# GENERAL STATE OF AFFAIRS REGARDING AGRIVOLTAICS IN GERMANY

Technical potential & Political support and Subsidies in GER and EU



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Agrivoltaics Webinar Prague, 03/01/2022

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## AGENDA

- Introduction to ISE
- Agrivoltaics -From the Idea to the Implementation
- Challenges of the Energy Transition
- Political support and subsidies in GER
- European support and International prospects





## FRAUNHOFER ISE IN FREIBURG

- Founded in 1981 by Prof. Adolf Goetzberg in Freiburg, Germany
- Over 1200 employee
- Largest solar research institute in Europe
- Research focus on energy conversion, energy efficiency, energy distribution and energy storage, it contributes to broad application of new technologies.





# AGRIVOLTAICS -FROM THE IDEA TO THE IMPLEMENTATION

#### The Concept of APV





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#### Agrivoltaics – From the Idea to the Implementation Brief History

#### **Timeline of APV**





## **CHALLENGES OF THE ENERGY TRANSITION**

## The Potentials of PV:

- **Integrated Photovoltaic** concepts
- **Technical Potentials of IPV**
- Land Potential of APV





## **Challenges of the Energy Transition Technical Potential of IPV**

**Technical Potential:** 

Consideration of technical, infrastructural and ecological constraints







© Fraunhofer ISE FHG-SK: ISE-INTERNAL Challenges of the Energy Transition Technical Land Potential of APV

#### Land Potential in GER:

- **51%** of agricultural sector
  - 17% of agricultural land considered for APV installations (without grassland, reserves, protected agri land & wetlands)
  - 1.700 GW total APV capacity
- Carbon Neutrality Aim by 2030/ 2050:
  200 GW / 400 500 GW for PV
  - 0,5% of agricultural land needed by 2030
  - **3,5 4,5%** of agricultural land needed by 2050





## **POLITICAL SUPPORT AND SUBSIDIES**

- German Guideline 2020
- German Renewable Energies Law (EEG 2021)
- DIN SPEC 2021 & "Easter Amendment"
- European Agriculture Subsidy
- European Horizon Call



#### Political support and subsidies in GER German Guideline 2020

Guideline for the funding of energy efficiency and CO<sup>2</sup> savings in **agriculture** and **horticulture**:

- Published 09/18/2020 from the Federal Ministry of Food and Agriculture.
- Goal: Reduction of CO<sup>2</sup> emissions from agricultural operations.
- Agri-PV is mentioned by name:

"New photovoltaic (PV) installations on or at buildings or on farm site areas are subsidized, as well as agrophotovoltaics that do not lead to a loss or significant restriction of agricultural management, if the requirements under building law are met."



#### Political support and subsidies in GER Renewable Energies Law (EEG 2021)

Purpose:

- Promote the generation of electricity from renewable energy sources (hydro, wind, solar, geothermal and biomass).
- Support is provided by entitling plant operators to:
  - Connect the plant to the grid for general supply (grid).
  - Purchase the electricity generated by the plant.
  - Finance the electricity input into the grid.



### Political support and subsidies in GER Renewable Energies Law (EEG 2021)

- Relation to Agrivoltaic:
  - Agri-PV system is a system for the generation of electricity from renewable energy sources (§ 3 No. 1 EEG 2021).
  - Entitlement to prioritize connection to the existing grid (Legal grid connection point & option for the plant operator).
  - Entitlement to prioritize purchase of generated electricity exists
- But: Is there an entitlement to financial support?
- Grid connection and grid expansion conflict



# Political support and subsidies in GER DIN SPEC 2021

Core requirements & criteria of DIN SPEC 91434 2021 - 05

- Agricultural yield at least 66% to the reference yield
- Guaranteed agricultural usability of the area agricultural use concept
- Loss of land due to installation of the system maximum 10% (Cat. I) or 15% (Cat. II)
- Adapted to agricultural needs
- Adequate light availability and homogeneity as well as water availability
- Avoid soil erosion, compaction and damage (construction, anchoring, water management)
- Citeria help project evaluation methodology



#### Political support and subsidies in GER **DIN SPEC 2021**

#### **Definition – DIN SPEC 91434**

System	Type of Use	Examples	2-5
Category I: Height > 2,1 m → Production under PV panels Category II: Height < 2,1 m → Production between PV panels	Permanent & perrennial cultivation	Kern-, Steinobst, Beeren, Wein, Hopfen	AN
	Field & vegetable cultivation	Cereals, potatoes etc.	A
	Permanent greenland	Intensive or extensive grass & green fodder crops	~~
	Pasture	Grazing livestock, chickens, sheep, goats	AN





## Political support and subsidies in GER "Easter Amendment" 2022

Key points paper from **02/10/2022**:

- "Expansion of photovoltaics on open spaces in harmony with agricultural use and nature conservation" by BMWK, BMVU and BMEL
- APV systems shall be permitted on:
  - All arable land
  - Disadvantaged areas
  - Wetlands
- Financial participation of municipalities to be linked to nature conservation requirements





### Political support and subsidies European Agriculture Subsidy

**Direct Payment Implementation Regulation:** 

- Core element of EU agricultural support.
- Serves to implement the Agricultural Direct Payment Regulation 2013 (No. 1307/2013 of the European Parliament) and the legal acts adopted within its framework.
- But: Several conditions + no impact on agricultural yield and operation to be proven
- Reduction of usable agricultural area by a maximum of 15% based on DIN SPEC 91434:2021-051.



#### Political support and subsidies European Horizon Calls

- 2021: Novel Agro-Photovoltaic systems
  - First APV call



European Commission



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#### Thank you for your Attention!



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