

Making the Most of Every Ray

Embracing Intelligence, Active Safety, and Grid Forming
to Integrate PV+Wind+ESS, and Accelerating PV+ESS as the Main
Energy Source



Agrivoltaics: Between promises and performance
5th of December 2024



Agenda

1. Short introduction HUAWEI FusionSolar
2. Overview about drivers and classifications for Agrivoltaics
3. Requirements for PV inverter selection in Agrivoltaics & HUAWEI solution
4. Project examples in Germany

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Focusing on ICT to provide products, solutions, and services to three customer groups alongside ecosystems and partners

Bring digital to every person, home and organization for a fully connected, intelligent world



Consumers



Carriers



Enterprises

Ecosystems

Partners

Devices

Smartphones
Wearables
Smart home devices
Telematics
All-scenario lifestyle services

Intelligent Automotive Solution

Intelligent driving
Intelligent vehicle control
Intelligent vehicle cloud services
Intelligent cockpit
Intelligent automotive optics

Connectivity

Wireless network
Data communications
Optical network
Cloud core network

Computing

Computing
Data storage

Cloud

Public cloud
Hybrid cloud

Digital Power

Smart PV & ESS
Smart Charging Network
DriveONE
Data Center Facility & Critical Power

Information distribution
& interaction

Information
transmission

Information processing & storage,
learning & inference

Green Energy

+ Intelligence

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Overview about drivers and classifications for Agrivoltaics (1/2)

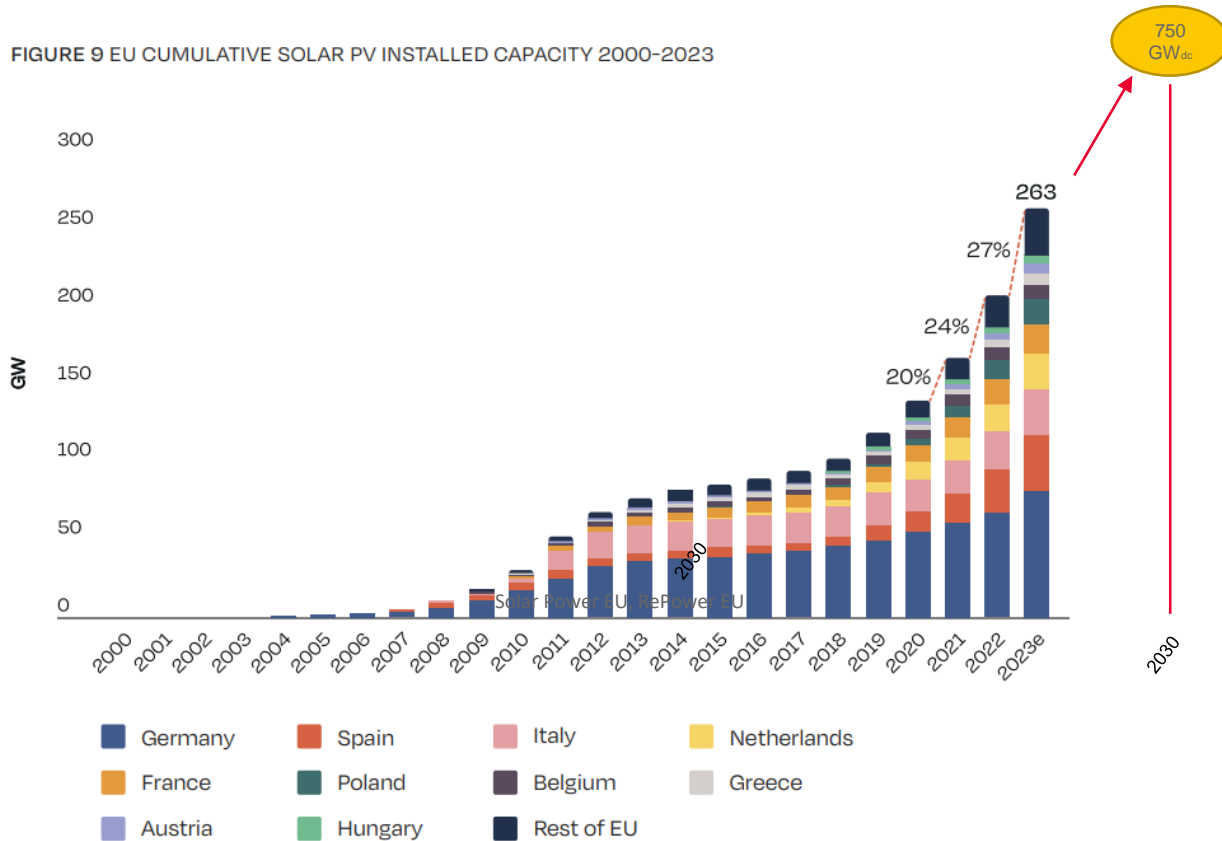
LAND SHORTAGE is the main driver for Agrivoltaics since PV installations targets require substantial land

EU PV Targets conflicts with available land and land use targets

REPower EU: 2024-30 = 470 GW_{dc}

Germany's PV expansion goal to 215 GW by 2030 is in direct conflict with the daily land use reduction goal

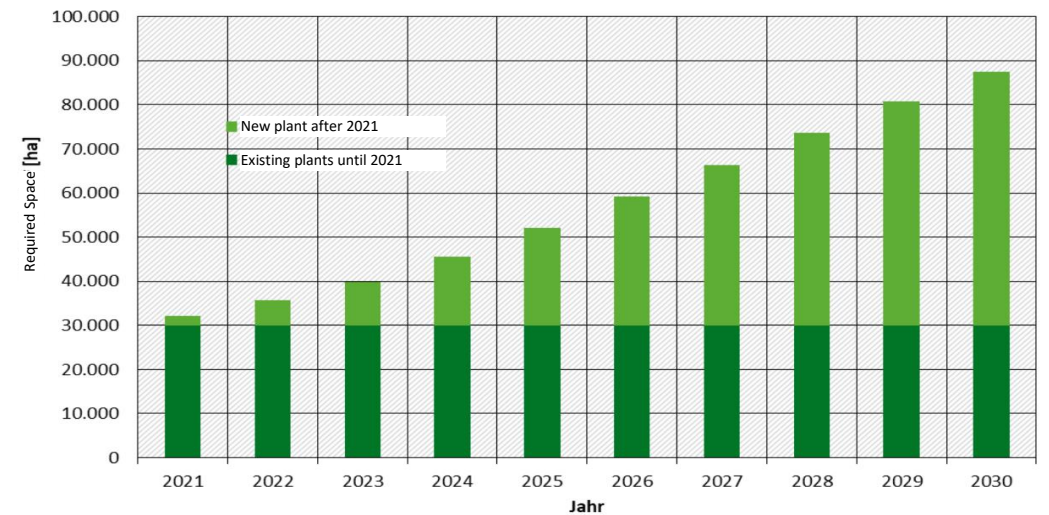
FIGURE 9 EU CUMULATIVE SOLAR PV INSTALLED CAPACITY 2000-2023



Source: Solar Power EU, RePower EU

Year	Total land use incl. buildings, roads, and PV* ha/day	Est. land use for solar GM PV only ha/day
2021	54	5 to 5.5 (related to ~1.8 GW/year)
2030	<30	16 to 20 (related to ~8-10 GW/year)**

Projected space requirements up to 2030



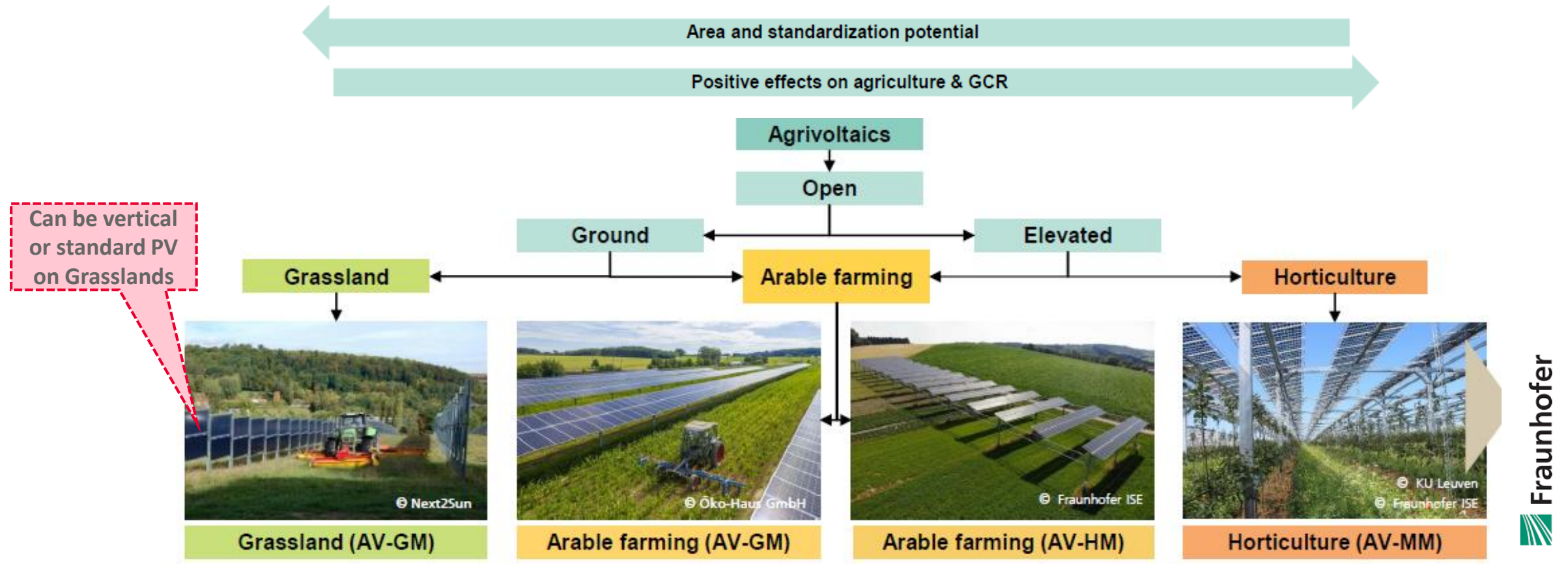
Source: ZSW 2022

* National Sustainable Strategy, by Federal Govt. of Germany

** 16 ha/day was based upon 2021 PV expansion target, in 2023 target revised to 215 GW. Area strongly Depends upon efficiency of PV Panel, Assuming 1.3 MW/ Ha

Overview about drivers and classifications for Agrivoltaics (2/2)

Fraunhofer Institute defines 4 AgriPV scenarios, keeping the DIN specification as reference



AV = Agrivoltaics | GM = Ground Mounted | HM = High Mounted (height > 2.1 m, typically 4 m) | MM = Medium Mounted (height < 2.1 m)



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Requirements for PV inverter selection in Agrivoltaics & HUAWEI solution (1/4)

Selected typical requirements for Agrivoltaics applications








Feature	Requirement
Robustness	Inverter experiences high dust/muddy conditions in Agrivoltaics
Noise	Agrivoltaics projects near settlements and/or for the sake of animal welfare prefer inverters with low noise emissions
Inverter power class	The usage of semi-transparent PV modules and the space constraints demands shorter row length and hence a smaller inverter
Safety	Higher safety requirements due to hot dry and even wet conditions of Agrivoltaics projects
Flexible plant layout	Multi-MPPT to tackle mismatch between rows by connecting each row to an MPPT



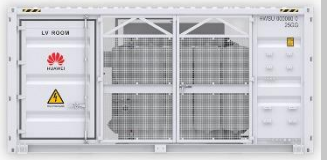




Requirements for PV inverter selection in Agrivoltaics & HUAWEI solution (2/4)

Overview of HUAWEI FusionSolar solution portfolio for Agrivoltaics applications

Commercial & Industrial – 400 V AC

 <p>Smart Optimizer SUN2000-1100 / 1300</p>	 <p>Monitoring/Control SmartLogger 3000A</p>	 <p>Smart Inverter SUN2000-12-25KTL-M5</p>	 <p>Smart Inverter SUN2000-30 / 36 / 40KTL 50KTL-M3</p>	 <p>Smart Inverter SUN2000-100 / 115 KTL-M2</p>	 <p>NEW Smart Inverter SUN2000-150K-MG0 SUN5000-150K-MG0</p>	 <p>Smart PCS & ESS LUNA2000 – 97 / 129 / 161 / 193kWh LUNA2000-100KTL</p>
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Utility-Scale – 800 V AC

 <p>Smart Transformer Station 3000 / 6000 / 9000 / 10 – 35 kV</p>	 <p>Smart ESS LUNA2000 2.0 MWh 0,5C / 1,0C</p>	 <p>Smart PCS LUNA2000-200KTL (+ DC LV panel)</p>	 <p>Smart Inverter SUN2000-330KTL-H1</p>	 <p>Smart Inverter SUN2000-215KTL-H0 / H3</p>
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Requirements for PV inverter selection in Agrivoltaics & HUAWEI solution (3/4)

The new 150kW inverter matches quite well to the Agrivoltaics requirements

SUN2000 – without optimizer



SUN2000-150K-MG0

- **The largest 400V inverter in the world**
- Better applicable to large roof-top projects (MW class) as well small ground-mount projects (e.g. Agrivoltaics).

SUN5000 – Only with optimizer



SUN5000-150K-MG0
MERC-1100/1300W-P

- **the only 100kW+ inverter with optimizer**
- More complex and nested installations and/or for projects with rapid shutdown requirements

Requirements for PV inverter selection in Agrivoltaics & HUAWEI solution (4/4)

Specs of SUN2000/SUN5000-150K-MG0 Series



Rated output power: 150 kW

Maximum apparent power: 165 kVA

Maximum DC input voltage: 1100 V DC

Max. Current per MPPT/per String: 48A / 16A

Output voltage: 380/400/480 V AC

	Features	SUN2000-150K	SUN5000-150K
Efficiency	Max. efficiency	98.6% @400V, 98.8% @480V	98.6% @400V, 98.8% @480V
Input	Max. input number	21 (7*3)	12
	Max. Current per MPPT	48A	/
	Max. Short Circuit Current	66 A	66 A
	Operating Voltage Range	200 V ~ 1,000 V	200 V ~ 1,000 V
Output	Maximum apparent power	165 kVA	165 kVA
	Rated output power	150 kW	150 kW
	Nominal Output Voltage	380V/400V/480Vac	380V/400V/480Vac
General	Dimensions (W x H x D)	1,000 x 710 x 395 mm	1,000 x 710 x 395 mm
	Weight (with mounting plate)	98 kg	100 kg

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Project examples in Germany



Thank you.



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把数字世界带入每个人、每个家庭、
每个组织，构建万物互联的智能世界。

Bring digital to every person, home and
organization for a fully connected,
intelligent world.

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