

Agri PV Plants and RE Grid Integration with vertical bifacial technology by Next2Sun

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Sascha Krause-Tünker, CFO Next2Sun

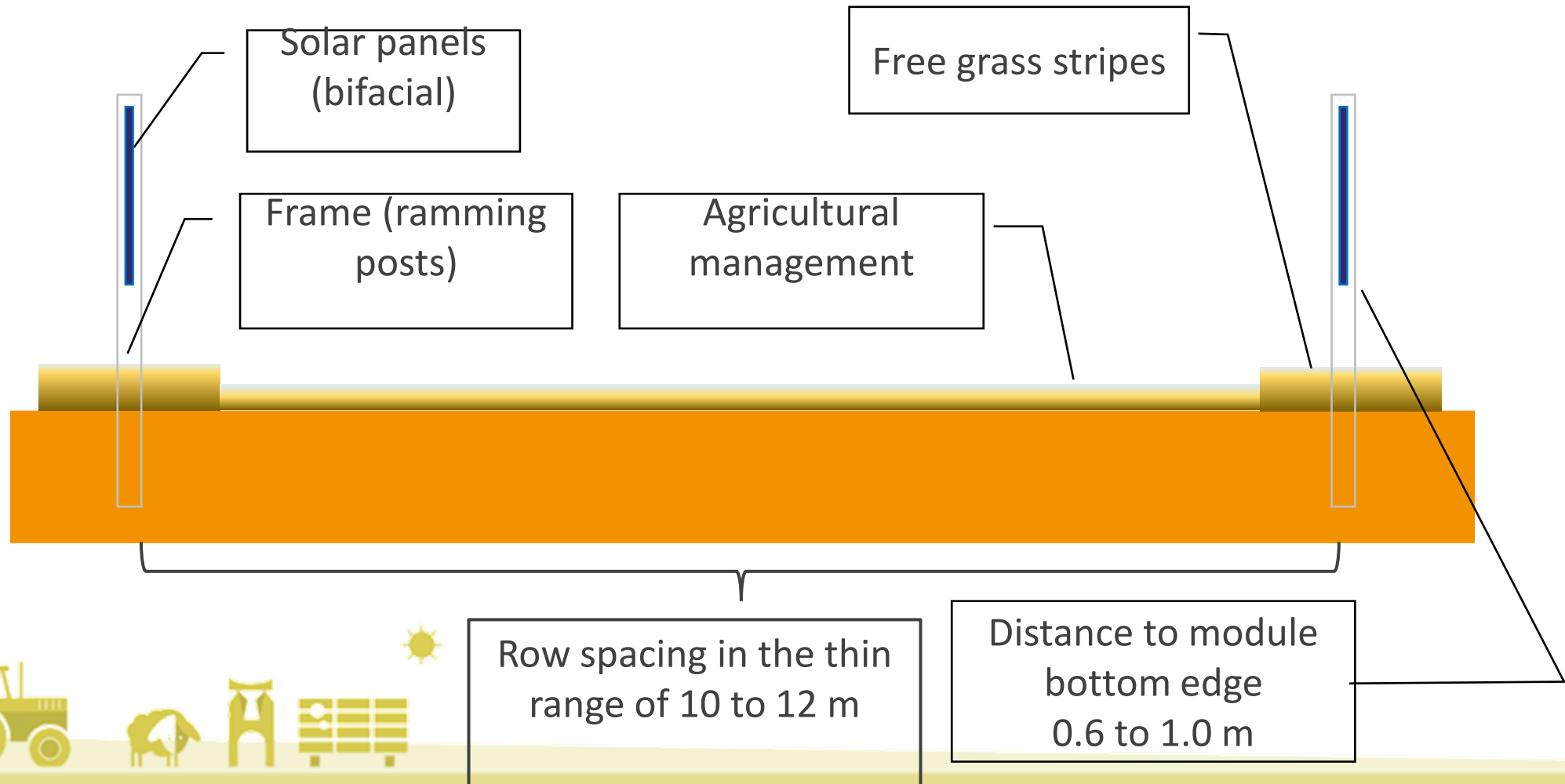


Vertical bifacial PV as an economic, ecologic and grid stabilising way of Agri-PV

Source: Next2Sun GmbH



Plant scheme (View from the South)



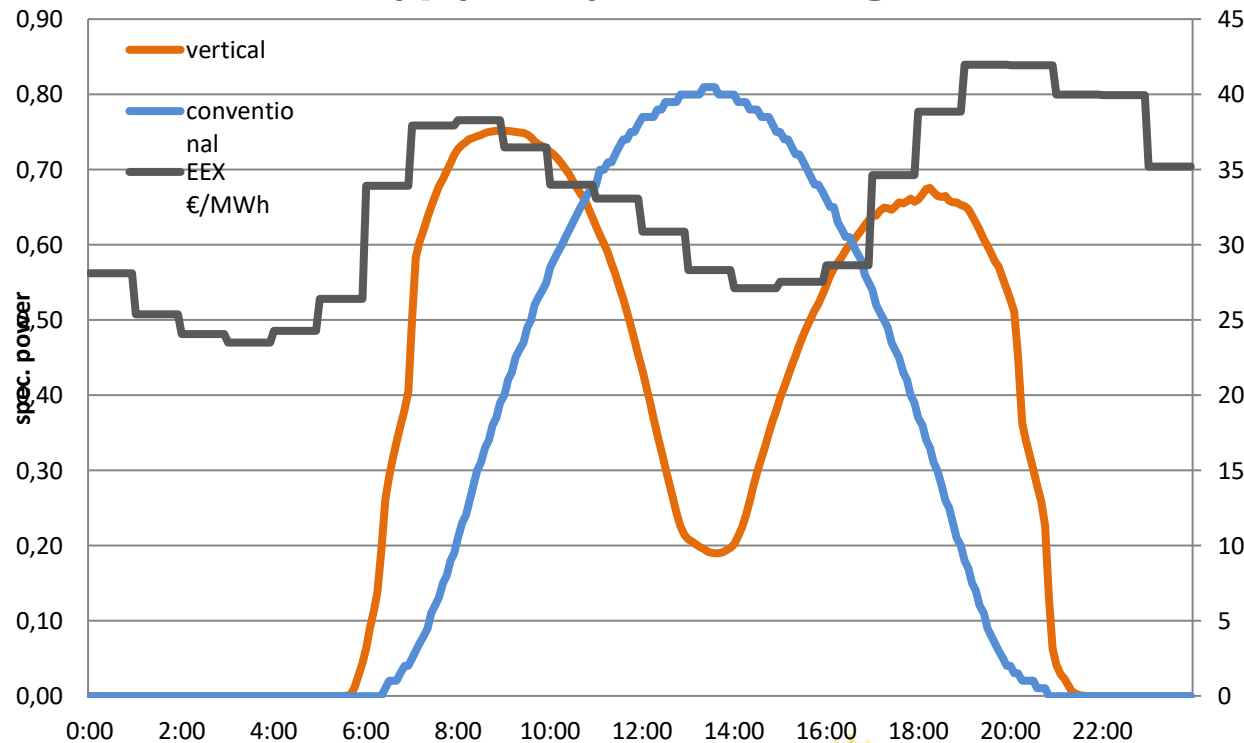
Vertical bifacial PV makes flexible!

- Yield of a bifacial PV system = sum of front side yield (A) and rear side yield (B) - some examples:
 - N2S East-West: A=600, B=500, Sum: 1.100
 - N2S South-North: A=800, B=250, Sum: 1.050
 - N2S Southwest-Northeast: A=650, B=450, Sum: 1.100
- It stands out: The **yield differences** between very different orientations are **very small**.
- The alignment thus becomes a degree of freedom!



East-West-Alignment: Stabilizing PV production during the day

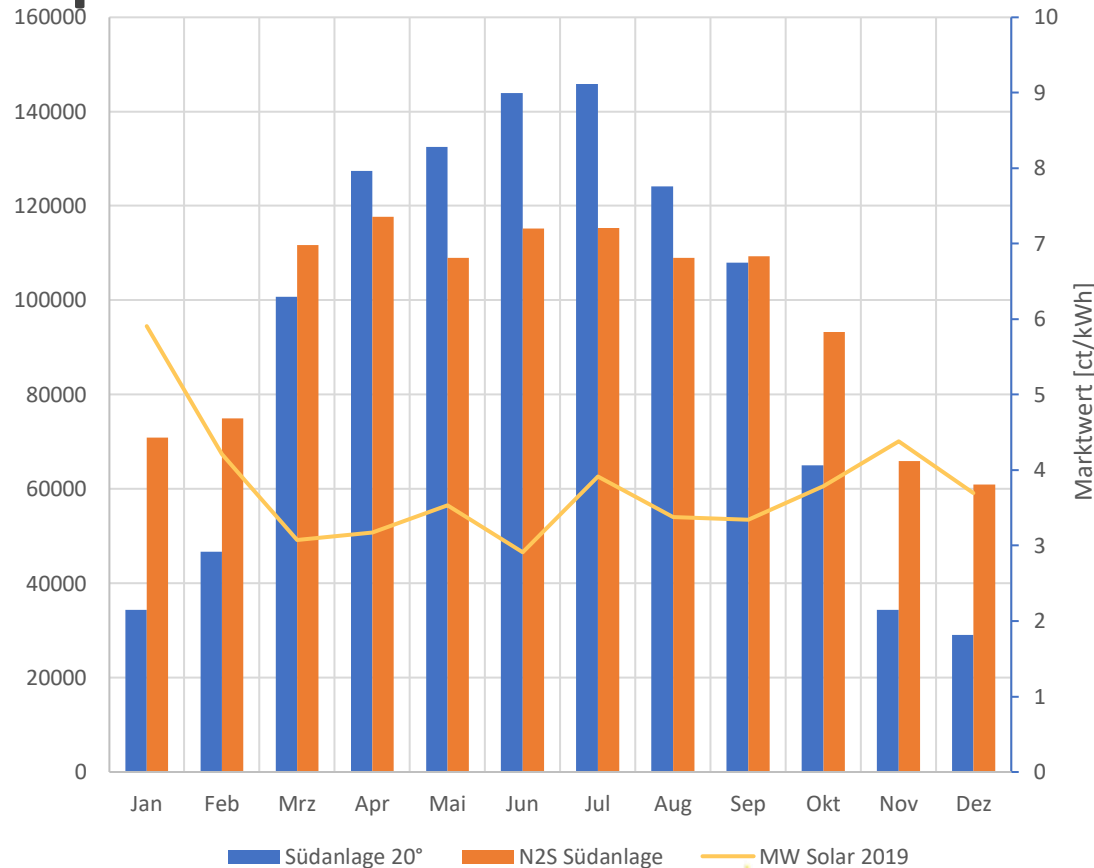
Specific generation capacity during the day [kW / kWp], prices power exchange



- **East-west alignment** of the two active module surfaces results in a profile that complements **conventional systems** over the course of the day (“riding the duck curve”)
- Empirical values from Germany:
 - Market value of electricity production by approx. 3 €/MWh higher (reached in 2019 in real terms), with an upward trend
 - April 2020: MW Solar 8,90 €/MWh, MW N2S: 13,76 €/MWh (app. 5 €, 55%)
- Additional value for operator depending on market model



South-north orientation: Shifting PV production in the wintertime

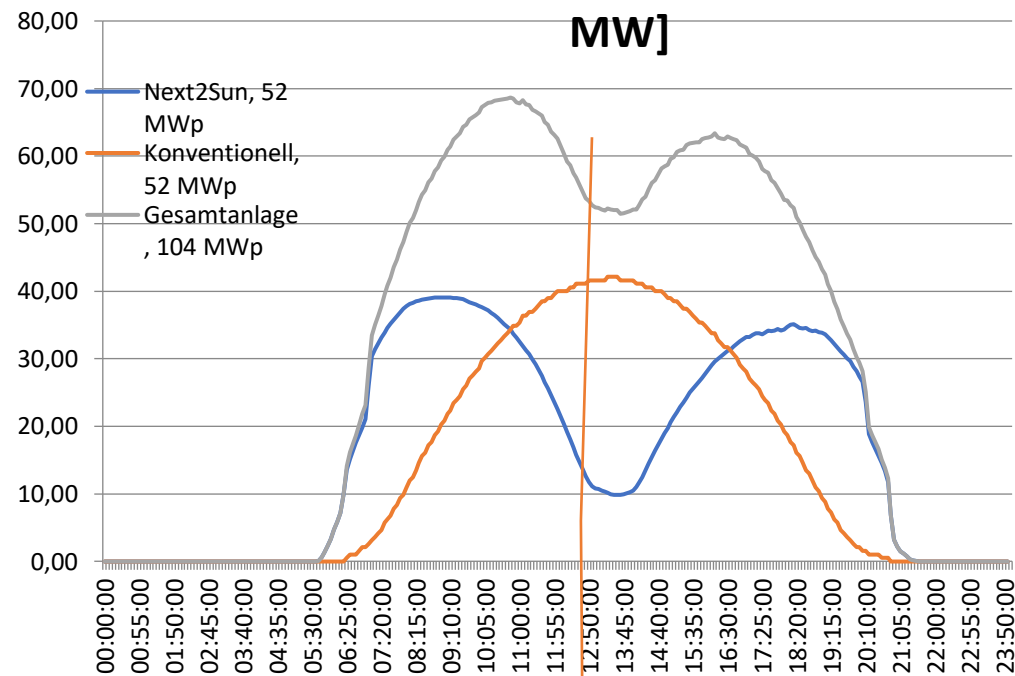


- **South-north** orientation of the two active module surfaces results in a more **even profile** over the **course of the year**
- The production share in the winter half-year increases by about one third (approx. 25% -> approx. 33% of the total annual production already excluding snow)
- This also can generate a higher market value



Capacity utilization through combination

**Absolute performance during the day
[AC power at grid connection point, in
MW]**



At 63 MW maximum total power, 104 MW PV power can be connected (comparative value only conv. south PV: 80 MW)

- Even if grid connection is still possible, the **grid capacity is often limited**
 - through network absorption capacity
 - due to the size of the transformer station
- A larger dimensioning of the PV system is possible here, if **different orientations are combined**
 - Vertical E-W system with conventional PV
 - Vertical E-W system with vertical S-N system
- The **improvement in economic efficiency** here results primarily from better utilisation of infrastructure costs (grid connection, project costs, development, operation)



Sample Project Donaueschingen-Aasen



Site: Donaueschingen, Baden-Wuerttemberg (south of Germany)

Size: 14 ha (module area)

Total installed capacity: 4,1 MW.

Yield estimate: 1.209 kWh/kW
compared to 1107 kWh/kW on the same site for a conventional plant

Total investment costs: 3 Mio. €

Tenant continues to use the area as grassland

Source: Next2Sun GmbH



Thank you for your attention!



Contact:

Sascha Krause-Tünker
CFO Next2Sun GmbH
CSO Next2Sun Mounting Systems GmbH

Tel: +49 (0) 176-611 99 315

Mail: sascha.krause-tuenker@next2sun.de

