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Photovoltaic systems – it all depends on the right alignment – Summary

In southern Germany, on the darkest day of the year (December 21), photovoltaic systems built with a steep angle of inclination of the modules in relation to the horizontal and consistent south orientation (DN 70-80°; 180° south) achieve > on average around 1 kilowatt-hour per kilowatt-peak. (value: average specific winter daily yield)All photovoltaic systems that are not aligned in the ideal direction have a lower average specific winter daily yield. In the case of east-west systems, the characteristic value is sometimes considerably weaker by a factor of 2 to 2.5 at only around 0.4 to 0.5 kilowatt-hours per kilowatt-peak !

The daily final energy consumption in Germany is higher in winter than in summer. According to a model calculation, daily consumption on the darkest day of the year is about twice as high as on a summer day. Even with the successful progress of the energy transition, and taking into account efficiency measures, savings, electrification, etc., little will probably change in principle

Every kilowatt-hour that can be generated "just-in-time" reduces the need for complex, expensive and resource-intensive storage. For this purpose, it is necessary to take into account the specifications of physics and mathematics when creating photovoltaic system concepts.

With an expansion of the photovoltaic sector in Germany to estimated 500 gigawatt-peak, more attention should be paid to gearing the system concepts to an optimal winter daily yield. 500 gigawatt-peak with ideal orientation (DN 70-80°; 180° south) would be able to generate an average of around 500 gigawatt-hours of solar power on the darkest day of the year. A system park with, for example, less favorable (suitable for winter) east-west systems (e. g. DN 15°; east & west) would generate only 200 to 250 gigawatt hours of solar power on the same day. A difference that would correspond to the generation capacity of around 7 to 9 nuclear power plants (24 hours of operation/day) of the Neckarwestheim II reactor (1,400 MW).

In southern Germany (e. g. Stuttgart), the midday sun is at its zenith at around 18° on the darkest day of the year. In Northern Germany (e. g. Hamburg) it is at the zenith at around 13°. An optimal winter daily yield can be achieved when the module surfaces are largely perpendicular to this midday sun.

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