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AGRIVOLTAICS Solar System Means "COMBINES AGRICULTURE AND PV"

Combined land use, the land use efficiency of the agrivoltaic research plant for wheat cultivation in Heggelbach was 160 percent.

The problem for Ground-Mounted Systems

Arable land is a very limited and valuable resource

Agrivoltaics solves this conflict by enabling food production and electricity generation in the same area

The Energy Transformation Requires a massive expansion Of Solar Electricity Production, Combined with a high demand for Space

Climate change is shedding light on the vulnerabilities of our food, energy and water systems and the importance of building resilience in renewable energy and food production

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Increase PV performance

Vegetation under modules can contribute to lower soil temperatures and increase solar performance

- Ability to Maintain Crop Production during Solar Generation
- Potential for water use reduction
- Save environment and reduce Co2 emissions
- Allow for nutrient and land recharge of degraded lands
- Bring innovation in your architectural
- Potential to extend growing seasons
- Earn a great return (ROI /IRR) on your investment
- Achieve sustainability and Green goals

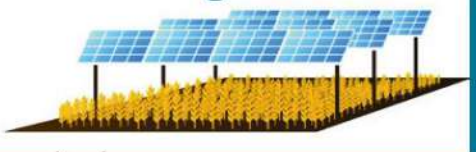
Accelerate the energy transition

by joining forces with the land managers and rural areas, more owners would probably be interested in using their lands for energy purposes too

Conventional

100% wheat + 100% solar power
on 2 hectares
100 % land use efficienc

Agrivoltaics



80% wheat + 80% solar power
on 1 hectare
160 % land use efficiency

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AGRIVOLTAICS COMBINES AGRICULTURE AND PV

The energy transformation requires a massive expansion of solar electricity pro- duction, combined with a high demand for space. The problem for ground-mounted systems: Arable land is a very limited and valuable resource. Agrivoltaics solves this conflict by enabling food production and electricity generation on the same area.

Through dual land use, agrivoltaics not only increases land efficiency but also increases the resilience of agricultural production against global warming. Agrivoltaics pro- vides farmers with additional income and promotes the economic development of rural areas.

Intelligent Lighting ManagementTo harvest solar energy and crops on the same area, a balanced ratio of light and shade is required. Fraunhofer ISE has level- oped models and concepts to optimize the yields from PV and photosynthesis through targeted light management. By selecting and adapting module types, mounting frames and installation parameters, it is ensured that the respective plants receive sufficient light throughout the day and year.

Based on our experience with several ref- erence plants in Germany, India and South America we offer the following services:

GIS-based potential analyses
Analysis and optimization of PV yield (also bifacial, tracking systems)
Light management, profitability
Design of the agrivoltaics power plant & prototype development and implementation
Quality assurance and monitoring
Optimization of self-consumption of PV electricity
Social and environmental impact studies, feasibility studies
Technology transfer to other countries and climate regions

In recent years, agrivoltaic technology has developed very dynamically in almost all regions of the world. Government subsidy programs in Japan, China, France and the USA, among others, led to an increase in globally installed agrivoltaic capacity from approx. 3 MWp to almost 3 GWp between 2012 and 2019. The technical potential in Germany is around 1700 Gwp.

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Sun Protection in Times of Climate Change

Central elements of agrivoltaic research are interactions and synergies between the fields of agriculture and photovoltaics. An adapted PV system design with targeted light management and the selection of suitable plant species can stabilize or even increase agricultural yields. Particularly in increasingly dry periods, crop failures can be reduced or avoided altogether. The need for irrigation is reduced due to par- tial shading, and wind erosion decreases. The PV substructure can also be used for protective nets or foils. The resilience of fruit and vegetable cultivation to hail, frost and drought increases.

High Efficiency Proven in Pilot Project

With the project group "APV-RESOLA" Fraunhofer ISE was able to demonstrate the efficiency of agrivoltaics with a 194 kWp pilot plant in Heggelbach, Germany. The 2017 results showed a land use efficiency of 160 percent. The performance of the agrivoltaic system in the very hot summer of 2018 exceeded this value again by far. The partial shading under the photovoltaic modules improved the agricultural yield – the sunny summer increased solar power production. Taking the example of potato yields, the land use efficiency of the agri- voltaic system in Heggelbach rose to 186 percent in 2018. Fraunhofer ISE is working in several pro- jects to transfer the technology to emerg- ing and developing countries as well as for new applications.

Pilot Study for 50 MWp Plant in India

A pilot study by Fraunhofer ISE on agrivol-taic systems for the Indian state of Maharashtra confirmed the results from Chile. Due to partial shading and reduced evap- oration, up to 40 percent higher yields of tomatoes and cotton are expected in this region.

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Agri- Voltics