Intersolar Europe
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TREND PAPER FOR INTERSOLAR EUROPE: PV IN AGRICULTURE

Munich/Pforzheim, April 2023 – German farmers have been banking on photovoltaics (PV) for years. In some regions, such as Southern Germany, Rooftop PV on agricultural buildings has almost become the norm. With the prices for electricity and fossil energy carriers soaring and discussions on climate protection intensifying, demand for photovoltaics (PV) in the agricultural sector is booming. In addition, regulatory improvements, such as the scrapping of the EEG levy in Germany, are spurring farmers' interest in decentralized photovoltaic installations, because the combination of PV and energy storage systems has become more lucrative and worth-while. Increased self-consumption of solar power also offers interesting options for the continued use of old systems that are no longer eligible for feed-in tariffs. Free-standing PV installations that allow farmers to harvest from both the land and the sun are another trend. The collective, decentralized self-consumption of solar power using free-standing installations in combination with agricultural production and PV off-grid solutions for remote locations are helping the agricultural sector get ready for the future.

The new EEG 2023 (Renewable Energy Sources Act) scrapped the EEG levy for self-generated electricity, making self-consumption more attractive for agricultural businesses, as they often have large PV systems and high electricity consumption. Until July 2022, only photovoltaic installations whose output was below 30 kilowatt (kW) were exempt from the levy on self-consumption, while installations above this threshold were subject to a 40% levy. In 2022, the levy amounted to 3.72 Euro cents per kilowatt hour (€ct/kWh). Farmers often limited the capacity of their installations and storage systems to 30 kW in order to stay below the threshold, even though the electricity demand of their technical equipment (barn ventilation, milk coolers, milking robots, water treatment plants and e-vehicles) was much higher. Thanks to the scrapping of the EEG levy, many farms are now expanding their PV systems or investing into new installations and storage systems.

Converting large-scale PV installations – which had been subsidized by the EEG for 20 years and had fed all the electricity into the power grid – to self-consumption is becoming more lucrative, too. Using excess solar power for hot water production, i.e., electrical heat supply (power-to-heat) is becoming more attractive for farmers. The increased heating costs have made powering electrical heating rods with PV energy profitable even without the support of a heat pump, so that pellets heating system, woodchip stove or cogeneration plants can be shut down over the summer.

Trending: dual land use in agriculture
While most farmers still stick to PV on roof surfaces, there is a growing trend towards using agricultural surfaces for the production of food and solar power simultaneously. The general term is agrivoltaics (Agri PV), but there are various different types. For once, more and more farmers are turning to free-standing solar installations on fields and meadows, which can track the sun's position to achieve about 20% more yield (in Germany) than standard fixed elevated modules. If required, the solar panels can be brought into a vertical or horizontal position, allowing farm machinery to pass and do their work – whether plowing, harrowing, sowing, cutting or harvesting. Bifacial solar modules increase the electricity yield even further: They generate electricity not only on the side that faces the sun, but also on the back of the module from light reflected off the ground. North-south axis trackers can also be beneficial because the shadow produced by the modules can help

plant species that prefer less direct sunlight to thrive. The modules also reduce water evaporation, which is particularly important during droughts.

Rooftop PV: Enormous potential for orchards, berry farms and vineyards
Another type of Agri PV is the partial covering of crops with PV modules higher above the ground than conventional solar panels. This is particularly favorable for the cultivation of fruit, berries, wine or herbs, and any plants that grow better in partial shade. Herb producer Steinecke in Lüchow, Lower Saxony, is planning to harvest herbs such as chives from underneath solar panels this spring. Their semi-transparent PV modules are installed 6 meters above the ground across one hectare of arable land. The working width for the farm machinery is 18 meters. In addition to 30 metric tons of chives, the pilot plant is set to produce 700,000 kWh per year. There are several pilot plants as well as some commercial AgriPV systems for apples, raspberries and grapes in countries such as the Netherlands. These "solar roofs" have the added benefit of replacing conventional protection equipment such as hail netting and polytunnels, and of protecting the crops from drying out. However, the capital cost of Agri PV is high – especially when installed horizontally on supports. The complex substructures and customized modules are still more expensive than conventional ground-mounted installations. But large installations are gaining traction: For instance, Commerzbank recently announced their investment into a 50 megawatt (MW) Agri PV installation in the Berlin area.

Collective self-consumption offers massive opportunities for the agricultural sector
The decentralized, collective use of solar power harbors great opportunities in connection with the revitalization of agricultural use. A regional cooperative in Catral in the southeast of Spain illustrates how this could work. The cooperative constructed a free-standing PV installation with a capacity of 1.84 MW spanning four hectares of hitherto unused, fallow land. About a third of the land is now used for agriculture – featuring native crops such as lemon, orange and date trees. The Spanish government permitted collective self-consumption in 2019, which contributed to making the project possible.

Off-grid PV solutions for remote locations, including in Europe, also give rise to diverse agricultural applications, such as the water supply for cow barns in the southeast of France, for example. Savings on grid connection costs and the elimination of diesel generators quickly pay for the investment.

Agricultural PV at Intersolar Europe 2023 and its accompanying conference
The latest trends in Agri PV will be presented at Intersolar Europe 2023. Service providers will be giving visitors an overview of the solutions for "solar farmers". These include companies that offer services such as cleaning PV installations on animal barns using autonomous cleaning robots. This year's Intersolar Europe will be held from June 14–16, 2023, as part of The smarter E Europe at Messe München. Intersolar Europe 2023 and the accompanying Intersolar Europe Conference, both of which are major drivers for the solar industry, will shine a spotlight on the exciting area of agricultural PV. The Intersolar Europe Conference will take place at International Congress Center München ICM from June 13–14, 2023. More information on the conference topics will be announced in due course.

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