swiss energy transition. This form of PV application is still in its infancy in Switzerland. To date there are only a few, comparatively small installations, many of which are declared as research projects and are negligible within the overall PV statistics. The question therefore arises as to which factors are impeding the development of this enormous potential and what could be done to accelerate its expansion.

1.1 Objectives and Approach

Given the urgent need to accelerate PV expansion in Switzerland, this report identifies drivers and barriers for unlocking the high theoretical potential of Agri-PV in Switzerland. The identification of drivers and barriers is based on a synthesis of practical experience in the planning of specific Agri-PV systems. In a previously completed project, ZHAW supported various agricultural businesses in the Canton of Zurich with feasibility studies, thereby gaining experience in the planning of Agri-PV systems (Strebel et al., 2025). Building on this, the experience is being continuously supplemented by a follow-up project (ZHAW, 2026). The practical experiences are supplemented by earlier potential and literature studies conducted by ZHAW on the topic of Agri-PV in Switzerland (Anderegg et al., 2024; Jäger et al., 2022) and rounded out in specific areas by a literature review.

The drivers and barriers for Agri-PV in Switzerland are presented in Chapter 2 in the form of a brief overview. They are based on the technical, operational, economic, legal, social, and environmental framework conditions of Agri-PV, with a focus on Switzerland. These framework conditions are elaborated upon following the drivers and barriers in Chapter 3. The framework conditions are illustrated with practical examples and supplemented with additional literature. Based on the identified drivers and barriers, recommendations for action are derived that aim to remove the barriers and leverage existing and new drivers to better realize the potential (Chapter 4).

1.2 Definitions and Terminology

Terms used in the introduction and throughout the report require clear definition, with the terms agri-photovoltaics (Agri-PV), agricultural land (landwirtschaftliche Nutzfläche, LN), crop rotation areas (Fruchtfolgeflächen, FFF), summer grazing areas (Sömmerungsflächen, SF), and direct payments (Direktzahlungen, DZ) being of particular relevance to this report.

Agri-Photovoltaics (Agri-PV)

Agri-PV, internationally more commonly called agrivoltaics, refers to the dual use of agricultural land for both agriculture and solar power production on the same area. Under Art. 24ter para. 2 RPG (Raumplanungsgesetz, Spatial Planning Act), solar installations on utilised agricultural land (LN) are deemed site-bound if they:

a) do not impair agricultural interests alongside electricity production and generate benefits for agricultural production; or

b) serve agricultural experimental or research purposes.

Pursuant to Art. 24ter para. 3 RPG, the installations "*bei endgültiger Ausserbetriebnahme zurückgebaut werden und die Ausgangslage muss wiederhergestellt werden*". For Agri-PV installations (free-standing solar installations outside building zones that are not of national interest), Art. 32d of the Spatial Planning Ordinance (Raumplanungsverordnung, RPV) refers directly to Art. 24ter RPG.

The ARE's explanatory notes on the amendment to the RPV in October 2025 state that the above conditions (a & b) require interpretation on a case-by-case basis (ARE, 2025). However, the explanatory notes provide guidance on the application of these terms: Whether a facility is classified as beneficial for agricultural production depends, according to the explanatory notes for example, on whether the facility offers protection from the weather. This can include not only the replacement of existing protective measures but also shading, protection from heat, or erosion. It is generally assumed that the agricultural land area will be preserved. On FFF, it must also be ensured *"that the agricultural yield potential as well as the suitability for mechanized cultivation are fully preserved or even improved"* (ARE, 2025). For photovoltaic systems with an installed capacity of 5 MW or more located outside of building zones, there is also a requirement to conduct an environmental impact assessment (EIA).

Agricultural Land (landwirtschaftliche Nutzfläche, LN)

The term “agricultural land” (LN) is defined in the Agricultural Terminology Ordinance (landwirtschaftliche Begriffsverordung, LBV). According to Art. 14 LBV, agricultural land is the *“area assigned to a farm and used for crop production, excluding summer grazing land (Art. 24), which is available to the farmer year-round and is managed exclusively by the farm (Art. 6).”.* These areas include arable land, permanent grassland, forage areas, areas with permanent crops, areas for crops grown under year-round protection (greenhouses, high tunnels, hotbeds), as well as areas with hedges, riverbanks, and field copses that do not belong to the forest. In Switzerland, the total agricultural land area is approximately 1,041,000 ha, of which about 47% is farmed as leased land (Bundesamt für Statistik, 2025).

Crop Rotation Areas (Fruchtfolgeflächen, FFF)

The term “crop rotation areas” (Fruchtfolgeflächen, FFF) can be defined both from the perspective of spatial planning and in terms of agricultural use, although the meanings are not identical.

As a spatial planning term, crop rotation areas are defined in Art. 26 para. 1 RPV as "*Teil der für die Landwirtschaft geeigneten Gebiete (Art. 6 Abs. 2 Bst. a RPG); sie umfassen das ackerfähige Kulturland, vorab das Ackerland und die Kunstwiesen in Rotation sowie die ackerfähigen Naturwiesen, und werden mit Massnahmen der Raumplanung gesichert.*". According to Art. 26 para. 3 RPV "*ein Mindestumfang an Fruchtfolgeflächen wird benötigt, damit in Zeiten gestörter Zufuhr die ausreichende Versorgungsbasis des Landes im Sinne der Ernährungsplanung gewährleistet werden kann.*". Crop rotation areas thus comprise by definition the highest-quality arable farmland (ARE, 2018), with FFF accounting for approximately 40% of Switzerland’s agricultural land. The minimum area for FFF in Switzerland is specified in the FFF Sectoral Plan and amounts to 438,460 ha. The cantons are required to secure a respective quota (depending on size and conditions) (ARE, n.d.). These areas are intended to ensure food self-sufficiency in the event of severe shortages (ARE, 2023). While areas designated as FFF in cantonal spatial planning are primarily used for arable crops, they may also be used for permanent crops or managed as permanent grassland. In spatial planning, FFFs merely define agricultural potential for times of crisis. Conversely, there are currently also open arable fields or permanent crops on areas not designated as FFF in the cantonal structure plans. Thus, the crop cultivated on an area in recent years does not provide a clear indication of whether it is FFF. Due to the high protection requirements on FFF, additional requirements apply there for Agri-PV systems (see the term Agri-PV above).

In the agricultural context, crop rotation areas are often understood as well-suited, arable soils that are used for various crops within a crop rotation. In the ZHAW Agri-PV potential study, this largely corresponds to the areas designated as open farmland, which are based on current land use practices (Anderegg et al., 2024). Crop rotation in agriculture (or open arable land in the ZHAW potential study) describes a sequence of different crops on the same plot over several years. It helps maintain soil fertility, reduce plant diseases and pests, and stabilize yields. The ZHAW potential study therefore bases its definition of the “open arable land” category not on the spatial planning definition of FFF, but on the actual land use at the time of data collection in 2023.

Summer grazing areas (Sömmerungsflächen, SF)

The term “SF” is defined in the LBV. According to Art. 24 LBV, communal pastures, summer pastures (not used year-round), and hay meadows whose yield is used for supplementary feeding during the summer grazing season are considered SF. According to Art. 14 LBV, SF are explicitly not part of the LN. PV systems on SF are therefore not to be understood as Agri-PV systems, but fall under the provisions of the Energy Act (EnG) Art. 71a (transitional provisions for the production of additional electricity from large-scale photovoltaic systems) or are large-scale systems of national interest pursuant to Art. 12 EnG.

Direct Payments (Direktzahlungen, DZ)

Due to the public services provided by agriculture (including food supply and maintenance of the cultural landscape), the federal government supports these services with DZ, thereby supplementing the income

of farming operations(BLW, n.d.). At 19%, DZ constitute a significant component of agriculture's economic resources (BLW, 2026). They are thus a central component of farmers' income. For this reason, it is particularly important to determine whether land with (agri-)PV systems is eligible for direct payments

Installations of national interest

According to Art. 12 EnG, a solar plant is of national interest if its expected production from October to March is at least 5 GWh. The cantons must designate suitable areas for this in their structural plans, taking into account the protection of the landscape, water bodies, forests, and agriculture. For installations of national interest, no benefit to agricultural production is required. Thus, these are generally classic ground-mounted PV installations and not Agri-PV installations. This also eliminates the entitlement to direct payments, as the areas are no longer considered agricultural land.

1.3 Current Status of Agri-PV in Switzerland

According to a study by the ZHAW, Agri-PV has immense theoretical potential for electricity generation at 323 TWh/a (Figure 1, above) (Anderegg et al., 2024). A large portion of the theoretical potential of 225 TWh/a is located on open farmland. Permanent grassland also exhibits very high potential at 85 TWh/a. The theoretical potential is lowest for permanent crops, although the likelihood of project approval (particularly regarding the benefit to agricultural production through crop protection measures) is highest in this sector.

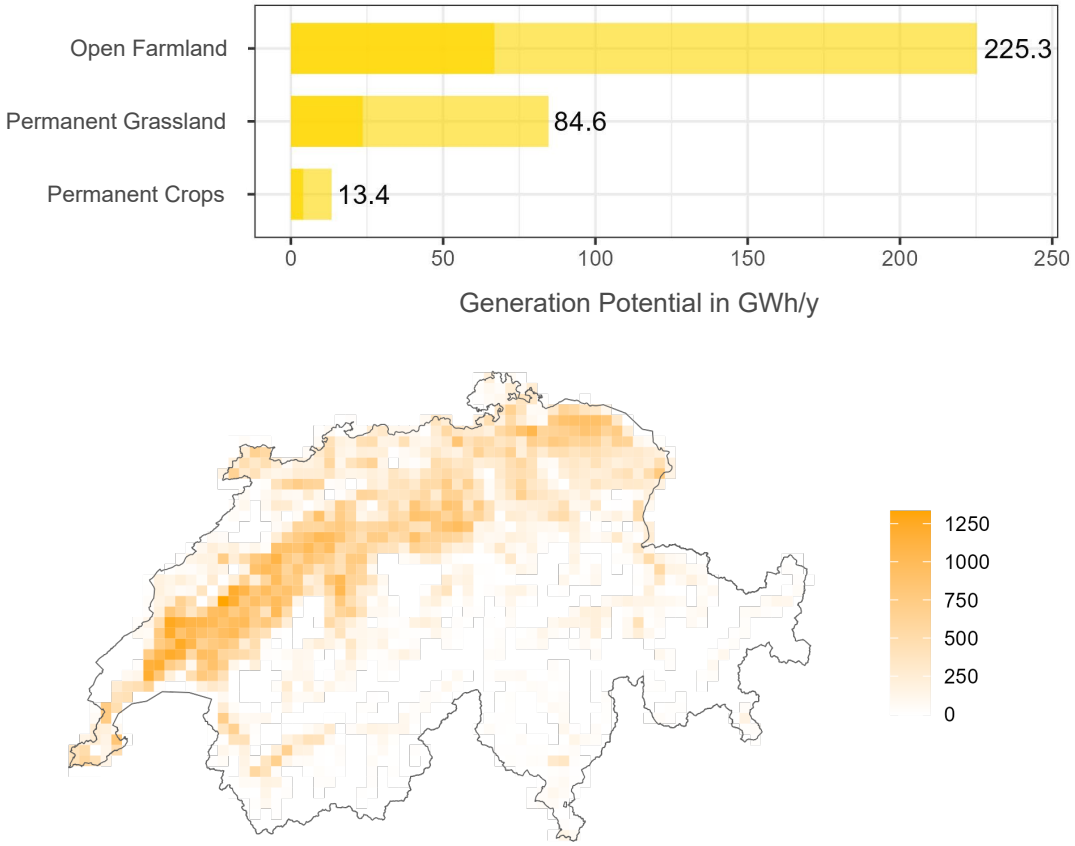


Figure 1. Theoretical electricity generation potential of Agri-PV in Switzerland broken down by crop groups (top). The potential for the winter half-year is shown in dark shades, while the potential for the summer half-year is shown in light shades. The map (bottom) shows the geographical distribution of the potential across Switzerland with a grid size of 5x5 km.

The geographic distribution of the potential (Figure 1, below) shows a concentration in northwestern Switzerland and the northern Swiss Plateau. The greatest potential lies in the most land-extensive agricultural cantons of Bern, Vaud, and Fribourg. Agri-PV could spread electricity production geographically across Switzerland, thereby helping to relieve pressure on the grid infrastructure and strengthen regional value creation.

Various Agri-PV project variants from the ZHAW feasibility studies (Jäger et al., 2022; Strebel et al., 2025) show high specific annual and winter electricity yields (Figure 2). The high yields are attributable in particular to the use of bifacial modules and, where applicable, tracking systems. On rooftops, typical specific annual yields of between 900 and 980 kWh/kWp (Hostettler, 2025; Hostettler & Hekler, 2021, 2022, 2023, 2024) and winter electricity shares of 27% (Bucher & Schwarz, 2021) can be expected. This results in specific winter electricity yields of 243 to 265 kWh/kWp. In contrast, for various Agri-PV systems in the canton of Zurich, according to Figure 2 specific winter electricity yields ranging from 300 kWh/kWp (high-mounted systems with a low tilt angle and without tracking) to 450 kWh/kWp (high-mounted systems with dual-axis tracking) are expected.

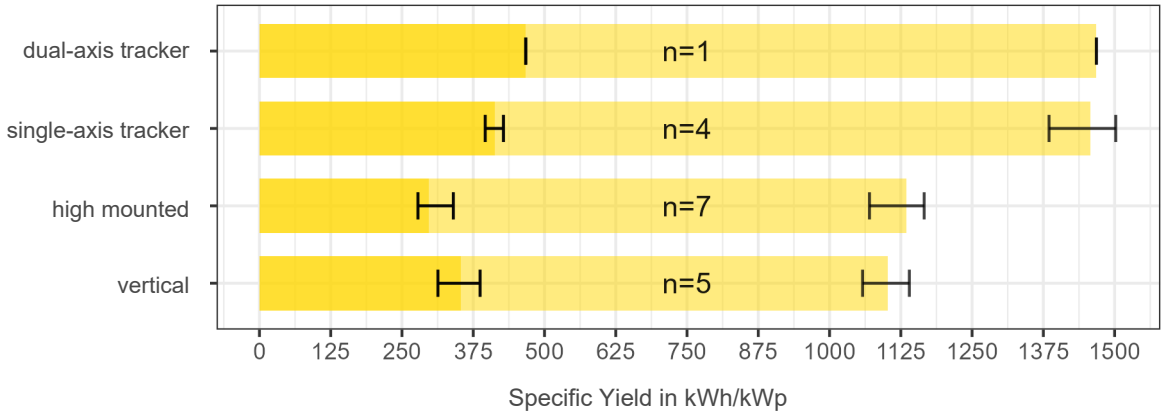


Figure 2. Average specific winter yield (dark) and summer yield (light) as well as annual yield (sum of the bars) per system type at various locations in the Canton of Zurich (n = number). The double-T bars show the range between minimum and maximum. The yields are based on simulations in PVsyst: orientation and tilt according to the respective system design using bifacial modules (dual-axis tracking, monofacial) and local weather data (TMY) from Meteonorm Version 8.2 (reference period 2001 to 2020).

Despite the enormous theoretical potential, only a few Agri-PV systems have been installed in Switzerland to date. According to Solarmonitor 2025, Agri-PV systems currently account for less than 0.1% of electricity production from PV systems in Switzerland (Swissolar, 2026). The 2024 Solar Energy Statistics from the Swiss Federal Office of Energy recorded the construction of 22 Agri-PV systems throughout Switzerland in 2024, with a cumulative installed capacity of 2.4 MW (Hostettler, 2025). It can be assumed that fewer than 100 Agri-PV systems are currently in operation throughout Switzerland and that the existing systems are primarily research and pilot facilities. This report addresses the gap between the significant realizable potential and the slow implementation of that potential to date.

1.4 International Status of Agri-PV

The following discussion of the international status of Agri-PV focuses on Switzerland's neighbouring countries Germany, France, Italy and Austria as these show similarities with Switzerland in many areas of agriculture, PV conditions, energy systems and legislation, while at the same time ranking among the internationally advanced countries in the field of Agri-PV. France has had specific support programmes for Agri-PV since 2017, Germany since 2019 and Italy since 2023 (Trommsdorff et al., 2025). An examination of the current status, the legislation and the expansion targets for Agri-PV shows that Agri-PV is more advanced in our neighbouring countries and is more proactively integrated by the state into plans for the expansion of renewables, supported by mature legislation (see Table Table 1). In international comparisons it should be noted that Agri-PV is subject to differing definitions, which makes standardised

comparisons difficult (Trommsdorff et al., 2025). Italy, for example, has had very specific rules for an innovative Agri-PV support programme since 2023, but this does not mean that no other Agri-PV installations have been or are being built that fail to meet these narrower criteria. Such installations may nevertheless meet the definition of Agri-PV as applied in Switzerland or in other countries. In summary, it is evident that installations in our neighbouring countries reach considerably larger dimensions than has so far been the case in Switzerland. In all countries it is clearly regulated that agricultural subsidies remain available for areas with compliant PV installations. Furthermore, all countries examined accept a certain reduction in agricultural yield. Auctions are frequently used as the support mechanism, whereby various systems exist and, in some cases, several systems are used in parallel even within individual countries.

Table 1. Overview of the status of Agri-PV in Switzerland's neighbouring countries. CAP: Common Agricultural Policy (EU); EEG: Erneuerbare-Energien-Gesetz (German Renewable Energy Sources Act); GAPDZV: GAP-Direktzahlungen-Verordnung (German CAP Direct Payments Ordinance); ADEME: Agence de la transition écologique; CRE: Commission de régulation de l'énergie (French energy regulatory authority); PNRR: Piano Nazionale di Ripresa e Resilienza (Italian National Recovery and Resilience Plan); FER-X: Fonti Energetiche Rinnovabili; EAG: Erneuerbaren-Ausbau-Gesetz (Austrian Renewables Expansion Act).

Criterion	Germany	France	Italy	Austria
Installed capacity and number of installations (end of 2025)	No separate official statistics in the *Marktstammdatenregister*; estimate: several 100 MWp. The largest Agri-PV project realised in 2025 had a capacity of 76 MWp (GLS Crowd, 2026).	125 Agri-PV installations realised by the end of 2025, totalling 714 MWp (ADEME – Agence de la transition écologique, 2025).	No official statistics available on realised Agri-PV capacity. Estimated few 100 MWp in operation at the end of 2025 (unclear whether these correspond to the current Agri-PV definition). Installations under the PNRR programme will only be realised from around 2027 (Righini, 2026; Studio Legale Tedioli, 2026).	No separate official statistics; estimate: a few 100 MWp. Largest installation: Wallern/Tadten (Burgenland), 164 MWp on 180 ha, in operation since the beginning of 2025 (photovoltaik.eu, 2025).
Project applications / pipeline	Auction segment "special solar installations" (of which Agri-PV forms an important part): bidding round Dec. 2025: 30 awards totalling 204 MWp. Planned tender volumes for special solar installations: 300 MWp (2024), 800 MWp (2025), 1200 MWp (2026), rising to 2075 MWp (2029) (Bundesnetzagentur, 2026).	Approx. 1600 projects in the pipeline (all development stages). Strong expansion expected on the basis of the publicly known pipeline. No separate Agri-PV tender; awards are made through the general CRE auctions (Actualités News Environnement, 2026; ADEME – Agence de la transition écologique, 2025).	PNRR tender 2024: 643 applications totalling 1.78 GWp (quota: 1.04 GWp). Updated ranking July 2025: 536 eligible projects with 1.59 GWp and EUR 802.7 million in funding. Deadline for commissioning: 24 months from conclusion of the funding agreement (Ministero dell'Ambiente e della Sicurezza Energetica (MASE), 2025; pv magazine Italia, 2025; Righini, 2026).	No separate Agri-PV quota; participation in the general EAG market premium auctions (minimum volume of 700 MWp/year for all PV) (klimaaktiv, 2025; Photovoltaic Austria, 2026).
Further plans / potential	Fraunhofer ISE study 2025: 500 GWp potential on the most suitable areas alone; exceeds German PV expansion targets up to 2040 (Fraunhofer-Institut für Solare Energiesysteme ISE, 2025).	National monitoring and steering framework via the ADEME observatory (launched Nov. 2025); regular audits and reversibility clauses pursuant to the Instruction of Feb. 2025 (Ministère de l'Économie, des Finances et de la Souveraineté industrielle et numérique, 2025).	Reopening of the PNRR call in 2025 with EUR 323 million in remaining budget; continuation via the FER-X decree for larger installations under discussion (Ministero dell'Ambiente e della Sicurezza Energetica (MASE), 2025).	According to a potential study, ground-mounted and Agri-PV must deliver around 50 % of the PV capacity required for climate neutrality by 2040. EAG target: +11 TWh PV by 2030 (total planned expansion may meanwhile be higher). Expansion primarily market-driven via EAG auctions (Fechner, 2024, 2025).

Support for PV installations	EEG tenders with a dedicated sub-segment; ceiling value 9.5 ct/kWh. The technology bonus (+2.5 ct/kWh) provided for in Solarpaket I (2024) is still awaiting EU state aid approval; in practice, currently awarded bid values plus a 0.7 ct/kWh technology bonus apply for elevated installations (Bundesnetzagentur, 2026; Logic Energy, 2026).	CRE tender tariffs (no separate Agri-PV scheme) (Legifrance, 2024).	PNRR dual support: up to 40 % investment grant plus feed-in tariff (EUR 85/MWh; EUR 93/MWh up to 300 kWp; +EUR 4/MWh central Italy, +EUR 10/MWh northern Italy). Eligible investment costs: max. EUR 1,700/kWp (< 300 kW) and EUR 1,500/kWp (≥ 300 kW). Total budget: EUR 1.1 billion (Ministero dell'Ambiente e della Sicurezza Energetica (MASE), 2024; pv magazine Italia, 2025).	EAG investment grant with a bonus of up to +30 % for innovative Agri-PV (vertical or lower module edge ≥ 2 m); alternatively the EAG market premium (20 years, via auction) (klimaaktiv, 2025; Photovoltaic Austria, 2026). Agri-PV is exempt from the 25 % funding reduction applied to ground-mounted installations.
Direct payments / agricultural support	Where DIN SPEC 91434 is complied with, the area remains eligible for CAP payments (§ 12 Abs. 5 GAPDZV) (C.A.R.M.E.N. e.V., 2025).	CAP direct payments are generally retained provided that primary agricultural use is demonstrated; deductions apply to sub-areas permanently no longer usable (max. 10 %) (Légifrance, 2024).	CAP direct payments are retained for installations of Type 1 or 3 under the MASE guidelines; at least 70 % of the area must remain under agricultural management. In addition: valid title of management, control and decision-making authority held by the farmer, prior notification, predominant and continuous agricultural use, and registration in the cultivation plan (AGEA, 2025; MiTE, 2022).	Participation in ÖPUL (agri-environmental programme) and direct payments generally remain possible provided that agricultural management, measured against the criteria catalogue, is maintained (klimaaktiv, 2023).
Legal framework / tolerated reduction in agricultural yield	DIN SPEC 91434 (2021): reference yield at least 66 % (max. 34 % yield reduction); loss of area max. 10 % (Cat. I, elevated) and 15 % (Cat. II, ground-level) (DIN Deutsches Institut für Normung e.V., 2021). Anchored in the EEG as a "special solar installation" since Solarpaket I; privileged status under the Federal Building Code up to 2.5 ha.	Loi APER (2023) + Décret n° 2024-318: agricultural yield at least 90 % of the reference plot in crop production (max. 10 % yield reduction); ground coverage max. 40 % (possibly more for livestock farming); max. 10 % of the area permanently unusable; obligation to dismantle at end of lifetime (Legifrance, 2024).	DM 436/2023 (PNRR support programme "agrivoltaico innovativo"): at least 70 % of the area under agricultural use; minimum module height 1.3 m (livestock farming) and 2.1 m (crop production); electricity yield at least 60 % of a reference PV system (Ministero dell'Ambiente e della Sicurezza Energetica (MASE), 2024). No explicit yield reduction threshold, but a monitoring obligation. Agri-PV in Italy also exists in a more broadly defined form with fewer requirements.	EAG plus the EAG Investment Grant Ordinance for Electricity / Market Premium Ordinance: at least 75 % of the total area under agricultural use; primary use must not be impaired, or only marginally so (Bundesministerium für Land- und Forstwirtschaft, Klima- und Umweltschutz, Regionen und Wasserwirtschaft (BMLUK), 2026). No statutory yield threshold; the klimaaktiv guidance recommends a maximum yield reduction of 20 % (klimaaktiv, 2023). An agricultural use concept is mandatory for Agri-PV bids (klimaaktiv, 2025).

2 Drivers and barriers for Agri-PV in Switzerland

Agri-PV has high theoretical potential for electricity generation in Switzerland, which has hardly been utilized to date (see Chapter 1.3). The following describes the drivers and barriers that influence the adoption and spread of Agri-PV in Switzerland. In this context, drivers are understood as factors that propel development and encourage implementation. Barriers, on the other hand, slow down implementation and prevent the adoption of the technology. Individual aspects (e.g., profitability or future energy prices) can be both drivers and barriers because they depend heavily on the local situation.

The drivers and barriers are based on the framework conditions and the context of Agri-PV in Switzerland, which are explored in greater depth in the Chapter 3. The order of the listed drivers and barriers is based on a rough assessment of their relevance derived from the analyses and discussions conducted.

2.1 Overview of Drivers

High profitability

The profitability of Agri-PV systems is highly location-dependent and can therefore act as both a driver and a barrier (see Chapter 2.2) to the implementation of Agri-PV in Switzerland. In suitable locations and with the right marketing model, Agri-PV systems can achieve a return on investment of over 5%. This creates lucrative business opportunities for farmers and/or investors. The economic aspects of Agri-PV systems are described in detail in Chapter 3.3.

Hedging against future energy price fluctuations

Agri-PV systems can increase the degree of self-sufficiency through self-consumption, thereby reducing the risk of future electricity price fluctuations for agricultural operations. This aspect is particularly relevant for operations with high electricity demand (see Chapter 3.3.4). High electricity demand is to be expected, for example, in greenhouses or for on-site food processing and storage. By electrifying previously fossil-fuel-based applications (e.g., heat supply, mobile machinery), dependence on volatile fuel prices is reduced, even as farms' electricity demand rises. Combined with Agri-PV systems that generate electricity for on-site consumption, this can significantly reduce overall cost volatility (see Chapter 3.3.2).

Replacement of existing crop protection measures

Various agricultural crops are already protected today from weather conditions, particularly hail and heavy rain, using nets, plastic tunnels, or other structures. Agri-PV systems can fully or partially replace such existing crop protection measures, thereby combining weather protection with electricity production.

Use of land with limited agricultural suitability

On land that can only be used to a limited extent due to pests, erosion risks, or nitrate leaching, Agri-PV provides an additional source of income and thus increases land efficiency, even though the system's profitability is somewhat lower than at optimal locations (see Chapter 3.2.2).

Diversification of agricultural operations

Agri-PV offers agricultural businesses the opportunity to diversify their operations by establishing an additional line of business. This increases the farm's resilience to price and yield fluctuations and can lead to revenue growth (see Chapter 3.3.4) without requiring increased farming intensity or additional land. Alternatively, the additional revenue can be used to reduce farming intensity while still achieving similar revenue. Since agricultural land in Switzerland is severely limited, high land efficiency (see Chapter 3.1.2) is crucial. Through multiple land uses, various societal interests (e.g., food security, electricity supply, biodiversity) can be accommodated on the same land.

Additional protection for agricultural crops and climate adaptation

Agri-PV systems can help adapt agricultural production systems to climate change. By providing shade, they reduce heat and drought stress, lower evaporation, and can thus indirectly promote humus formation. Vertical Agri-PV systems also reduce wind speed near the ground and can thereby lower the risk of wind erosion. The benefits of additional structures for the microclimate, soil, and plant protection are discussed in greater detail in Chapter 3.2.1.

Contribution to energy transition

The energy transition requires a rapid restructuring of the energy supply. Decarbonizing the energy system and expanding renewable electricity production are central aspects of this transformation. It is unclear – or, at present, doubtful – whether the goals set forth in the Energy Act (EnG Art. 2, para. 1), with their current strong focus on rooftop photovoltaics, can be achieved (see Chapter 1). Agri-PV can complement PV expansion through its high and geographically widespread potential (see Chapter 1.3). Agri-PV enables the construction of large-scale installations and can thus accelerate expansion. The ZHAW's advisory services show that there are farmers who are motivated to contribute to the energy transition (Strebel et al., 2025; ZHAW, 2026). Recent studies show that Agri-PV is more widely accepted by the Swiss public than traditional ground-mounted PV (Fesenfeld et al., 2026).

Positive public perception and social acceptance

The rapid expansion of renewable electricity production in Switzerland poses challenges regarding social acceptance, particularly in areas outside built-up zones (see Chapter 3.5.1). However, studies suggest that Agri-PV is generally supported in Switzerland provided it is well integrated into the agricultural landscape, does not fundamentally impair agricultural production and local ownership structures are chosen(Fesenfeld et al., 2026). Under these conditions, Agri-PV can strengthen a farm's image as an innovative and climate-conscious food producer.

Contribution to low-greenhouse-gas food production

Demand for food from fossil-free or low-greenhouse-gas production is increasing, and farms are under growing pressure to reduce their operational CO_2 emissions (see Chapter 3.3.4). As heat supply and agricultural machinery and vehicles are decarbonized, energy demand is increasingly shifting toward electricity. This additional electricity demand can be met entirely or partially by on-farm Agri-PV systems, enabling food production with renewable electricity and contributing to more climate-friendly agriculture.

2.2 Overview of barriers

Uncertain or insufficient profitability

The profitability of Agri-PV systems is highly location-dependent and can therefore serve as both a driver (see Chapter 2.1) and an obstacle to the implementation of Agri-PV in Switzerland. Investment costs are influenced, among other things, by current and future agricultural practices as well as by soil conditions (see Chapter 3.1.3 and Chapter 3.3.1) and also depend on existing infrastructure (e.g., land improvements). The cost of grid connection is also central to economic viability (see Chapter 3.1.4 and Chapter 3.3.1). Under current conditions, profitability typically drops significantly if there are no local electricity consumers (see Chapter 3.3.2). The sliding market premium (GMP) could, in principle, remedy this situation in the absence of local electricity consumption. However, for various projects in the Canton of Zurich, profitable operation of an Agri-PV system is not expected even at current GMP bid values (see Chapter 3.3.2 and Chapter 3.3.3).

High regulatory requirements

The requirements for an Agri-PV system – and thus for its eligibility for approval – are stringent (see Chapter 3.4). In particular, regarding the criterion that a system must offer "benefits for agricultural production," there is a lack of reliable data to support a conclusive argument within the approval process.

Existing Agri-PV installations were primarily approved under the framework of accompanying agricultural research. The additional spatial planning requirements on crop rotation areas (FFF) are difficult to interpret, as they must ensure *"that the agricultural yield potential as well as the suitability for mechanized cultivation are fully preserved or even improved"*. Because FFF account for a large share of the theoretical potential for Agri-PV in Switzerland, a significant hindrance to the realization of this potential is to be expected (see Chapter 3.4.1).

Limited investment capital

The construction and grid connection of an Agri-PV system require high investments, which even for simple systems range from 1,000 to 1,600 CHF/kWp or between 180,000 and 450,000 CHF/ha of agricultural land (see Chapter 3.3.1). These high costs can pose a significant hurdle for agricultural businesses. The necessary financial resources may be lacking, or they may be prioritized for agriculture-related investments. While financing options do exist in the form of interest-free investment loans, these are subject to cantonal regulations. In the Canton of Zurich, for example, while renewable energy production systems are generally eligible for investment support, the focus is on self-consumption, and the amount of subsidies is capped at 100 CHF/kWp, covering only a small portion of the total costs of an Agri-PV system. In principle, external financing or joint financing (see Chapter 3.5.3) of the systems is also conceivable.

Planning uncertainties and additional organisational complexity

The planning and implementation of an Agri-PV system leads to increased operational complexity and additional organizational requirements (see Chapter 3.1.5). New operational challenges arise, particularly due to the wide variety of possible system types, design options, and degrees of flexibility in system design (Chapter 3.1). In addition, permitting procedures (Chapter 3.4.1), grid connection (Chapter 3.1.4), and various options for electricity marketing (Chapter 3.3.2) increase the complexity of project planning. For most aspects, cantonal – and in some cases even local – regulations and contact points apply, which complicates efficient, standardized project planning and consulting. Furthermore, financial upfront costs may be required as early as the initial project phases, for example for site investigations or test drilling (Chapter 3.3.3). This can lead to companies refraining from developing their own projects or discontinuing projects despite fundamentally suitable conditions.

Restrictions on agricultural use

The implementation of an Agri-PV system can lead to restrictions on agricultural management (Chapter 3.2.3). The additional structures on the land tend to make mechanized management more difficult or increase the workload. This creates conflicting goals regarding land use, as agricultural production remains the primary focus and the PV system is to be subordinated to agricultural interests. The additional benefits of Agri-PV, such as erosion control, microclimate improvement, or humus formation, are not always immediately apparent to farms and sometimes only become evident over longer periods of time (see Chapter 3.2.4 and Chapter 3.4.1). This can lead to farms not pursuing their potential projects despite generally suitable conditions or giving priority to agricultural use.

Leased land and ownership structures

About half of the agricultural land in Switzerland is leased (see Chapter 3.1.6). This means that the consent of the landowners must be obtained. If suitable contractual arrangements are lacking or if the remaining term of lease agreements is too short, this can delay the implementation of projects or lead to a shift toward unleased land.

Lack of local acceptance

A lack of acceptance within the local community can complicate the implementation of Agri-PV systems (see Chapter 3.5.3). Farms are often deeply integrated into their local environment; changes in land use or the appearance of the land are highly visible to the public and may meet with resistance. It can happen that projects are generally supported but encounter resistance in the immediate vicinity. It is often difficult

for the farm to assess how a project will be received in the local community. This can lead to projects not being pursued despite generally suitable conditions. Perceptions of the landscape can further exacerbate this effect (see Chapter 3.5.1).

3 Framework Conditions and Context of Agri-PV in Switzerland

3.1 System and Location

Planning Agri-PV systems requires a site-specific assessment of the technical and structural framework conditions. In addition to the chosen system type, the characteristics of the land in particular influence the specific design of the system. These include, among other things, soil conditions, the shape of the plot, and the possibilities for grid connection. Existing infrastructure can also impose additional requirements.

3.1.1 Proven and Scalable Technology

The underlying technology of Agri-PV systems is well-established and highly scalable. Fundamentally, it does not differ technologically from other photovoltaic applications, as the same components and system concepts are used. What sets it apart is the integration of electricity production on agricultural land, with the mounting structure adapted to agricultural practices. This allows agricultural interests to be preserved and enables dual land use.

Various mounting systems are available for Agri-PV systems. A basic distinction is made between ground-level systems with vertically installed modules and elevated systems. In vertical systems, farming takes place between the rows of modules, whereas in elevated systems, agricultural use occurs beneath the modules (Figure 3 and Figure 4). To further manage the impact on agricultural production and electricity yield, single- or dual-axis tracking systems can also be employed. This allows for different site conditions and requirements to be accommodated.

A key planning parameter is the row spacing between the module rows or between the supports. This depends on the one hand on the width of the machinery to allow for mechanical cultivation with as few obstacles as possible. On the other hand, the row spacing and the width of the module rows can influence the degree of ground coverage. This describes the ratio of the area covered by PV modules to the total area. The orientation of the module rows also influences light distribution across the agricultural area. In vertical Agri-PV systems, the module rows ideally run from north to south to ensure the most homogeneous light distribution possible, resulting in the modules being oriented east-west. In elevated systems, this is achieved by selecting an orientation that deviates slightly from south. However, the specific orientation is often based on the direction of cultivation of the land, which in turn can lead to restrictions in the choice of Agri-PV system type (see Chapter 3.2.3).

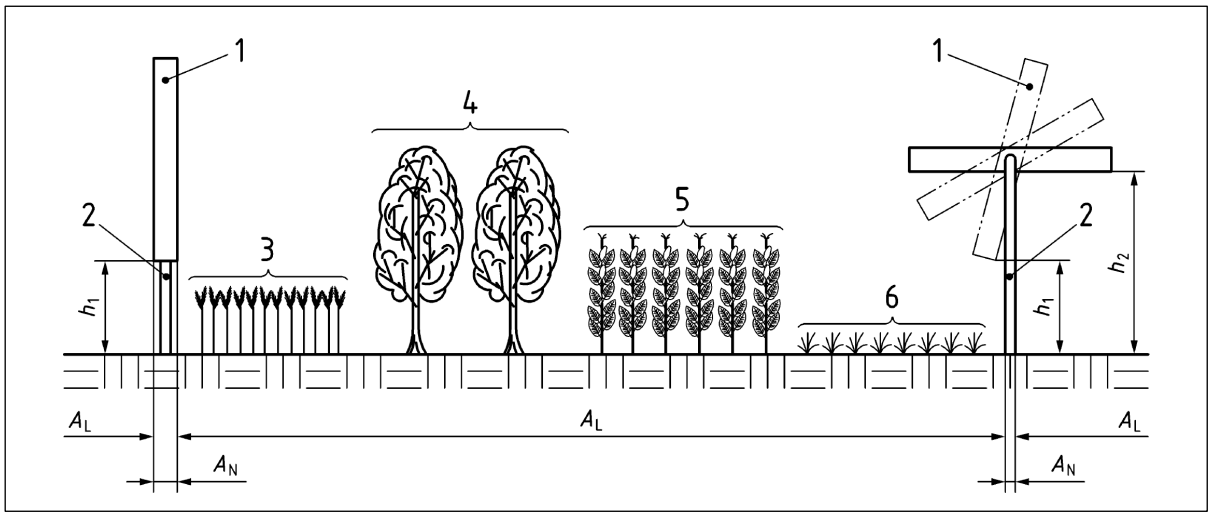


Figure 3. Schematic representation of an Agri-PV system with ground-level mounting according to DIN 91434:2021 (DIN Deutsches Institut für Normung e.V., 2021). Farming takes place between the rows (1: PV modules, 2: mounting structure, 3 to 6: examples of agricultural crops).

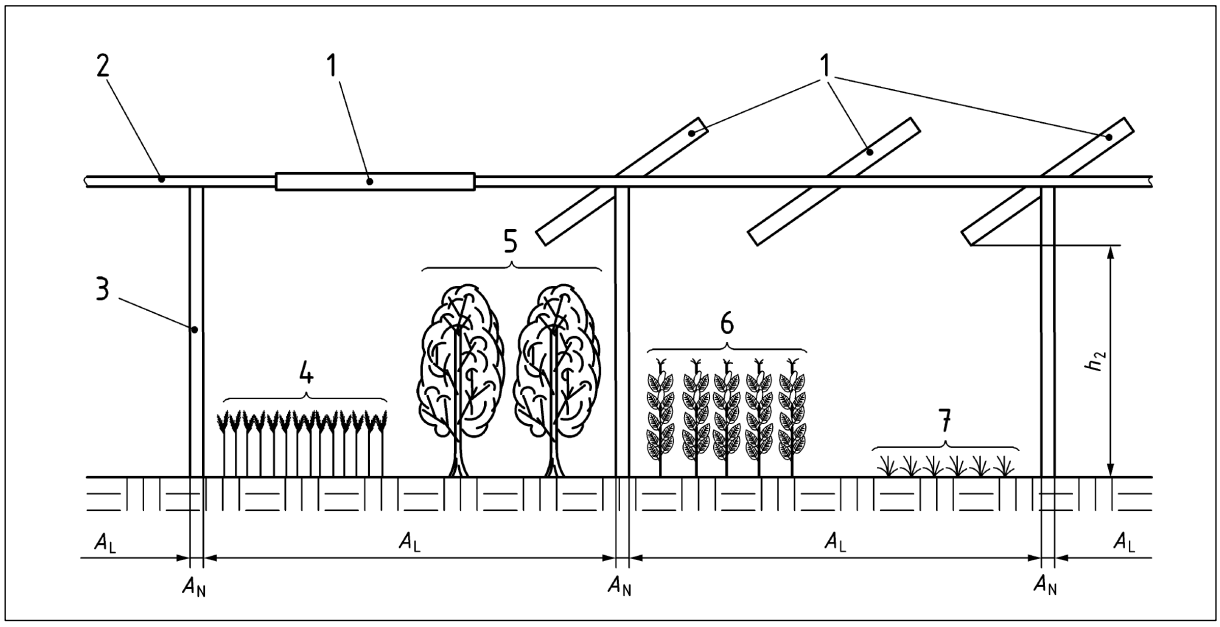


Figure 4. Schematic representation of a high-rack Agri-PV system in accordance with DIN 91434:2021 (DIN Deutsches Institut für Normung e.V., 2021). Farming takes place beneath the Agri-PV system (1: PV modules, 2: bracing, 3: mounting structure, 4 to 7: examples of agricultural crops).

The so-called albedo effect can be specifically harnessed in Agri-PV systems. In this process, light reflected from the ground or from crops strikes the modules and can be used to generate electricity. The albedo value describes the proportion of incident radiation reflected by the surface and depends on the specific ground surface or crop. On agricultural land, values typically range from 0.13 for bare arable soil to 0.22 for winter barley (Sieber et al., 2022). By using bifacial PV modules, light incident on both the front and back of the modules can be utilized for electricity production. The additional costs compared to monofacial modules are low, and module costs account for only a minor portion of the total costs of an Agri-PV system. The use of bifacial modules is particularly effective in vertical systems. Systems with east-west oriented modules exhibit higher electricity production in the morning and afternoon hours compared to south-facing PV systems. This results in a more consistent production profile throughout the day, which better aligns with electricity demand. A south-facing module array can increase winter electricity production in the Swiss Plateau by approximately 36% compared to an east-west orientation, while the annual yield is reduced by about 8%.

3.1.2 Space Efficiency

Agri-PV systems can increase the land-use efficiency of agricultural land. This is possible because the land is used simultaneously for agricultural production and electricity generation. The efficiency of this dual use is often described using the land-equivalent ratio (LER). It indicates how much land would be required if agricultural and energy production were carried out separately (Figure 5). For Agri-PV systems, the LER typically ranges between 1.2 and 1.6 (Vaverková et al., 2026). A land use efficiency greater than 1 means that the combined use yields a higher total yield per unit area than separate use for agriculture and photovoltaics.

The level of land-use efficiency depends on the crop, the selected system type, and the system layout. Specifically, row spacing and the degree of ground coverage influence both electricity yield and the agricultural use of the land. There is a conflict of objectives between these two uses, as a denser land use typically leads to higher electricity yields but can simultaneously restrict agricultural production more severely.

Thanks to the higher land-use efficiency, an additional line of business in the form of electricity production can be established on the existing land without requiring additional agricultural land.

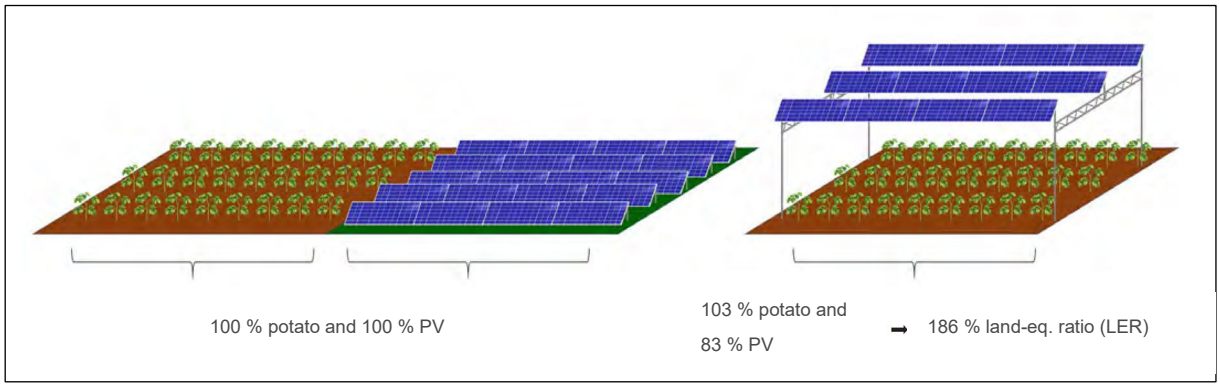


Figure 5. Schematic representation of land-equivalent ratio (LER). Thanks to shading from the Agri-PV system, the potato yield increases by 3%. In the example shown, separate agricultural and energy use would require 1.86 times the land area compared to combined use with Agri-PV. For this example, the LER is 1.86.

3.1.3 Soil Conditions and Construction Implementation

Site factors such as the shape of the plot, soil depth, and existing drainage systems or water intakes can influence technical feasibility and construction costs. For efficient land use, plots that are as rectangular as possible are advantageous, as they allow for the installation of parallel rows of panels. In the case of irregularly shaped or polygonal plots, row lengths are shortened or do not run continuously parallel, thereby reducing the usable area.

A key factor regarding foundations is the depth of the soil. The substructures are typically driven into the ground or bolted in place. These are localized interventions in the soil. If the soil is not deep enough, alternative foundation solutions may be required, which entail additional costs (see Chapter 3.3.1). For example, in the area examined by Strebel et al.(2025) for a poultry run in Rüti, it was expected that the soil depth for driving piles would not be sufficient across the entire area. Nagelfluh is expected in the subsoil. However, its extent and the depth at which Nagelfluh is encountered are unknown(Strebel et al., 2025). Therefore, in addition to a driven pile variant, a solution with bolted foundations was also investigated, which results in higher construction costs (see Chapter 3.3.3).

With regards to drainage systems, it must first be clarified whether and in what form they are present. To this end, corresponding plans must be available that show the location and route of the drainage lines. In individual discussions during the initial site inspections as part of an ongoing feasibility study, it was mentioned that such plans are sometimes unavailable or lack sufficient accuracy (ZHAW, 2026). In addition, the condition of the drainage systems across the entire site must be assessed. It may be advisable to replace them before constructing the system, as subsequent repair work will be more complex due to the installed Agri-PV system and, in extreme cases, may require partial dismantling of the system. Assessing soil conditions, existing drainage systems, and any additional pipes involves significant effort and is only possible to a limited extent. While the depth of the soil can be determined in advance through soil investigations or test pile driving, such localized assessments require upfront financial investment and cannot be readily extrapolated to the entire site. Available soil maps can provide an initial estimate of the soil depth. Consequently, uncertainties regarding feasibility and costs remain even after such investigations.

Regardless of the construction method chosen, ground disturbance is limited. Concrete foundations are required only to a very limited extent, if at all – for example, for individual technical components such as distribution boxes or, in the case of larger facilities, for the transformer station. These are generally limited to a few square meters and are preferably located at the edge of the field. Complete dismantling at the end of the operational life is technically feasible and involves manageable costs. This ensures

that no permanent changes are made to the agricultural land. After dismantling, the area can once again be used for agricultural purposes in full and without restriction.

Soil protection must be taken into account during both installation and dismantling of the system. In particular, soil compaction caused by heavy machinery must be avoided, as this can lead to yield losses. Accordingly, machinery that is as light as possible with a large contact area should be used, the number of trips minimized, and installation carried out in dry soil conditions whenever possible. In addition, temporary mats can be used to further reduce the load on the soil.

3.1.4 Grid Connection Situation

To feed the generated electricity into the grid, a grid connection point with sufficient capacity and located as close as possible is required. However, agricultural land is often situated away from existing grid infrastructure, which reduces the number of suitable locations. Furthermore, necessary grid capacity expansions can lead to longer planning times and affect the implementation timeline. The impact on economic viability is highly location- and plant-specific (see Chapter 3.3.1). Particularly for smaller plants, long connection distances or costly grid expansions have a significantly negative impact. For larger plants, this effect is partially mitigated, as the grid connection costs are spread across a higher installed capacity.

Grid connection costs depend primarily on the distance between the system and the grid connection point, as longer cable runs result in additional construction costs and require larger cable cross-sections. This is because transmission losses and voltage rise increase with cable length, which must be mitigated by using larger cable cross-sections. Another factor is the available connection capacity. While the required connection power can be reduced by limiting the system on the AC side (inverters with a lower AC rated power than the DC module rated power, typically in a ratio of 0.6 to 0.8). Nevertheless, the available capacity at the grid connection point is often insufficient. This may necessitate grid expansion or, for larger systems, the construction of a dedicated substation. Sufficient space must be provided at the system site for the transformer. Another option is the use of battery storage systems, which smooth out feed-in peaks (peak shaving) and thus reduce the required connection capacity, facilitating grid expansion through lower connection capacity and faster connection options. At the same time, storage systems enable better marketing of electricity through time-optimized feed-in as well as additional revenue from system services. With falling costs and the continued expansion of photovoltaics, battery storage systems will gain in importance in the future and reduce the problem of grid integration for PV systems. Current developments in this area are progressing rapidly. For example, by 2024 in Switzerland, nearly half of all PV systems on single-family homes were already combined with battery storage(Hostettler, 2025), while in the EU in 2022–2023, approximately 80% of all newly installed PV systems in the residential segment were combined with battery storage (SolarPower Europe, 2025). With battery costs continuing to fall, it is expected that these trends will also spill over to Agri-PV applications on a large scale (BloombergNEF, 2025).

The connection up to the grid connection point must generally be financed by the plant operator. The allocation of costs for necessary capacity expansions beyond the grid connection point depends on the specific grid situation and the rules of the local distribution system operator. Whether only one or multiple customers are connected at the grid connection point can be a decisive factor in this regard. Distribution network operators can, to a limited extent, reclaim the costs for such grid reinforcements from Swissgrid by submitting an application which is assessed by ElCom. In feasibility studies conducted by the ZHAW, sites with a system capacity between 104 and 837 kWp were examined (Strebel et al., 2025). Different plant variants were considered for each site. Grid assessments showed that the available capacity at the nearest grid connection points is often insufficient for plants with a capacity of more than 200 kWp. In three out of five cases, a capacity expansion is already required for the smallest system variant examined (see Table 2). For the sites under consideration, a dedicated substation is generally not required. With exception of the Cherwis site, this is not necessary at any of the locations. At the Cherwis site, a substation is only necessary for the largest system variant.

Table 2. Grid connection status of the sites examined as part of a feasibility study (Strebel et al., 2025). The nearest grid connection points have been considered. The need for capacity expansion refers in each case to the smallest plant variant. For the Halbinsel Au site, connection to the neighboring country inn is possible but requires a corresponding agreement with the owner.

Operation	Site	System capacity (kWp)	Distance to grid connection point (m)	Capacity expansion required
Imhofbio	Three-row	375 – 837	50	Yes
Imhofbio	Cherwis	371–666	420	Yes
Imhofbio	Förliwiesen	501 – 856	20	No
B. Reinhard	Poultry Run	375 – 587	55	Yes
WBZ	Etzelstrasse East	162	165	No
WBZ	Etzelstrasse West	104	105	No
WBZ	Au Peninsula	435	120	No

Preliminary investigations into the grid connection situation for 21 sites in the ongoing feasibility study revealed that, as a rule, a dedicated private substation is required for connected loads ranging from approximately 750 to 1,000 kVA (ZHAW, 2026). However, the specific design depends heavily on local grid conditions as well as the distance to the nearest grid connection point.

3.1.5 Infrastructure and Environmental Conditions

Agricultural land may be located near infrastructure such as highways, airports, or rail lines, or may be crossed by high-voltage power lines. Specific requirements sometimes apply to such infrastructure, which must be taken into account during the construction of facilities.

As part of the feasibility study by Strebel et al. (2025), an area within the approach path of Dübendorf Airport was examined. According to the guidelines of the Federal Office of Civil Aviation (FOCA), reflective surfaces must be assessed for potential glare effects. If disruptive reflections cannot be ruled out, the facility design must be adjusted to ensure aviation safety. In addition, a high-voltage power line runs across the poultry grazing area in Rüti. According to the operator, structures located beneath the power line require a special permit (Strebel et al., 2025). Furthermore, the performance of an Agri-PV system located beneath a high-voltage power line may be negatively affected by the magnetic field.

If major infrastructure is located near a site or runs across the field, additional planning efforts and longer clarifications are therefore to be expected, which may already require upfront financial investments. Any requirements regarding system design may also lead to additional costs. This can limit or call into question the feasibility of a project and makes it difficult to estimate the likelihood of implementation in advance.

3.1.6 Ownership of Agricultural Land

On average in Switzerland, about half of the agricultural land is leased by private individuals or public institutions and is not owned by the farms that cultivate it. This proportion has tended to increase in recent years as a result of structural change, as agricultural land is distributed among fewer farms (*Pachtrecht für die Praxis*, n.d.). In many cases, therefore, the consent of landowners is required for the implementation of an Agri-PV system.

The ongoing feasibility study by the ZHAW (2026) revealed that, for several preferred sites, the landowners' consent had to be obtained first. As a result, sites owned by the farm were often preferred, even if they were not optimally suited. Ownership structures thus represent an additional constraint in site selection.

3.2 Agricultural Management

The design of the system is heavily influenced by the requirements of mechanized cultivation, particularly regarding row spacing and the direction of cultivation. Nevertheless, the additional structures impose restrictions and entail extra operational effort. The additional structures on the land also affect the microclimate and thus crop production, with potential positive and negative consequences for crop production. Furthermore, conflicts of interest regarding land use may arise, as another form of land use is introduced. However, land with limited agricultural use can be enhanced through additional energy production.

3.2.1 Structures Creation and Changes to the Microclimate for Plants and Animals

Certain agricultural crops require protective measures to ensure stable yields. In particular, high solar radiation, heat and drought, hail, or prolonged moisture can significantly affect product quality and yield. This applies above all to perennial crops such as berries, which are often equipped with weather protection systems anyway. If this protective function is provided by an Agri-PV system, a dual benefit is achieved, as electricity is generated alongside weather protection, yielding an additional economic contribution. With increasing drought and in the wake of advancing climate change, this protective function is becoming even more important. Traditional field crops can also benefit from moderate shading and reduced evaporation, particularly during dry periods.

Partial shading under Agri-PV systems alters the microclimate on the agricultural land. Available solar radiation is reduced depending on the system design, resulting in lower soil temperatures – and to a lesser extent, air temperatures – especially on hot days. At the same time, evaporation may decrease and soil moisture may increase, which has a positive effect on humus development (Trommsdorff et al., 2020). The extent of these effects depends heavily on the system design, particularly the system type, the height of the mounting structure, the row spacing, and the orientation of the modules. The system design is specifically tailored to the crops being grown in order to maximize the positive microclimatic effects. The impacts on agricultural production depend on the location, crop, and system and must be assessed on a site-specific basis. The altered microclimatic conditions have direct effects on agricultural use. On the one hand, they can help alleviate stress on crops during heat and drought; on the other hand, reduced solar radiation and lower temperatures can prolong the development period of individual crops. In addition, changing humidity and wind conditions can alter the conditions conducive to plant diseases. At the same time, there is currently a lack of varieties specifically adapted to the heterogeneous microclimatic conditions under Agri-PV systems, as these requirements have not yet been an explicit breeding goal (Jäger et al., 2022).

In addition to plants, animals can also benefit from the structures of an Agri-PV system. In poultry runs in particular, artificial structures influence the animals' behavior in the run, as they provide protection from predators. As part of a previously completed feasibility study by the ZHAW (Strebel et al., 2025), such a use was investigated for a poultry outdoor run at a farm in Rüti (Figure 6). Under the protection of such structures, laying hens generally utilize the available space more evenly. As a result, the flock is distributed over a larger area, which reduces excessive wear on the turf in the area near the barn. Other grazing animals, such as cattle or sheep, can also benefit from the shade provided by an Agri-PV system, particularly during periods of high solar radiation.

Furthermore, certain types of systems can perform additional functions. For example, a vertical Agri-PV system on wind-exposed areas can reduce wind speed and thus help mitigate soil erosion. Compared to traditional windbreak structures such as hedges, this function can be achieved on a smaller area. Furthermore, the effect takes hold immediately after installation rather than only after several years as the hedge grows. At the same time, maintenance requirements may be lower compared to such measures.

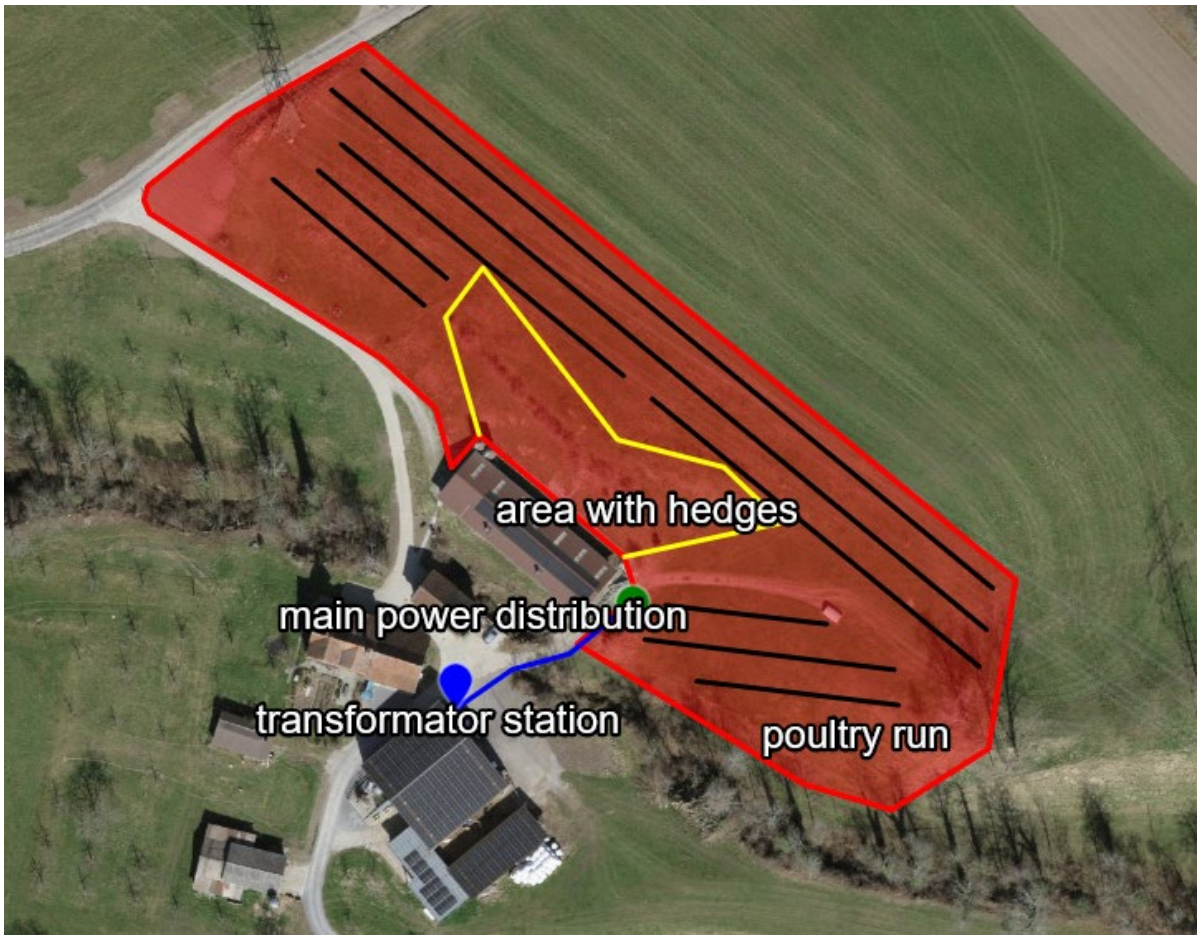


Figure 6. Poultry outdoor run area investigated by Strebel et al. (2025) for the use of an Agri-PV system. The arrangement of the module rows is intended to help ensure that the laying hens utilize the area as fully as possible. Today, the animals spend most of their time in the area marked yellow, which is lined with hedges. Planned vertical PV module rows are marked black, and the entire poultry run area is colored red.

3.2.2 Enhancing the Value of Land with limited Use

Agri-PV systems fundamentally offer the possibility of utilizing agricultural land for additional energy production. Discussions with farmers during the preliminary investigations for the ongoing feasibility study revealed that such a secondary use is particularly considered for areas with limited cultivation conditions, for example due to their sloping terrain, small plot size, or otherwise limited usage possibilities (ZHAW, 2026). With an Agri-PV system, such areas can make an additional financial contribution to the farm. Accordingly, implementation was primarily considered on such areas (ZHAW, 2026). Installation on productive farmland, however, is viewed with some caution, as agricultural production is clearly the primary focus there and farmers initially prefer other areas.

Limited land use can have various causes – including phytosanitary issues such as fungal infestation, as well as soil contamination. For example, as part of the ZHAW's feasibility studies, a plot was identified that is infested with the honey fungus (Strebel et al., 2025). As a result, all the plum trees had to be cut down. Alternative uses were out of the question for the farm, so the area was converted into a biodiversity area. From the farmer's perspective, the area would therefore be best suited for the installation of an Agri-PV system.

On land contaminated with substances such as PFAS, the use of Agri-PV systems in combination with phytoremediation measures can also be a viable option. While farms with livestock can still use some of these areas as pasture, their suitability for crop production is limited. In such cases, the land is often used to meet ecological requirements. To qualify for direct payments, farms must designate at least 7%

of their agricultural land as biodiversity promotion areas (BFF). In 2024, the average proportion of BFF in Switzerland was just under 20% (BLW, 2025). These areas can be used, for example, as extensive meadows or pastures, as field margins, or as flower-rich fallow land. Against this backdrop, it may make sense to combine ecological use with energy production. An Agri-PV system can thus contribute to energy production while also meeting existing ecological requirements. The extent to which BFF areas continue to qualify as such when used for Agri-PV and are eligible for corresponding direct payment contributions has not yet been conclusively clarified.

3.2.3 Mechanized Farming

Agricultural management of the land remains central even when using Agri-PV systems. The system must therefore be planned in such a way that mechanized cultivation is restricted as little as possible and the direction of cultivation can be maintained. In practice, various machines are used for soil preparation, seeding, plant protection, and fertilization. The widths of the machines used depend on both the crop and the various cultivation steps during the growing season. As a rule, however, a farm is geared toward a typical machine width across the crop rotation, which serves as the basis for cultivation. Individual crops or work steps may deviate from this and require wider working widths. Additionally, a headland is needed at the beginning and end of the working direction to allow the machines to turn.

The direction of cultivation for the field is often predetermined, for example by the shape of the plot. Typically, it runs along the longitudinal axis to minimize the number of turns. This also influences the orientation of the Agri-PV system. As a result, certain system types may be less suitable. For example, if a field is cultivated in an east-west direction, the rows of modules in a vertical Agri-PV system would also have to run in that direction. This results in permanently shaded areas on the north side of the rows, which is particularly unfavorable for arable land used for crop production, while permanent grassland generally does not experience any yield losses.

When planning Agri-PV systems, the spacing between module rows or supports is typically chosen as a multiple of the typical machine width, with particular attention given to the widest machine used. The same spacing is generally maintained between the field edge and the outermost module row. This enables efficient cultivation and prevents overlap between cultivation steps. The typical working width for tillage and seeding in Switzerland is around 3 m, while machines such as field sprayers or drag hose distributors can reach working widths of 15 m or more. An additional buffer between the cultivated area and the structure facilitates management, especially when GPS-assisted guidance is not used on the tractors. The required row spacing can therefore vary greatly depending on the use of the land. For the poultry free-range area studied by Strebel et al. (2025), a row spacing of 10 m was chosen, as no wide machinery is used and mechanical cultivation plays a minor role. In contrast, on the vegetable producer Imhofbio's land, a row spacing of 22.8 m was required to allow for the use of harvesters with extended conveyor belts (Strebel et al., 2025). The row spacing of Agri-PV systems is therefore often determined by the widths of the machinery used and not primarily by a specified degree of ground coverage. This reduces the installable system capacity per area and the potential electricity yield. Particularly in the case of smaller plots, as are common in Switzerland, this can result in relatively low system capacities, leading to higher specific system costs, as fixed costs such as planning, project design, or excavation work for the grid connection are spread across a lower capacity.

The chosen row spacing and the layout of the system determine the extent to which additional structures are introduced into the area. Many mechanically cultivated areas are now largely free of obstacles such as individual trees, utility poles, or hedges. The fewer obstacles present in a field, the easier and more flexibly the area can be cultivated. In practice, additional structures require the farmer to adjust the operating speed in order to work the land as seamlessly as possible right up to the obstacle while simultaneously avoiding damage to machinery or infrastructure. A farmer who already operates a vertical Agri-PV system on a plot in Donaueschingen (Germany) reported in a discussion, for example, that he drives more slowly on this plot than on comparable plots without the system. In addition, he sometimes has to adjust the working width of individual machines, such as the spray boom or the flow rate of the

individual spray nozzles, which leads to additional effort. Overall, this can lead to increased operational costs and reduce farming efficiency.

3.2.4 Conflicts of Interest regarding Land Use

Farmers must already decide today which areas they will use primarily for agricultural production and on which areas ecological measures will be implemented. The use of Agri-PV systems adds an additional form of land use that must be incorporated into these operational considerations.

Agricultural land is limited, and the farm faces multiple demands simultaneously. On the one hand, agricultural production must be economically viable; on the other hand, there are requirements for ecological management and the promotion of biodiversity. The farm must therefore continually weigh which use is prioritized on which areas.

For many farms, agricultural production is clearly the top priority. However, the potential agricultural benefits of Agri-PV systems are not always immediately apparent to the farm and must be demonstrated on a case-by-case basis. This assessment emerged from discussions with farmers from the farms studied (Strebel et al., 2025; ZHAW, 2026). This can lead to farms not pursuing Agri-PV systems despite having suitable land. Without a clearly evident benefit for the core agricultural business, such a system is sometimes viewed critically by farms and perceived more as an additional constraint and extra effort in farm management.

3.3 Economic Viability and Operation

The economic viability of Agri-PV systems depends on various factors and must be assessed on a site-specific basis. Investment costs depend, among other things, on the farming practices and soil conditions of the site as well as the grid connection situation (Chapter 3.3.1). Various marketing models and self-consumption (Chapter 3.3.2) influence both revenue from electricity production and eligibility for various support instruments. Economic feasibility analyses for Agri-PV systems are subject to uncertainties, with the future development of electricity prices playing a central role (Chapter 3.3.3). In addition, uncertainties arising from project development (soil depth, existing drainage systems, etc.) play an important role. From an economic perspective, Agri-PV systems can contribute to the diversification of agricultural operations and reduce dependencies on purchased electricity (Chapter 3.3.4).

3.3.1 Investment Costs

According to Figure 7, feasibility studies conducted by the ZHAW revealed a wide range of investment costs for various types of Agri-PV systems at eight different locations in the Canton of Zurich (Strebel et al., 2025). The specific investment costs, excluding grid connection, range between 800 and 3,800 CHF/kWp.

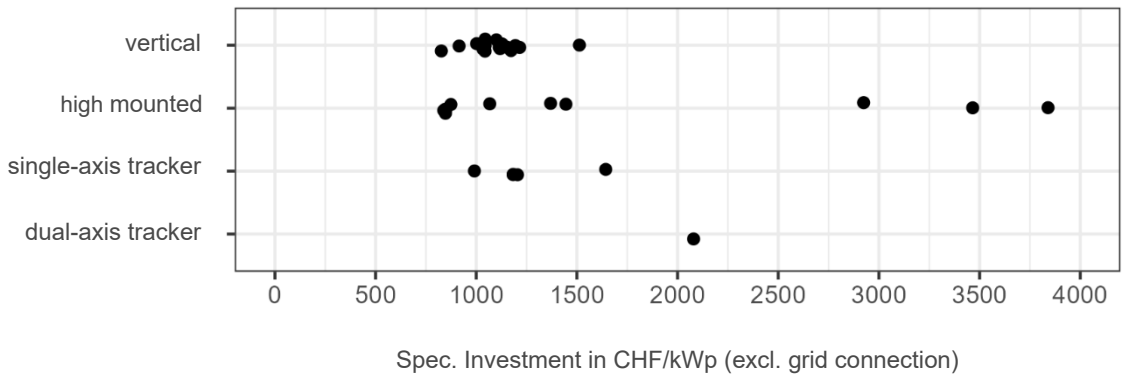


Figure 7. Specific investment costs in CHF/kWp (excluding grid connection costs), broken down by system type according to feasibility studies by the ZHAW (Strebel et al., 2025). The wide range of variation is the result of different plant sizes (104 to 1,237 kWp), site conditions, and system providers.

The wide range of variation in specific investment costs results from a combination of the following factors:

- Economies of scale: Larger systems tend to have lower specific costs. The two highest values in Figure 7 are for small systems installed above vineyards with rated outputs of 104 and 162 kWp, respectively.
- System type: Costs tend to increase with the complexity of the system (especially tracking systems compared to fixed systems).
- Soil conditions: The cost of foundations depends on the nature of the soil (e.g., driven piles vs. screw piles). For a specific project in Rüti, ZH, using screw piles exclusively instead of driven piles is expected to result in additional costs of 200 to 320 CHF/kWp (19 to 26% of the investment costs).
- Crop-specific requirements: Investment costs rise with increasing requirements for agricultural cultivation. For example, the use of modules as weather protection over rows of vines generally leads to higher costs. This applies to the three highest specific investment costs from Figure 7.

Grid connection costs vary greatly and can therefore have a decisive impact on the economic viability of an Agri-PV system. They depend on various factors:

- Distance to the substation.
- The nature of the ground affected by the line construction, with excavation work on sealed surfaces being approximately 10 times more expensive than on natural surfaces (approx. 450 CHF/m vs. 40 CHF/m).
- Larger distribution network operators (DNOs) tend to benefit from economies of scale in material and labor costs and can therefore offer lower prices than smaller DNOs.
- Specific grid connection station (see Chapter 3.1.4): Typically, the connection from the installation to the grid connection point must be financed by the plant operators. If only the Agri-PV system is connected at the grid connection point, necessary grid upgrades are typically borne by the operators. If, on the other hand, the grid connection point is used by multiple subscribers, Swissgrid covers the expansion costs for the shared grid section.

The interplay of the factors mentioned above results in highly variable prices for grid connection of Agri-PV systems. The specific grid connection costs for the projects analyzed by ZHAW in the canton of Zurich, with cable lengths ranging from 20 to 400 m, vary between 50 and 550 CHF/kVA of grid connection capacity. This accounts for 4 to 25% of the total investment costs (Strebel et al., 2025). The sites are tied to the local distribution network operator (DNO). The feasibility studies show price differences of up to 20% among different DNOs for similar grid connection scenarios.

A majority of the plant variants from the ZHAW feasibility studies suggest specific investment costs, including grid connection, ranging from 1,000 to 1,600 CHF/kWp (Strebel et al., 2025). Outliers result either from high crop protection requirements and/or small plants, as well as from complex plant types such as dual-axis tracking.

3.3.2 Marketing Models and Funding Instruments

The marketing of electricity from Agri-PV systems can be achieved through various models. Because the marketing model limits the available funding instruments, the aspects of marketing and funding are addressed together.

The selection of suitable marketing models must take local conditions into account (especially local consumers). Due to various uncertainties, such as the future development of electricity prices, the opportunities and risks of different marketing models must be evaluated. Various marketing models are listed below, along with the corresponding funding instruments. While one-time payments cushion the investment costs of Agri-PV systems, they leave the significant risk of fluctuating electricity prices entirely with the system operators. This can result in projects being deemed “unbankable” or only partially “bankable” from the perspective of banks, meaning they are difficult to finance through debt capital. The

high risk associated with feed-in tariffs is generally addressed through the sliding market premium (SMP). However, current maximum bids and the uncertain remuneration for solar certificates of origin complicate the economic operation of Agri-PV systems. Possible marketing models and the corresponding support instruments are outlined below.

Local self-consumption with surplus feed-in

The Agri-PV system is operated with local self-consumption and surplus feed-in. The electricity generated is primarily used on-site, and any surplus is fed into the grid. This model can be implemented regardless of location or system size, provided there is a demand for electricity at the same grid connection point. If there is a high local electricity demand that ideally aligns with the production profile of the Agri-PV system, the self-consumption with surplus feed-in variant can be a lucrative option. This means that, in addition to the energy price, grid fees and statutory charges that apply when purchasing electricity from the public grid are eliminated for self-consumed electricity. The financial value of self-consumption is thus higher than that of selling electricity.

Agri-PV systems with self-consumption are eligible for one-time payments (EIV), with the subsidy currently ranging from 250 to 300 CHF/kWp as of March 2026, depending on the system size. Systems with an inclination angle > 75° (vertical Agri-PV systems) can also apply for the inclination angle bonus of 200 CHF/kWp.

Lucrative project variants with self-consumption were identified in the ZHAW feasibility studies, for example, for the Imhof Bio vegetable farm at the Dreiägerten site in Schwerzenbach (Strebel et al., 2025). The internal rate of return (IRR) is estimated there at 8 to 12% for various system types with self-consumption; the payback periods for the systems range from 9 to 14 years with an expected service life of at least 30 years. At this location, the challenge lies in the grid connection required for self-consumption: An affordable grid connection can be realized for approximately 100 CHF/kWp. However, due to a separate connection point, this does not allow for self-consumption because the site is not located directly adjacent to the operational buildings. Self-consumption is only feasible with a more expensive grid connection in the range of 400 CHF/kWp, as this requires a longer power line. This increases the investment costs for project variants with self-consumption by around 20% compared to variants with full feed-in. Because electricity has a significantly higher value when used for self-consumption, variants with self-consumption are among the most economical despite higher investment costs. This underscores the improvement in economic efficiency achieved through local self-consumption.

Full feed-in with high one-time remuneration

PV systems can be operated without self-consumption and feed all of their electricity into the grid. For systems of 150 kWp or more that feed all of their electricity into the grid, participation in auctions for the high one-time feed-in tariff (HEIV) is possible. This typically doubles the investment subsidies. In past auctions, the median HEIV for systems with a positive funding decision was around 550 CHF/kWp (Pronovo AG, 2026a, 2026b). With vertical systems, an additional 200 CHF/kWp tilt angle bonus can be obtained on top of the auction value. This allows for a subsidy of around 750 CHF/kWp for vertical Agri-PV systems. In Germany, the investment costs for such systems range from only 700 to 800 €/kWp (Rösch & Fakharizadehshirazi, 2024). The fact that such systems are offered at significantly higher prices in Switzerland (see Figure 7) could be the result of over-subsidization of this type of system.

In the projects from the ZHAW feasibility studies, variants with full feed-in and HEIV were never the most economically lucrative options (Strebel et al., 2025). The reason is the expected low feed-in tariff, which in many cases only slightly exceeds the capital costs (even after deducting the HEIV) as well as the operating costs. Furthermore, plant operators would be fully exposed to the risk of declining feed-in tariffs (see Chapter 3.3.3)

Full Feed-in with a Sliding Market Premium (GMP)

For PV systems with a rated output exceeding 150 kWp and full feed-in, a sliding market premium (GMP) has been available via auction since 2025. If the GMP is selected as the marketing model, it replaces the investment contribution (EIV / HEIV) with an electricity feed-in tariff over 20 years, which is determined through an auction process. This support mechanism is intended to reduce uncertainties regarding declining feed-in tariffs, but it results in an increased investment burden due to the elimination of the one-time payment.

The current maximum bid price is 9 Rp./kWh. In previous auction rounds, feed-in premiums were awarded for bid prices ranging from 8.5 to 8.9 Rp./kWh (Pronovo AG, 2026a, 2026b). The bid value includes the average revenue from the sale of solar HKN in Switzerland, regardless of whether plant operators can actually sell the HKN at this price. HKN are currently priced at 1.5 Rp./kWh in the bid value under the GMP. Various distribution network operators in the Canton of Zurich currently pay between 0 and 3 Rp./kWh for HKN, meaning the effective revenue from electricity sales can be estimated at between 7 and 10 Rp./kWh. Under the GMP, vertical installations can also benefit from a tilt angle bonus. This increases the remuneration by 1 Rp./kWh.

Since the introduction of the GMP in 2025, funding applications have been submitted for only 15 PV systems in four auction rounds, of which nine systems received a funding award. This suggests that the model has hardly been used in practice so far. Furthermore, the levelized costs of Agri-PV systems without a one-time payment are of the same order of magnitude as the minimum remuneration of around 7 Rp./kWh in the GMP (excluding uncertain off-take of solar HKN), meaning that the project variants presented in the ZHAW feasibility studies are not expected to be economically viable (Strebel et al., 2025).

(Virtual) Pooling for Self-Consumption ((v)ZEV) with Surplus Feed-In

Similar to self-consumption with surplus feed-in, electricity from Agri-PV systems can be marketed in a (v)ZEV. This means that, in addition to traditional self-consumption, additional consumers at the same grid connection point (ZEV) or up to a shared distribution cabinet (vZEV) also count as self-consumption. Thus, depending on the situation, self-consumption can be increased by including additional consumer parties. With (v)ZEV, fees for grid usage and statutory levies are also waived. The financial benefit of on-site self-consumption is typically shared between both parties (producers and consumers) by setting the electricity price between the production cost and the purchase price for grid-supplied electricity. Variants with (v)ZEV are economically viable when there is high electricity demand at the same grid connection or up to the same distribution cabinet, and the consumers have an interest in purchasing locally produced PV electricity. As with the self-consumption variant, subsidies in the form of one-time payments for Agri-PV systems can be applied for. The same subsidy rates apply as for self-consumption with surplus feed-in.

The ZHAW feasibility studies have not yet led to a recommendation for a (v)ZEV in the present cases because either no electricity consumers were connected to the same distribution cabinet or because their electricity demand was not high enough (Strebel et al., 2025; ZHAW, 2026). At one location (Wädenswil Viticulture Center, Au Peninsula), a ZEV combined with a restaurant would be a recommended marketing opportunity; however, the implementation of the facility is very difficult from a land-use planning perspective and due to high investment costs. For this reason, no further marketing assessments were conducted in this case.

Local Electricity Community (LEG):

A LEG is a community of electricity producers and consumers at the local level (same municipality, same distribution network operator, and same grid level at the grid connection point). Through a LEG, the pool of potential electricity consumers can be expanded beyond self-consumption and (v)ZEV to a larger region. Members of the LEG can purchase electricity from the PV system via the public grid during

simultaneous production. Producers and consumers simply negotiate the energy price among themselves. Grid usage fees and statutory charges are levied by the distribution network operators. The active tariffs for grid costs are reduced for the consumer depending on the grid levels involved (by 20% with transformation or by 40% without transformation between the parties). This allows grid costs to be reduced by approximately 1 to 4 Rp./kWh, depending on local tariffs and the grid levels involved. The ZHAW feasibility studies present a corresponding business case based on the Reinhard poultry farm in Rüti (Strebel et al., 2025): The poultry farm collaborates with an egg processing plant in the same municipality. The latter has expressed interest in purchasing the locally produced electricity via a LEG. The variants involving a LEG are expected to yield the highest total returns on investment at this location (variants involving full feed-in or the GMP were also examined). Depending on the type of system, a return of 5 to 9% is projected for marketing via a LEG in this project. The LEG also emerged as the most economically lucrative option at other sites from the ZHAW feasibility studies, provided that local self-consumption was not possible (Strebel et al., 2025). Variants with LEG thus lead to higher profitability than variants with full feed-in or GMP. For the LEG, however, suitable electricity buyers must be identified and corresponding contracts negotiated.

Overview of one-time payments:

Table 3 shows typical subsidy amounts for a 500 kWp Agri-PV system commissioned before March 31, 2027. The one-time payments that can be obtained depend on the system type and the chosen marketing model. Particularly high investment subsidies of approx. 750 CHF/kWp can be achieved for vertical Agri-PV systems with full feed-in by having the systems funded through auctions for high one-time payments. In past auctions, the feed-in tariff for systems with a positive funding decision was around 550 CHF/kWp(Pronovo AG, 2026a, 2026b). Additionally, vertical systems can benefit from a fixed tilt angle bonus of 200 CHF/kWp.

Table 3. Current one-time payment for PV systems > 150 kWp based on a system size of 500 kWp (commissioning before March 31, 2027). Systems in the GMP do not receive a one-time payment because, instead, a remuneration rate for electricity production is auctioned off. The subsidy rates are set annually and may change in the future.

Module tilt	Marketing method	Power contribution (CHF)	Tilt angle bonus (CHF)	Total (CHF)	Note
> 75°	Self-consumption (v)ZEV	131,800	100,000	**231,800**	According to the Pronovo rate calculator with commissioning before March 31, 2027
	LEG Full feed-in	275,000	100,000	**375,000**	Assumption: HEIV auctions with a bid of 550 CHF/kWp
	GMP	0	0	**0**	No one-time payment
< 75 °	Self-consumption (v)ZEV	131,800	0	**131,800**	According to the Pronovo rate calculator with commissioning before March 31, 2027
	LEG Full feed-in	275,000	0	**275,000**	Assumption: HEIV auctions with a bid of 550 CHF/kWp
	GMP	0	0	**0**	No one-time payment

The subsidy landscape for PV systems in Switzerland has changed significantly in recent years. While it offers a wide range of options (with or without self-consumption, bonuses for certain system types, etc.) as well as marketing models (self-consumption, ZEV, vZEV, LEG), it also increases the complexity of project planning and can make it difficult for stakeholders to choose a specific subsidy model. Dis-

cussions with farmers have revealed an enormous need for advisory and informational resources, especially since farmers must familiarize themselves with a new and complex topic alongside their day-to-day operations (Strebel et al., 2025).

The current subsidy landscape is intended to provide incentives for systems with high winter electricity production. However, the subsidy criteria appear to be only partially effective for promoting winter electricity from Agri-PV systems. For example, vertical Agri-PV systems are currently specifically subsidized due to the expected high share of winter electricity (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). However, tracking systems are excluded from this subsidy due to the choice of subsidy criterion (tilt angle > 75°), even though they can deliver higher winter electricity yields in many locations, both per installed capacity and per unit of land area.

3.3.3 Uncertainty

Economic feasibility analyses for Agri-PV systems are based on assumptions and are therefore subject to uncertainties. These include, for example, (investment) costs that are difficult to calculate and uncertain revenues due to future electricity price fluctuations, both for self-consumption (purchase tariff) and for feeding electricity into the grid (feed-in tariff).

Investment costs require project-specific assessments in advance but cannot be predicted with exact precision. A typical example is the cost of suitable foundation solutions (see Chapter 3.1.3). Generally, foundations can be driven or bolted, with driving typically being the more cost-effective option but requiring deep soil. Test pile driving can be performed in advance. However, this incurs additional costs and provides only limited insight into the entire facility perimeter. Consequently, it is usually not possible to determine in advance exactly whether and how many screw foundations will be required. The feasibility study for a poultry farm in Rüti, ZH, showed, when comparing exclusively driven foundations with exclusively screwed ones, additional costs of approximately 200 to 320 CHF/kWp (19 to 26% additional costs, depending on the system type) (Strebel et al., 2025). The use of bolts exclusively should be understood as a worst-case scenario, because the foundations would only be bolted where pile foundations cannot be used.

Revenue from Agri-PV systems is heavily driven by the development of electricity prices (except for systems subsidized under the GMP). This applies to both systems with full feed-in and systems with self-consumption, because purchase tariffs for systems with self-consumption may also fluctuate in the coming years and surplus feed-in occurs. The remuneration for solar power fed into the grid from systems > 150 kWp must be at least equal to the reference market price (RMP) for photovoltaics pursuant to Art. 15 EnFV. The RMP is determined quarterly by the SFOE based on Swiss PV production and spot market prices. It has fluctuated significantly in the past and exhibits a seasonal pattern, with prices tending to be lower during the high-yield summer half-year and higher during the lower-yield winter half-year. Figure 8 (top) shows the development of the SFOE's RMP for solar power between 2018 and 2025. Based on this, Figure 8 (bottom) shows the annual feed-in tariffs weighted by quarterly volumes according to the SFOE. This corresponds to an approximation of the average value of electricity fed into the grid from PV systems per calendar year. In recent years, it has ranged between 3.1 Rp./kWh (2020) and 29.0 Rp./kWh (2022), with the peak in 2022 triggered, among other factors, by the war in Ukraine and a supply bottleneck in Europe. Market prices above 10 Rp./kWh are an exception. Apart from 2022, the annual minimum remuneration ranged between 3.1 and 9.5 Rp./kWh. Figure 8 illustrates the massive price fluctuations for feed-in tariffs based on the SFOE's reference market prices. These fluctuations pose a significant investment risk and make it difficult to predict revenue. Starting in 2027, the quarterly reference market price is expected to be replaced by the spot market price, which will then take into account the plant-specific feed-in profile. This means another system change and an additional source of uncertainty.

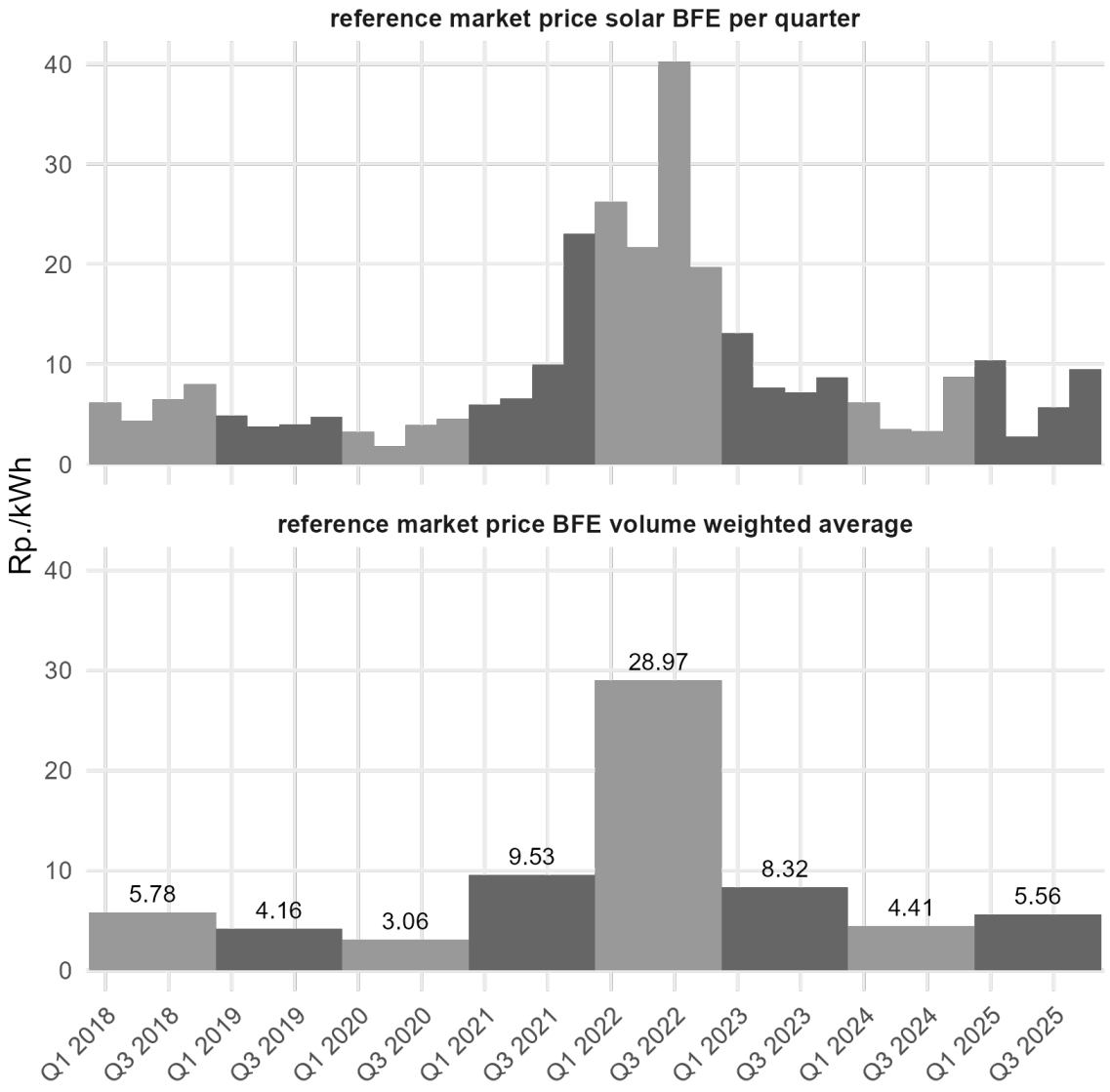


Figure 8. Reference market prices for solar power by quarter (top) and the annual average of reference market prices weighted by quarterly volumes (bottom) between 2018 and 2025 (BFE, 2023, 2026).

Without self-consumption or long-term power purchase agreements, for example with the local distribution network operator, through a LEG, or via Power Purchase Agreements (PPA), operators of Agri-PV systems are fully exposed to the risk of low electricity prices. The choice of marketing model, however, must be based on the local situation: self-consumption and (v)ZEV are only feasible where appropriate consumers are available, whereas many agricultural areas are located far from major consumers. Consequently, the LEG usually emerges as the primary option for direct marketing. Although electricity revenue in a LEG depends on negotiations, it is lower than with traditional self-consumption because (slightly reduced) grid fees still apply. If a large number of electricity consumers participate in a LEG, an increase in grid fees must also be expected, as the distribution network operator (VNB) must still somehow pass on its grid operating costs – which are barely lower due to the LEG – to the consumers.

3.3.4 Diversification and Reduction of Dependencies

Agri-PV systems offer agricultural businesses the opportunity to tap into an additional source of income. In 2023, the average farm generated the largest share of its revenue from livestock farming, followed by direct payments and crop production (Jan et al., 2024). The actual distribution of income per farm varies greatly. Energy production using Agri-PV can supplement existing income and diversify farms' product portfolios. Individual projects from existing feasibility studies suggest that, after depreciation and taking

into account maintenance and capital costs, high four-figure to low five-figure yields per hectare of agricultural land can be expected (Strebel et al., 2025). By comparison, the gross margin of the most important arable crops in Switzerland ranges between 1,500 and 9,500 CHF/ha (Ramseyer et al., 2021), although the gross margin tends to increase with rising agricultural intensity. In grassland (intensive production), a contribution margin of up to approximately 2,000 CHF/ha can be expected (Agridea, 2020). Even equipping small portions of farmland with Agri-PV can thus make a significant economic contribution to farm revenue. The most lucrative Agri-PV variants identified in the ZHAW feasibility studies are expected to generate annual financial returns per hectare in the range of CHF 8,000 to 16,000/ha, thereby enabling higher financial returns than the primary agricultural use (Strebel et al., 2025).

Through operational diversification, farms can become less dependent on volatile agricultural markets. Local production can increase regional value creation, particularly when combined with appropriate marketing models (LEG, (v)ZEV). This opens up new economic opportunities, especially for rural regions.

Some agricultural businesses have high electricity needs, for example, for processing and storing the crops they produce. Energy-intensive operations such as greenhouse production with artificial lighting and the use of heat pumps also contribute significantly to electricity demand. Such businesses are dependent on electricity price trends and have limited ability to plan for future energy costs. The large fluctuations in electricity prices in recent years (see Chapter 3.3.3 and Figure 8) have brought to mind a strong dependence on the development of energy prices. Because the production costs of electricity from Agri-PV systems are strongly influenced by investments, these can be estimated quite reliably over a longer period.

As part of the ongoing feasibility study by ZHAW (2026), several farms were identified whose annual electricity demand is at least 1 GWh and where a large portion of the available roof space is already used for photovoltaics. In addition, farms with greenhouses in particular are under increasing pressure to provide fossil-free heating in the medium term. For example, Migros aims to prioritize the marketing of vegetables from fossil-fuel-free heated greenhouses starting in 2026 (Migros, 2025). This was evident, for instance, at the Imhofbio farm examined as part of a feasibility study (Strebel et al., 2025). In this context, the use of heat pumps is an obvious solution, which goes hand in hand with rising electricity demand. In such cases, Agri-PV systems increase local electricity production and thus help meet the growing demand for electricity. At the same time, they enable better long-term planning of electricity costs. Furthermore, electricity demand will increase due to the decarbonization of the energy system even outside of agriculture, requiring additional renewable electricity production.

The ZHAW feasibility studies show that the production costs after subsidies vary between 4.5 and 27 cents per kWh, depending on the type and size of the plant as well as the requirements for agricultural crops,kWh, with the upper end of the range attributable to small systems with high crop protection requirements (e.g., grapevines) (Strebel et al., 2025). Most system variants are expected to have production costs between 4.5 and 7 Rp./kWh after investment subsidies (including depreciation, maintenance, and capital costs with a WACC of 4.5%). For farms with high local electricity demand, investing in an Agri-PV system can thus represent an investment in low long-term energy costs.

3.3.5 Additional Complexity for Agricultural Operations

Agricultural businesses are already faced with a multitude of tasks in crop production or livestock farming. Planning and operating an Agri-PV system adds an additional area of activity that increases operational complexity. While the farm has previously focused on agricultural production processes, an Agri-PV system requires additional knowledge in areas such as system planning, permitting procedures, grid connection, or electricity marketing. Although planning and construction are carried out by external specialist planners or project developers, However, for the operation of the system, it is helpful to understand the underlying relationships, as otherwise individual decisions made during the project's course can be difficult to assess. Many of these topics have few direct connections to the farm's existing operations. In particular, selecting a suitable system type or designing the system layout presents additional

challenges, as technical, agricultural, and economic requirements must all be considered simultaneously.

Feasibility studies conducted by the ZHAW frequently revealed that various stakeholders are involved in the implementation of an Agri-PV system (Strebel et al., 2025). These include, for example, project developers or grid operators. For the farm, this often raises the question of what role it wishes to play in the project and to what extent it will participate in the planning, financing, or operation of the system. For agricultural businesses, this entails additional organizational effort as well as new operational challenges. The increased complexity can lead to farms deciding against developing their own project or abandoning the initiative, despite having fundamentally suitable land and initial motivation.

3.4 Legal Framework

Various legal frameworks are relevant for Agri-PV. On the one hand, the eligibility of the systems for approval under spatial planning is central. Furthermore, the impact of Agri-PV systems on farms' entitlement to direct payments is of interest. For Agri-PV systems of 5 MWp or more, an environmental impact assessment is also required.

3.4.1 Eligibility for Approval and Spatial Planning

Under Art. 24ter para. 2 RPG, Agri-PV installations must not impair agricultural production and must either generate benefits for agricultural production or serve agricultural experimental and research purposes in order to be eligible for a permit (see Chapter 1.2).In many cases, it is difficult to present a convincing argument regarding the benefits of an Agri-PV system for agricultural production because there is a lack of relevant practical experience, and plants' responses to Agri-PV can vary significantly depending on the location, crop, and variety. The varieties used today were not bred in the past with a view to cultivation in Agri-PV systems, or other breeding objectives took precedence. Making general statements about changes in crop yields and quality is currently challenging. For this reason, existing Agri-PV systems in Switzerland have primarily been approved as research and experimental facilities.

The difficulty of demonstrating the benefit of an Agri-PV installation for agricultural production is not specific to Switzerland. The international overview report of IEA PVPS Task 13 shows that the delineation of Agri-PV from conventional ground-mounted PV is contested worldwide and is defined more or less narrowly depending on the country (Trommsdorff et al., 2025). The report proposes four criteria by which applications can be placed within a definition hierarchy: land use efficiency, the simultaneous involvement of photosynthesis and electricity production, the intensity of agricultural use, and the degree of synergies and interactions between the two uses. The Swiss requirements under Art. 24ter RPG correspond most closely to the fourth criterion of synergies, while the Swiss regulation formulates no explicit requirements regarding the first three criteria. The report notes that definition criteria should be at least partially measurable and verifiable in order to reduce legal uncertainty and enable the authorities to exercise control. Yet it is precisely the criterion of synergies that is difficult to quantify, since a large number of site-specific effects must be taken into account. The fact that the Swiss regulation ties its central substantive requirement to the least measurable of the four criteria explains a considerable part of the differences in interpretation depending on location observed in practice.

Depending on whether the land is designated as crop rotation land (FFF), the criterion of being "beneficial for agricultural production" is interpreted differently (see Chapter 1.2). While, for example, weather protection or an extension of the harvest period outside of FFF may count as a benefit, in the case of FFF, *"the agricultural yield potential as well as the suitability for mechanized cultivation* must *be fully preserved or even improved"* (ARE, 2025). The interpretation of the terms "yield potential" and "suitability for mechanized cultivation" determines how restrictive the additional requirements for Agri-PV on FFF are. If the term "yield potential" is equated by the approving authorities with natural yield, the requirement is particularly restrictive. However, if permits are possible under the consideration of the system's dismantlability (and the associated restoration of yield potential), the additional requirements for FFF represent a lesser hurdle.

An interpretation in the sense of natural yield would be particularly restrictive compared to some EU countries: Germany permits, according to DIN SPEC 91434, a yield reduction of up to 34% (DIN Deutsches Institut für Normung e.V., 2021). In France, yield reductions of 10% are permitted (Legifrance, 2024), and in Italy, Austria, and Spain, no explicit limits are set (Bundesministerium für Land- und Forstwirtschaft, Klima- und Umweltschutz, Regionen und Wasserwirtschaft (BMLUK), 2026; Gestore Servizi Energetici GSE, 2024; Ministerio de Agricultura, Pesca y Alimentación, 2023), although it is stipulated that agricultural cultivation must remain possible.

In response to the postulate “Laying the Groundwork for Agri-Photovoltaics” as early as 2024, the Government Council of the Canton of Basel-Landschaft stated that Agri-PV systems could only be implemented on land with permanent crops (Regierungsrat Basel-Landschaft, 2024). Arable land or permanent grassland, on the other hand, were not considered a priority because the benefits for agricultural production could not be achieved there. The Cantonal Government also made specific mention of FFFs, which in its view should be excluded because the aspects required at the time by the Spatial Planning Ordinance (*Raumplanungsverordnung*, RPV; moved from the RPV to the RPG as of 2026) could not be achieved. It should be added that FFFs account for around 40% of Switzerland’s agricultural land and merely identify areas that can be used for arable farming in the event of a crisis to ensure food security (see Chapter 1.2). On many FFFs, permanent grassland is currently being cultivated, or the areas are home to permanent crops. An analysis for the canton of Thurgau (Anderegg & Rohrer, 2026) has shown that 92% of the theoretical Agri-PV potential in the Thurgau canton lies on FFF. 81% of the potential on permanent grassland is located on FFF, 88% on permanent crops, and 95% of open arable land is designated as FFF. The interpretation of the requirements for Agri-PV systems on FFF thus has a significant impact on the feasibility of realizing this potential.

Whether areas are suitable for Agri-PV systems also depends on whether and what conflicting interests exist at the site. Art. 32d para. 3 states: "*In jedem Fall bedarf es einer umfassenden Interessenabwägung.*". National, cantonal or municipal nature and landscape protection interests can be interpreted as opposing factors.In any case, a balancing of interests must take place during the permitting process, with renewable electricity production being evaluated as positive and conservation requirements as conflicting. High conservation requirements are to be expected in nature reserves, moorlands, ecologically particularly valuable areas, sensitive landscapes, or BLN areas. Furthermore, the suitability of the area is assessed based on the current land-use zone (and, where applicable, adjacent zones). For example, the approval of Agri-PV systems near airports is complicated by potential glare effects (see the Cherwis site from Strebel et al., (2025)) or prevented by specially protected landscape or nature reserves (see the Au Peninsula site from Strebel et al., (2025)). Regional planning and development plans are also taken into account by the approving authorities (see the Altwiesen site from Strebel et al., (2025)).

Since the RGP and the RPV merely provide a national framework and do not address specific cases in detail, the cantons have a certain degree of discretion in their permitting practices. While some cantons have already issued specific guidelines on permitting requirements, others have not yet done so. The existing guidelines vary in terms of the logic behind the exclusions and their level of detail. In contrast to the Canton of Basel-Landschaft, the Canton of Lucerne formulates the requirements for the approval of Agri-PV systems in its “Solar Systems Information Sheet” in a significantly less restrictive manner: These must be used as weather protection or to increase agricultural yields (Kanton Luzern, 2026). The Canton of Zurich specifies the requirements in a similar manner: *“Agri-photovoltaic systems may be approved if they are located in less sensitive areas and provide benefits for agricultural production”* (Kanton Zürich Kantonsrat, 2024). Additionally, in the Canton of Zurich, a connection to an agricultural operation is a prerequisite for the system to be considered site-specific. The examples mentioned above demonstrate that cantonal assessment criteria vary in terms of specificity and restrictiveness. For this reason, it is to be expected that approval practices will also differ by canton.

The planning of Agri-PV systems and the necessary permitting procedures can be lengthy and time-consuming. They require interdisciplinary expertise, including knowledge from the fields of agriculture, spatial planning, and PV system construction. Consequently, the planning of Agri-PV systems places

diverse demands on project development. Feasibility studies conducted by the ZHAW, commissioned by the Canton of Zurich, indicate significant project planning and consulting costs (Strebel et al., 2025). In particular, questions regarding approval eligibility cannot be fully clarified during preliminary assessments and require the submission of a building application for a definitive evaluation. A significant amount of preliminary work is required, while the likelihood of a negative decision is difficult to assess in advance. Such preliminary work includes, for example, the preparation of planning documents and an agricultural management concept that conclusively demonstrates the benefits of dual use for agriculture. Agricultural businesses can hardly spare the necessary time alongside their core activities and currently lack the required expertise. Consequently, they rely on external support during the planning process and when applying for a building permit. For this reason, the Canton of Zurich, for example, provides corresponding seed funding, allowing interested farms to commission an Agri-PV feasibility study from the ZHAW for a nominal fee (ZHAW, 2026). The offer is intended for farms in the Canton of Zurich.

3.4.2 Subsidy system and direct payments

Chapter 3.3.2 provides an overview of subsidies and support for (agri-)PV systems. In addition, direct payments (DP) often play a structurally significant role for agricultural businesses. A 2023 survey by Agroscope shows that agricultural enterprises in Switzerland generated an average agricultural operating income of CHF 360,965 per year (Pierrick et al., 2024). Livestock farming accounted for the largest share of this, at 52%. The average agricultural operating income from direct payments was 22%, exceeding the average income from crop production, which accounted for 16%. This makes direct payments a very important source of income for many farms in Switzerland. Approximately 98% of farms in Switzerland receive direct payments (Mack et al., 2025). The question of how Agri-PV systems affect eligibility for direct payments is therefore significant, at least psychologically, even though the area-specific remuneration from the sale of electricity from Agri-PV systems tends to be higher (see Chapter 3.3.4) than the direct payment for the same area. In principle, agricultural land (LN) is eligible for direct payments; in addition, specific contributions are provided, for example, for summer grazing areas (SF) (Zufferey, 2025). The amount of the direct payment depends on the crop grown and production difficulties (hilly areas / mountain areas). Additionally, contributions are provided for slopes with a gradient > 18%. Additional payments for biodiversity measures and production systems (e.g., organic farming or avoiding herbicides) supplement the DZ payments (Agrofutura, 2025). For arable crops in valley zones without additional payments, direct payments in 2026 will amount to 1,000 CHF/ha (Agrofutura, 2025). With slope, supplementary, and biodiversity payments, direct payments can also amount to 2,000 to 4,000 CHF/ha on a per-area basis. Because Agri-PV systems are, by definition, located on agricultural land, eligibility for direct payments continues to apply(Zufferey, 2025).

3.4.3 Environmental Impact Assessment (EIA)

Photovoltaic systems with a capacity of 5 MWp or more are subject to an EIA requirement (Federal Office for the Environment FOEN, 2009). Previous experimental and pilot systems in Switzerland were significantly smaller and could therefore be implemented without an EIA. In principle, Agri-PV systems with a rated output exceeding 5 MWp would be possible, but they would then require an EIA. This significantly increases the procedural burden for large Agri-PV systems. The area required for a 5 MWp Agri-PV system depends heavily on the system type and agricultural management practices, which is why the range is approximately 6 to 25 ha.

3.5 Society and the Environment

Agri-PV systems affect the landscape and can have a positive impact on biodiversity. At the same time, local acceptance plays an important role, as changes in the landscape's appearance or in land use are perceived differently.

3.5.1 Impact on the Landscape

Agricultural land shapes the landscape in many regions. Especially in rural areas, a small-scale and natural appearance is considered important. The use of Agri-PV systems introduces additional technical

structures into this landscape. Due to their size, these systems are highly visible. In areas that have previously been only minimally influenced by technical infrastructure, this can be perceived as a negative intrusion into the existing landscape.

Studies show that the visibility and integration of PV systems into the landscape are particularly decisive for how their impact on the landscape is perceived. The more a system stands out in the landscape, the more likely it is to be perceived as an intrusion (Sánchez-Pantoja et al., 2018). The perception of the landscape is thus an important factor in the assessment of sites and can significantly influence the feasibility of Agri-PV systems.

3.5.2 Impacts on Biodiversity

Agri-PV offers the opportunity to promote biodiversity and ecosystem services. Switzerland is experiencing a significant loss of biodiversity. More than a third of species are endangered, and other species are potentially threatened; furthermore, around half of habitats are impaired (Federal Office for the Environment FOEN, 2023). Against this backdrop, agricultural land is becoming increasingly important as a potential habitat.

Studies by the ZHAW show that photovoltaic systems, particularly when used in extensive farming, can have positive effects on biodiversity (Jäger et al., 2022; Schlegel, 2021). These include, among other things:

- improved habitat structures through shading and microclimate effects
- reduced agricultural intensity (e.g., fewer pesticides)
- additional structural elements for insects and plants

Agri-PV can thus be understood as a component of ecological infrastructure, as it ecologically enhances agricultural land while simultaneously utilizing it productively. The integration of flower strips into agricultural production systems, extensive management of subplots, or grazing under PV modules can specifically contribute to promoting biodiversity.

At the same time, research shows that the ecological effects depend heavily on the system design and management. For example, Agri-PV systems in enclosed production systems such as berry or fruit orchards with protective nets and high use of pesticides have little positive impact on biodiversity, whereas the additional structures can have a positive effect, particularly in arable farming or permanent grassland. Careful planning is therefore essential to actually achieve biodiversity gains.

3.5.3 Acceptance in the Local Community

Farms are generally deeply integrated into their local communities. Many farms have been in operation for generations and depend on being well-integrated into the village and neighborhood. In addition, farms are also integrated into the professional community, for example through the shared use of machinery. A portion of the agricultural land is often not owned by the farm itself but is leased from private owners or the municipality. At the same time, agricultural use shapes the landscape and thus the living environment in the local area. Changes in land management or in the appearance of the landscape can therefore provoke strong reactions in the vicinity of a farm. For agricultural businesses, local acceptance is therefore a key factor in the implementation of Agri-PV systems. However, it is often difficult for the farm to assess how such a project will be received in the local community. To avoid potential conflicts, a farm may therefore decide not to proceed with a project despite having suitable land or existing interest. In addition to the local community, acceptance within the farm itself can also play a role, for example among family members or others involved in the farm.

For example, at a farm examined as part of the ongoing feasibility study, a site was not pursued because residents of an adjacent hamlet could not envision an Agri-PV system in their immediate neighborhood (ZHAW, 2026). The farmer subsequently decided not to pursue interest in this site.

Acceptance in the local community also depends on the extent to which the local population can benefit from the project. For example, if joint financing or participation models are considered, this can increase identification with the project and have a positive effect on acceptance.

4 Recommendations for Action

To date, despite the significant theoretical potential, only a few Agri-PV systems have been implemented in Switzerland. The ZHAW's experience from the feasibility study and planning of Agri-PV systems highlights key drivers for leveraging the high Agri-PV potential in Switzerland. On the other hand, various barriers have been identified that stand in the way of their implementation. Key barriers lie less in technological feasibility and more in economic and project-related uncertainties, legal hurdles, complex procedures, the grid connection situation, and a lack of implementation structures. The following recommendations for action are provided, which would facilitate the expansion of Agri-PV in Switzerland. The recommendations are primarily aimed at removing existing barriers and strengthening drivers. They are formulated from the perspective of Agri-PV and address the question of which framework conditions would facilitate its deployment. They do not, however, contain any overarching energy or general policy assessment, for instance with regard to technology neutrality, the efficient allocation of funding across different renewable technologies, or system-wide effects on the grid infrastructure. Such a prioritisation within the overall system would be the subject of a separate investigation.

The international overview report of IEA PVPS Task 13 identifies the early involvement of local stakeholders, a supportive policy environment with incentive programmes, and transparent performance standards as key factors for the successful implementation of Agri-PV projects (Trommsdorff et al., 2025). The recommendations in the Chapters 4.1 to 4.3 correspond well to these factors, while the absence of integrated planning and simulation tools diagnosed in the IEA-report underpins the need for advisory services explained here in Chapter 4.4.

4.1 Creating Investment Security

The economic viability of Agri-PV in Switzerland is highly dependent on location and market conditions. Particularly problematic are uncertain feed-in tariffs, purchase and feed-in rates, and high initial investments. Currently, Switzerland lacks both investment security and reliable economic viability for Agri-PV projects. While these two aspects are closely linked, they can be distinguished: even if a project were profitable under current conditions, it remains unclear whether those conditions will persist throughout the plant's entire lifespan.

To create investment security, reliable remuneration conditions guaranteed over an extended period should be established for Agri-PV projects, for instance in the form of feed-in tariffs that are predictable over at least 15 years. The sliding market premium (GMP) already provides such an instrument. However, uncertainties persist due to the locally varying and, in many places, discontinued remuneration for guarantees of origin (see Chapter 3.3.2). For this reason, the average assumed remuneration for guarantees of origin in Switzerland should not be deducted from the auction value. Remuneration models involving the paid provision of installation capacity and operational dispatch by the distribution system operator, for example feed-in limitations that go beyond the curtailment permissible without compensation, or other bankable offtake conditions could create additional investment security.

To improve the economic viability of Agri-PV installations, the sliding market premium (GMP) could be supplemented with a bonus for Agri-PV installations, analogous to those for parking areas or installations with a steep tilt angle. An important aspect, not least from a psychological perspective, would be that direct payments and other agricultural subsidies continue to be granted on areas with Agri-PV in the future, and that this assurance is clearly communicated. Since current profitability can vary greatly depending on the specific plot of land, it would make sense for measures to support profitability to be designed in such a way that they specifically help projects achieve a minimum level of profitability. Agri-PV projects could also be integrated into existing agricultural support and financing instruments to promote investment capital, for example through government-subsidized interest-free investment loans for structural improvements.

4.2 Adaptation, Simplification, and Harmonization of the Legal Framework

We recommend that the legal framework for Agri-PV be adapted, simplified, and harmonized across Switzerland. The current legal wording, which requires that a system must bring “benefits” to agricultural production or that the yield potential on FFF must remain the same, is too vague in practice, is interpreted very differently from canton to canton, and leads to uncertainty in approval procedures. In practice, it has become apparent that certain cantons apply the laws in such a way that they consider Agri-PV on FFF to be ineligible for approval. A regulation with clear, verifiable criteria would therefore be more appropriate. One possible solution would be to define the proof of agricultural benefit via a quantitative threshold, whereby a limited reduction in agricultural yield could be accepted. An accepted yield reduction of 34 % relative to a reference yield, as specified in DIN SPEC 91434, would for example be conceivable in combination with evidence of high land use efficiency (DIN Deutsches Institut für Normung e.V., 2021). In addition, legislation on topics such as anchoring the primary agricultural use, reversibility, monitoring, and clearly defined yield limits would merit examination. The international overview report of IEA PVPS Task 13 classifies Agri-PV on the basis of four criteria: land use efficiency, the simultaneous involvement of photosynthesis and electricity production, the intensity of agricultural use, and synergies and interactions (Trommsdorff et al., 2025). The current Swiss regulation ties its central substantive requirement to the synergy criterion, the quantification of which the report describes as particularly demanding. This explains a considerable part of the differences in statutory interpretation observed. It would therefore be advisable to use more concrete and more readily verifiable criteria.Crop rotation areas (FFF) are now subject to particularly strict protection under spatial planning regulations, as they are considered soils with the highest agricultural yield potential and are intended to ensure food supply in times of severe shortages. The definition of FFF in the context of spatial planning often contradicts the actual land use ; for example, many FFF areas are home to permanent pastures or permanent crops, and agricultural practice shows that certain FFF areas are not suitable for arable farming. At the same time, security of supply is crucial not only for food but also for electricity, especially since agricultural production would be severely restricted without a reliable power supply. While instruments such as the FFF Sectoral Plan and mandatory stockpiles with minimum storage levels for staple foods have long been in place to ensure food security, comparable strategies for electricity exist only to a limited extent. Against this backdrop, the high requirements for Agri-PV on FFFs, as well as the widespread interpretation in practice that actual agricultural production must not decline, no longer appear appropriate. The wording of the explanatory notes for the revision of the RPG of October 2025 concerning Art. 24ter RPG merely requires the preservation of agricultural *yield potential* - not actual production. Since fully demountable Agri-PV systems leave the land unchanged at the end of their operational life, this potential is fundamentally preserved. The lack of clarification on this interpretive issue has so far contributed to the fact that hardly any permit applications for Agri-PV on FFF have been submitted. This stands in contrast to other forms of land use expressly permitted on FFF: fruit trees tie up land for decades and must first be cleared before arable use is possible again, without this being considered a loss of yield potential. Lower per-area yields are likewise accepted in organic farming and on biodiversity promotion areas, since the yield potential is preserved.

A more nuanced assessment of food and energy security, as well as the use of Agri-PV to preserve and enhance already burdened or degraded agricultural land, would enable a more efficient use of Switzerland’s scarce land. Furthermore, the ease with which the systems can be dismantled in the event of a crisis allows agricultural yield potential to be preserved and ensures the land remains suitable for mechanized cultivation.

The establishment of a uniform and clearly defined enforcement practice across Switzerland would be highly beneficial. The eligibility of Agri-PV systems for approval should not depend significantly on the canton in which a project is located. At the same time, the role of agriculture in the energy transition could be explicitly enshrined in law. Just as agriculture already fulfills a legally defined function for food security, cultural landscape conservation, and ecological services, its contribution to renewable electricity production could also be recognized. This would strengthen the legitimacy of Agri-PV in enforcement.

4.3 Enabling Local Participatory Structures

It would make sense to actively promote financial participation by neighbors and the public. The report shows that a lack of acceptance in the immediate vicinity represents a significant barrier to implementation, even though Agri-PV generally meets with more approval than traditional ground-mounted PV. Acceptance arises particularly where local communities derive a recognizable benefit from a project or are involved in the decision-making and value-creation process.

Municipalities and cantons should therefore actively support citizen participation models, local energy cooperatives, co-financing opportunities, or regional procurement and participation structures – for example, through expedited procedures, financial incentives such as reduced permit fees or bonuses on feed-in tariffs, and preferential consideration in the allocation of public leasehold land. Local participation models increase identification with the project, reduce potential for conflict, and strengthen regional value creation. Social integration is a particularly important aspect for Agri-PV, which is highly visible in the landscape.

4.4 Development of Advisory Services

A neutral, technically competent advisory and support structure for interested farms would substantially facilitate the expansion of Agri-PV. Experience to date shows that project development involves considerable complexity for farms: Successful implementation requires expertise in system types, farm management, land-use planning, grid connection, marketing, contract drafting, and direct payments. For many farms, this is hardly feasible alongside their core agricultural business. Independent advisory structures that support interested farmers from the initial assessment through to project implementation would be of help here. Such a body should provide standardized tools, such as model contracts, recommendations on compensation for agricultural operations, guidelines for land assessment, guidance on management concepts, and standardized procedures for preliminary assessments. The integration of Agri-PV with climate change adaptation measures – such as protection against drought, heat, heavy rain, and hail – could be proactively addressed in advisory services. It would also be sensible to implement pilot installations quickly so that they can serve as examples for advisory services. Pilot projects facilitate technical and agronomic learning processes and reduce barriers to perception and implementation because they create concrete, illustrative examples for authorities, farms, and the public, as there is currently a lack of examples and role models. The use of peer effects has also emerged as a promising factor for the success of advisory services.

Such an advisory structure would not need to be built from scratch but could build on existing offerings in Swiss agriculture. Agricultural education and advisory centers already cover a broad spectrum ranging from animal husbandry and crop production to farm management. Agricultural trust agencies assist farms with financial, accounting, and business management issues and sometimes handle the bookkeeping themselves. In addition, there are industry-related advisory services for agricultural inputs, such as feed, plant protection, and fertilizers. These established structures demonstrate that specialized advisory services are firmly anchored in agriculture. Expanding these services to include Agri-PV expertise or establishing a complementary, topic-specific unit based on the same model would therefore be a logical and realistic step.

4.5 Anchoring National Expansion Targets at the Local Level

It would be advisable to break down national expansion targets for renewable energy into more binding forms at lower administrative levels. As long as the expansion of renewable electricity production is anchored in national law with concrete targets, but no specific targets exist at the level of cantons, municipalities, or distribution network operators, an implementation gap arises: For instance, the cantons, which define a large share of the legislation relevant to Agri-PV, have not set capacity expansion targets that, taken together, match the national targets. It therefore makes sense to distribute the national expansion targets for new renewables among cantons, regions, or other suitable administrative units and to anchor them there as planning parameters. Starting with the cantons, smaller units such as municipalities or distribution network operators could be held more accountable. Furthermore, it would

be helpful if expansion targets were broken down by category, so that specific targets for Agri-PV could be established, which could serve as a catalyst for both the agricultural and solar sectors.

4.6 Reducing Risks in Early Project Phases

Reducing uncertainty in the early phases of Agri-PV projects would be beneficial. A key problem is that, even at a very early stage, time and costs are required for site investigations, grid assessments, preliminary studies, management concepts, or planning documentation, even though the likelihood of implementation is still highly uncertain. This acts as a deterrent for agricultural businesses, as they must bear significant upfront costs before the decision-making criteria necessary for them to implement the project are even known. It would therefore make sense to have risk-sharing instruments in the early project phases, such as public contributions toward initial decision-making criteria or insurance and guarantee solutions for sunk costs of upfront investments, analogous to models from other high-risk project sectors. Another useful instrument could be modelled after the formal preliminary building assessment (preliminary decision): Based on simplified documentation, the competent authority would provide a reliable assessment of the project's fundamental eligibility for approval before the farm invests in costly detailed assessments. The goal must be to enable an initial, reliable assessment of a project's feasibility with reasonable time and financial investment.

What the points listed have in common is that Switzerland should learn from neighboring countries when implementing these recommendations. Germany, France, Italy, and Austria are ahead of Switzerland in the development of Agri-PV, both in the regulatory sphere and in terms of projects that have been concretely implemented. Therefore, there is an opportunity to avoid repeating past mistakes and to focus directly on measures that work. To this end, Switzerland should evaluate the framework conditions in neighboring countries and adapt them to its own context. This applies to regulatory issues as well as to support, implementation, and financing models. Doing so could save a considerable amount of time and resources.

5 Bibliography

Actualités News Environnement. (2026, April). *Agrivoltaisme: Promesse agricole ou accaparement foncier? Bilan 2026*. https://www.actualites-news-environnement.com/agrivoltaisme-parcs-solaires-agricoles-bilan-2026/

ADEME – Agence de la transition écologique. (2025). *Observatoire de l'agrivoltaïsme: Carte et données des installations* (Versions 2026-08-04) [Dataset]. https://observatoire-agrivoltaisme.ademe.fr/donnees/carte-des-installations

AGEA. (2025). *Circolare n. 101005 dell'11 dicembre 2025: Superfici ammissibili ai fini dei pagamenti diretti previsti dalla PAC in caso di installazione di impianti agrivoltaici.* Agenzia per le Erogazioni in Agricoltura. https://www.arpea.piemonte.it/documentazione/circolare-agea-n-101005-dell11-dicembre-2025-superfici-ammissibili-impianti

Agridea (Ed.). (2020). *Deckungsbeiträge Ausgabe 2020*. https://shop.agridea.ch/de/produkt/deckungsbeitraege-abo-print

Agrofutura. (2025). *Beiträge 2026 für alle Kulturen*. https://themes.agripedia.ch/wp-content/uploads/2025/12/Beitragstabelle_2026_def.pdf

Anderegg, D., Jäger, M., Strebel, S., & Rohrer, J. (2024). *Potenzialabschätzungen für Agri-PV in der Schweizer Landwirtschaft*. https://doi.org/10.21256/ZHAW-2649

Anderegg, D., & Rohrer, J. (2025). *Ausschöpfung der Photovoltaik-Potenziale auf Schweizer Dachflächen bei Anlagen mit Inbetriebnahme ab Januar 2023*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. https://doi.org/10.21256/zhaw-2647

Anderegg, D., & Rohrer, J. (2026). *Agri-Photovoltaik im Kanton Thurgau: Dokumentation, Methoden und Resultate*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. https://doi.org/10.21256/zhaw-35718

Anderegg, D., Strebel, S., & Rohrer, J. (2022). *Photovoltaik Potenzial auf Dachflächen in der Schweiz*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. https://doi.org/10.21256/zhaw-2425

ARE. (n.d.). *Sachplan Fruchtfolgeflächen (FFF)*. Retrieved March 24, 2026, from https://www.are.admin.ch/de/fff

ARE. (2018, July 1). *Fruchtfolgeflächen*. https://web.archive.org/web/20180701140240/https://www.are.admin.ch/are/de/home/raumentwicklung-und-raumplanung/grundlagen-und-daten/fakten-und-zahlen/fruchtfolgeflaechen.html

ARE. (2023, January 1). *Statistik Fruchtfolgeflächen*. https://www.are.admin.ch/de/fff-statistik

ARE. (2025, October 15). *Änderung der Raumplanungsverordnung (Umsetzung der zweiten Etappe der Teilrevision des Raumplanungsgesetzes [RPG 2] und des Bundesgesetzes über eine sichere Stromversorgung mit erneuerbaren Energien) Erläuterungen*. Bundesamt für Raumentwicklung. https://www.are.admin.ch/dam/de/sd-web/dsPjtCzi54Ou/Erl%C3%A4uterungen%20DE.pdf

BFE. (2021). *Energieperspektiven 2050+ Technischer Bericht*. Bundesamt für Energie (BFE). https://www.bfe.admin.ch/bfe/de/home/politik/energieperspektiven-2050-plus.html

BFE. (2023, September 14). *Referenz-Marktpreise gemäss Art. 15 EnFV*. Bundesamt für Energie, Bern. https://pubdb.bfe.admin.ch/de/publication/download/9319

BFE. (2025, July 1). *Schweizerische Elektrizitätsstatistik 2024*. https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/elektrizitaetsstatistik.exturl.html/aHR0cHM6Ly9wdWJkYi5iZmUuYWRtaW4uY2gvZGUvcHVibGljYX/Rpb24vZG93bmxvYWQvMTIyMjg=.html

BFE. (2026, January 21). *Referenz-Marktpreise gemäss Art. 15 EnFV*. Bundesamt für Energie, Bern. https://pubdb.bfe.admin.ch/de/publication/download/11515

BloombergNEF. (2025). *2025 lithium-ion battery price survey.* BloombergNEF.

BLW. (n.d.). *Direktzahlungen*. Retrieved March 5, 2026, from https://www.blw.admin.ch/de/direktzahlungen

BLW. (2025). *Agrarbericht 2025 – Biodiversitätsbeiträge*. https://www.agrarbericht.ch/de/politik/direktzahlungen/biodiversitaetsbeitraege

BLW. (2026). *Agrarbericht 2025 – Gesamtrechnung*. https://www.agrarbericht.ch/de/betrieb/wirtschaftliche-situation/gesamtrechnung

Bucher, C., & Schwarz, R. (2021, January 25). *Studie Winterstrom Schweiz—Schlussbericht V3*. https://pubdb.bfe.admin.ch/de/publication/download/9825

Bundesamt für Statistik (Ed.). (2025). *Landwirtschaft Taschenstatistik 2025*.

Bundesamt für Umwelt BAFU. (2009). *UVP-Handbuch*. https://www.vs.ch/documents/d/sen/uvp-handbuch-pdf

Bundesamt für Umwelt BAFU. (2023). *Biodiversität in der Schweiz*. https://www.bafu.admin.ch/de/publication?id=bJ81Rxe23pQ5

Bundesministerium für Land- und Forstwirtschaft, Klima- und Umweltschutz, Regionen und Wasserwirtschaft (BMLUK). (2026). *Marktprämie nach dem EAG: Förderfähige Flächenkategorien inkl. Agri-PV-Flächen*. https://www.bmluk.gv.at/themen/klima-und-umwelt/klima/energiewende/erneuerbare-energie/foerderungen-pv/marktpraemie2.html

Bundesnetzagentur. (2026). *Verdopplung der eingereichten Gebote für PV-Freiflächenanlagen zum Gebotstermin 1. Dezember 2025: Ergebnisse der Ausschreibung für Solaranlagen des ersten Segments und des Untersegments für besondere Solaranlagen*. Bundesnetzagentur. https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Ausschreibungen/Solaranlagen1/BeendeteAusschreibungen/2025/01122025/artikel.html

C.A.R.M.E.N. e.V. (2025). *Positionspapier zu Freiflächen- und Agri-PV*. C.A.R.M.E.N. e.V. – Centrales Agrar-Rohstoff Marketing- und Energie-Netzwerk. https://www.carmen-ev.de/wp-content/uploads/2025/09/2025_CARMEN_PV_Freiflaechen_Positionspapier.pdf

DIN Deutsches Institut für Normung e.V. (2021, May). *DIN SPEC 91434 Agri-Photovoltaik-Anlagen—Anforderungen an die landwirtschaftliche Hauptnutzung*.

Fechner, H. (2024). *Photovoltaik-Potentiale im Gebäudesektor in Österreich bis 2040 und Abschätzung der Photovoltaik-Potentiale auf weiteren Infrastrukturen*. Oesterreichs Energie. https://oesterreichsenergie.at/fileadmin/user_upload/Oesterreichs_Energie/Publikationsdatenbank/Studien/2024/2024_09_05_PV_Potential_2024_Finalversion.pdf

Fechner, H. (2025). *National Survey Report of PV Power Applications in Austria 2024*. International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS). https://iea-pvps.org/national_survey/nsr-austria-2024/

Fesenfeld, L. P., Sistek, L., Montfort, S., Anderegg, D., Rohrer, J., & Schmidt, T. (2026). *Agrivoltaics can reduce political polarization and local opposition to solar energy on land*. Zenodo. https://doi.org/10.5281/zenodo.18166238

Fraunhofer-Institut für Solare Energiesysteme ISE. (2025, July). *Flächenpotenzial für Agri-Photovoltaik in Deutschland übertrifft Ausbauziele für Klimaschutz [Presseinformation]*. https://www.ise.fraunhofer.de/de/presse-und-medien/presseinformationen/2025/fraunhofer-ise-ausgruendung-flaechenpotenzial-fuer-agri-photovoltaik-in-deutschland-uebertrifft-ausbauziele-fuer-klimaschutz.html

Gestore Servizi Energetici GSE. (2024, March 31). *M Agrivoltaico – Regole operative*. https://www.gse.it/documenti_site/Documenti%20GSE/Servizi%20per%20te/Attuazione%20misure%20PNRR/Sviluppo%20agrivoltaico/Regole%20e%20procedure/Regole%20Operative%20DM%20Agrivoltaico.pdf

GLS Crowd. (2026, February). *Agri-PV: Erneuerbare Energie und Landwirtschaft im Einklang*. https://www.gls-crowd.de/wissen/agri-pv-erneuerbare-energie-und-landwirtschaft/

Hostettler, T. (2025). *Statistik Sonnenenergie Referenzjahr 2024*. Bundesamt für Energie BFE. https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/teilstatistiken.exturl.html/aHR0cHM6Ly9wdWJkYi5iZmUuYWRtaW4uY2gvZGUvcHVibGljYX/Rpb24vZG93bmxvYWQvMTIyMjI=.html

Hostettler, T., & Hekler, A. (2021, July 13). *Statistik Sonnenenergie Referenzjahr 2020*. Bundesamt für Energie, Bern. https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/teilstatistiken.exturl.html/aHR0cHM6Ly9wdWJkYi5iZmUuYWRtaW4uY2gvZGUvcHVibGljYX/Rpb24vZG93bmxvYWQvMTA1Mzk=.html

Hostettler, T., & Hekler, A. (2022, July 14). *Statistik Sonnenenergie Referenzjahr 2021*. Bundesamt für Energie, Bern. https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/teilstatistiken.exturl.html/aHR0cHM6Ly9wdWJkYi5iZmUuYWRtaW4uY2gvZGUvcHVibGljYX/Rpb24vZG93bmxvYWQvMTA5ODY=.html

Hostettler, T., & Hekler, A. (2023, July 13). *Statistik Sonnenenergie Referenzjahr 2022*. Swiss Federal Office of Energy SFOE. https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/teilstatistiken.exturl.html/aHR0cHM6Ly9wdWJkYi5iZmUuYWRtaW4uY2gvZGUvcHVibGljYX/Rpb24vZG93bmxvYWQvMTE0NjE=.html

Hostettler, T., & Hekler, A. (2024, June 11). *Statistik Sonnenenergie Referenzjahr 2023*. Bundesamt für Energie BFE. https://www.bfe.admin.ch/bfe/de/home/versorgung/statistik-und-geodaten/energiestatistiken/teilstatistiken.exturl.html/aHR0cHM6Ly9wdWJkYi5iZmUuYWRtaW4uY2gvZGUvcHVibGljYX/Rpb24vZG93bmxvYWQvMTE4MDI=.html

Jäger, M., Vaccaro, C., Boos, J., Junghardt, J., Strebel, S., Anderegg, D., Rohrer, J., & Schibli, B. (2022). *Machbarkeitsstudie Agri-Photovoltaik in der Schweizer Landwirtschaft*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. https://doi.org/10.21256/zhaw-25624

Jan, P., Schmid, D., Renner, S., Schildknecht, P., Hoop, D., & Dieterle, M. (2024). *Die wirtschaftliche Entwicklung der schweizerischen Landwirtschaft 2023*. https://www.agroscope.admin.ch/agroscope/de/home/themen/wirtschaft-technik/smart-farming/publikationen/_jcr_content/par/externalcontent.bitexternalcontent.exturl.pdf/aHR0cHM6Ly9pcmEuYWdyb3Njb3BlLmNoL2RlL-UNIL0FqYXgvRW/luemVscHVibGlrYXRpb24vRG93bmxvYWQ_ZWluemVscHVib-Glr/YXRpb25JZD02MjU5Ng==.pdf

Kanton Luzern. (2026, January 1). *Merkblatt Solaranlagen*. https://rawi.lu.ch/-/media/RAWI/Dokumente/Downloads/baubewilligungen/Merkblatt_Solaranlagen.pdf

Kanton Zürich Kantonsrat. (2024, June 12). *Kantonaler Richtplan Erläuterungsbericht Teilrevision Energie Kapitel 5: Versorgung, Entsorgung*. https://www.zh.ch/content/dam/zhweb/bilder-dokumente/themen/planen-bauen/raumplanung/richtplaene/kantonaler-richtplan/laufende-verfahren/teilrevision-energie/oea/tr_energie_richtplantexte.pdf

klimaaktiv. (2023). *Leitfaden Agri-PV*. Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK). https://www.klimaaktiv.at/fileadmin/Bibliothek/Publikationen/2023_Agri_PV.pdf

klimaaktiv. (2025). *Agri-PV: Doppelnutzung für Landwirtschaft & Solarstrom*. https://www.klimaaktiv.at/fachpersonen/energie-bau/photovoltaik/agri-pv-landwirtschaft-trifft-energiewende

Légifrance. (2024, April). *Décret n° 2024-318 du 8 avril 2024 relatif au développement de l'agrivoltaïsme et aux conditions d'implantation des installations photovoltaïques sur des terrains agricoles, naturels ou forestiers*. https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000049386027

Legifrance. (2024, April 10). *Sous-section 2: Conditions relatives à la production agricole et au revenu issu de cette production (Articles R314-114 à R314-117)—Légifrance*. https://www.legifrance.gouv.fr/codes/id/LEGISCTA000049387793/2024-04-10

Logic Energy. (2026, July). *Photovoltaik Zubau 2026: Zahlen, Segmente & Marktlage*. https://www.logicenergy.de/neuigkeiten/photovoltaik-zubau-deutschland

Mack, G., Ritzel, C., Ammann, J., Heitkämper, K., & Benni, N. E. (2025). Data on the administrative workload and perceived administrative burden of farmers in Switzerland. *Data in Brief*, *58*, 111186. https://doi.org/10.1016/j.dib.2024.111186

Migros. (2025, January 14). *Grüne Gewächshäuser*. Migros - Corporate. https://corporate.migros.ch/de/story/nachhaltige-gewaechshaeuser

Ministère de l'Économie, des Finances et de la Souveraineté industrielle et numérique. (2025, November). *Agrivoltaïsme: Le Gouvernement renforce sa stratégie d'accompagnement du déploiement du secteur [Communiqué de presse]*. https://presse.economie.gouv.fr/?p=165425

Ministerio de Agricultura, Pesca y Alimentación,. (2023). *INFORME 2023 PROSPECTIVO SOBRE LA SITUACIÓN DE LA ENERGÍA AGRIVOLTAICA*. https://www.mapa.gob.es/dam/mapa/contenido/agricultura/publicaciones/informeprospectivoagrivoltaica2023.pdf

Ministero dell'Ambiente e della Sicurezza Energetica (MASE). (2024, February). *Decreto Ministeriale n. 436 del 22 dicembre 2023: Promozione della realizzazione di sistemi agrivoltaici innovativi di natura sperimentale (in vigore dal 14 febbraio 2024)*. https://www.mase.gov.it/portale/documents/d/guest/dec-436-2023-pdf

Ministero dell'Ambiente e della Sicurezza Energetica (MASE). (2025, July). *Decreti Direttoriali n. 146/2025 e n. 147/2025: Aggiornamento delle graduatorie del bando Sviluppo Agrivoltaico (PNRR, Missione 2, Componente 2)*. https://www.mase.gov.it/portale/-/investimento-1.1-sviluppo-agro-voltaico

MiTE. (2022, June). *Linee guida in materia di impianti agrivoltaici*. Ministero della Transizione Ecologica. https://www.mase.gov.it/portale/documents/d/guest/linee_guida_impianti_agrivoltaici-pdf

Pachtrecht für die Praxis. (n.d.). UFA-Revue. Retrieved April 10, 2026, from https://www.ufarevue.ch/betriebsfuehrung/pachtrecht-fuer-die-praxis

Perch-Nielsen, S., Lanz, L., Stoll, R., Kochuparampli, J., Andersen, D., & Müller, M. (2024, December). *Konzept Photovoltaik-Förderung und Nutzungsstrategie Photovoltaik Potenziale*. https://energeiaplus.com/2025/05/20/analyse-der-photovoltaik-foerderung-in-der-schweiz/

Photovoltaic Austria. (2026). *EAG Marktprämie*. https://pvaustria.at/eag-marktpraemie/

photovoltaik.eu. (2025, February). *Österreich: Agri-PV-Anlage mit 164 Megawatt in Betrieb*. https://www.photovoltaik.eu/solarparks/oesterreich-agri-pv-anlage-mit-164-megawatt-betrieb

Pronovo AG. (2026a, January 21). *Auktions-Cockpit Photovoltaik 2025 Runde 3*. https://pronovo.ch/de/services/berichte/

Pronovo AG. (2026b, February 18). *Cockpit 2026 Auktionen Photovoltaik Runde 1*. https://pronovo.ch/de/services/berichte/

pv magazine Italia. (2025, July). *Agrivoltaico Pnrr, 536 progetti per 1,59 GW nelle graduatorie aggiornate*. https://www.pv-magazine.it/2025/07/07/agrivoltaico-pnrr-536-progetti-per-159-gw-nelle-graduatorie-aggiornate/

Ramseyer, N., Steiner, B., Vonlanthen, I., & Brugger, D. (2021). *Potenzial ausgewählter Ackerkulturen in der Schweiz*. Schweizer Bauernverband. https://www.sbv-usp.ch/fileadmin/sbvuspch/04_Medien/Medienmitteilungen/PM_2021/Bericht_Potential_Schweizer_Ackerkulturen_DE_def.pdf

Regierungsrat Basel-Landschaft. (2024, June 25). *Bericht zum Postulat 2022/268 "Grundlagen für Agri-Photovoltaik schaffen."* https://baselland.talus.ch/de/dokumente/geschaeft/679aba99daf4474fb07b497ddbbfb3ff-332

Righini, B. (2026, July 20). *Agrivoltaico e Pnrr: Il mio progetto è in graduatoria, e ora?* AgroNotizie. https://agronotizie.imagelinenetwork.com/agricoltura-economia-politica/2026/07/20/agrivoltaico-e-pnrr-il-mio-progetto-e-in-graduatoria-e-ora/89549

Rösch, C., & Fakharizadehshirazi, E. (2024). The spatial socio-technical potential of agrivoltaics in Germany. *Renewable and Sustainable Energy Reviews*, *202*, 114706. https://doi.org/10.1016/j.rser.2024.114706

Sánchez-Pantoja, N., Vidal, R., & Pastor, M. C. (2018). Aesthetic impact of solar energy systems. *Renewable and Sustainable Energy Reviews*, *98*, 227–238. https://doi.org/10.1016/j.rser.2018.09.021

Schlegel, J. (2021). *Auswirkungen von Freiflächen-Photovoltaikanlagen auf Biodiversität und Umwelt: Literaturstudie*. https://doi.org/10.21256/zhaw-23607

Sieber, P., Böhme, S., Ericsson, N., & Hansson, P.-A. (2022). Albedo on cropland: Field-scale effects of current agricultural practices in Northern Europe. *Agricultural and Forest Meteorology*, *321*, 108978. https://doi.org/10.1016/j.agrformet.2022.108978

SolarPower Europe. (2025). *European Market Outlook for Battery Storage 2025–2029*. SolarPower Europe. https://www.solarpowereurope.org/insights/outlooks/european-market-outlook-for-battery-storage-2025-2029#download

Strebel, S., Anderegg, D., Rohrer, J., Jäger, M., den Hond-Vaccaro, C., & Baumann, M. (2025). *Abschlussbericht: Pilotprojekte Agri-Photovoltaik im Kanton Zürich*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. https://doi.org/10.21256/zhaw-2645

Studio Legale Tedioli. (2026, April 18). *Agrivoltaico PNRR 2026: Cosa cambia con le nuove Regole GSE? Una lettura tecnica delle criticità operative e dei rischi per l'impresa agricola*. https://www.tedioli.com/agrivoltaico-pnrr-regole-gse/

Swissolar. (2026). *Solarmonitor Schweiz 2025*. https://www.swissolar.ch/02_markt-politik/solarmonitor-schweiz/2025/ssr-solarmonitor-2025-final.pdf

Trommsdorff, M., Campana, P. E., Macknick, J., Fernández Solas, Á., Gorjian, S., & Tsanakas, I. (2025). *Dual Land Use for Agriculture and Solar Power Production: Overview and Performance of Agrivoltaic Systems* (M. Trommsdorff, P. E. Campana, J. Macknick, Á. Fernández Solas, S. Gorjian, & I. Tsanakas, Eds.; Report IEA-PVPS T13-29:2025; p. 100). International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS). https://iea-pvps.org/wp-content/uploads/2025/03/IEA-PVPS-T13-29-2025-REPORT-Dual-Land-Use.pdf

Trommsdorff, M., Gruber, S., Keinath, T., Hopf, M., Hermann, C., Schönberger, F., Högy, P., Zikeli, S., Ehmann, A., Weselek, A., Bodmer, U., Rösch, C., Ketzer, D., Weinberger, N., Schindle, S., & Vollprecht, J. (2020). *Agri-Photovoltaik: Chance für Landwirtschaft und Energiewende* (p. 56) [Leitfaden]. Fraunhofer-Institut für Solare Energiesysteme ISE. https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/APV-Leitfaden.pdf

Vaverková, M. D., Kousal, M., Kosakiewicz, M., Krysińska, K., & Winkler, J. (2026). Agrivoltaics for sustainable land use: A critical review of synergistic and antagonistic effects. *Renewable and Sustainable Energy Reviews*, *226*, 116482. https://doi.org/10.1016/j.rser.2025.116482

VSE, & Empa. (2022, December 13). *Energiezukunft 2050—Energieversorgung der Schweiz bis 2050*.

ZHAW. (2026, January 14). *Anschub für Agri-PV im Kanton Zürich*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. https://www.zhaw.ch/de/medien/medienmitteilungen/detailansicht-medienmitteilung/event-news/anschub-fuer-agri-pv-im-kanton-zuerich

Zufferey, M. (2025, May 8). *PV-Anlagen auf Landwirtschaftsflächen*. https://www.sbv-usp.ch/fileadmin/sbvuspch/05_Themen/Solaranlagen/Factsheet_Photovoltaik-Anlagen_auf_Landwirtschaftsland.pdf