

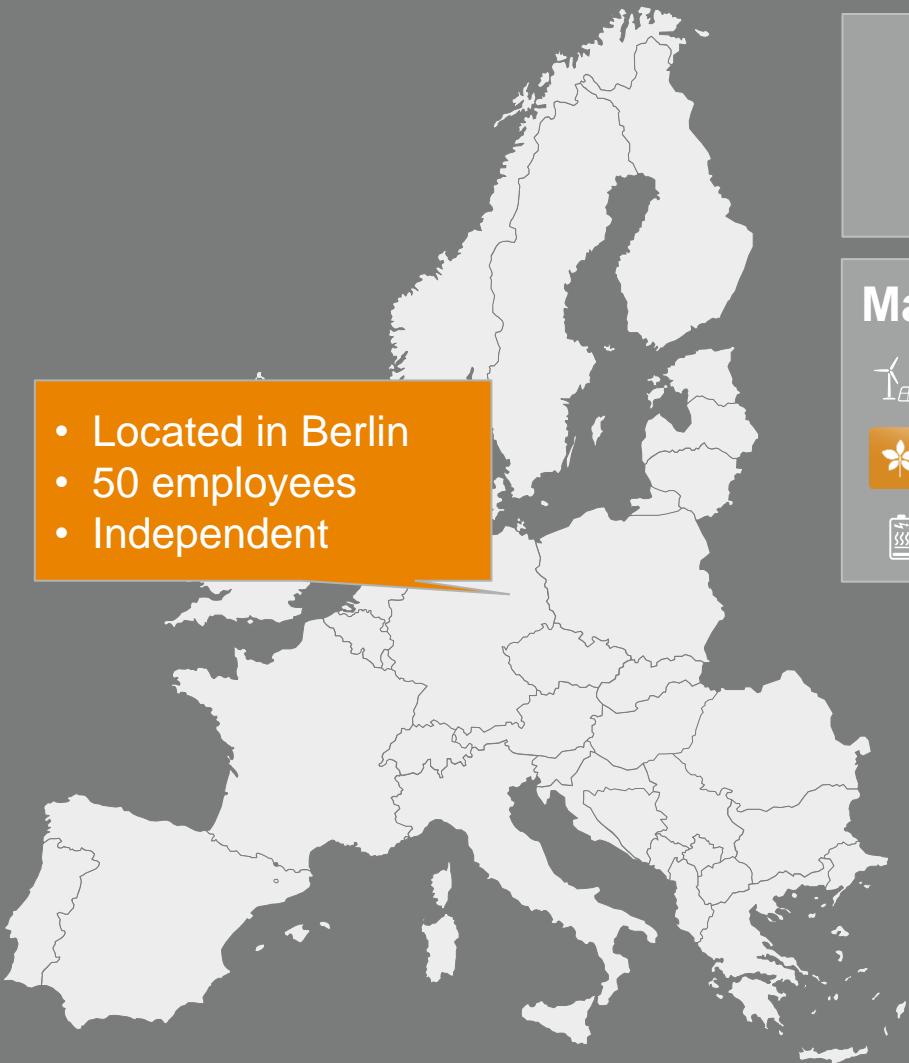


Analysis of innovative system designs for a power market optimised PV portfolio in Germany

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Thomas Rosenzopf | enervis energy advisors

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- Independent

Data






Models



Experience



Market intelligence for renewables:

-  Capture price assessment wind and solar
-  PPAs
-  Storage, H₂ and PtX



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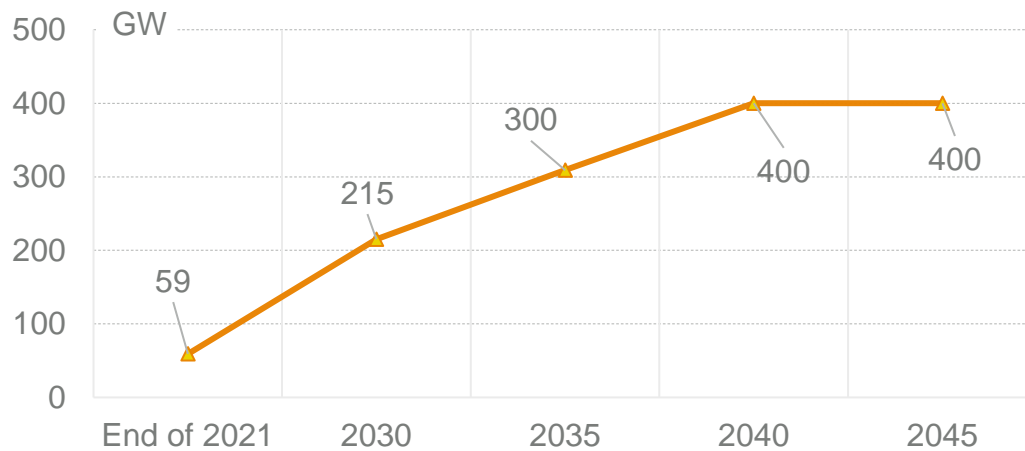


Economic solutions for new installations where a large share of the demand is already covered by PV are increasingly important.

The weekend read: Price cannibalization threatens PV growth

Is the cannibalization effect of intermittent renewables important for the German wholesale electricity market?

Volatile European power markets may be obscuring huge cannibalisation risk



Germany's PV expansion targets



Study



Analysis of innovative system-designs for a power market optimised PV portfolio in Germany

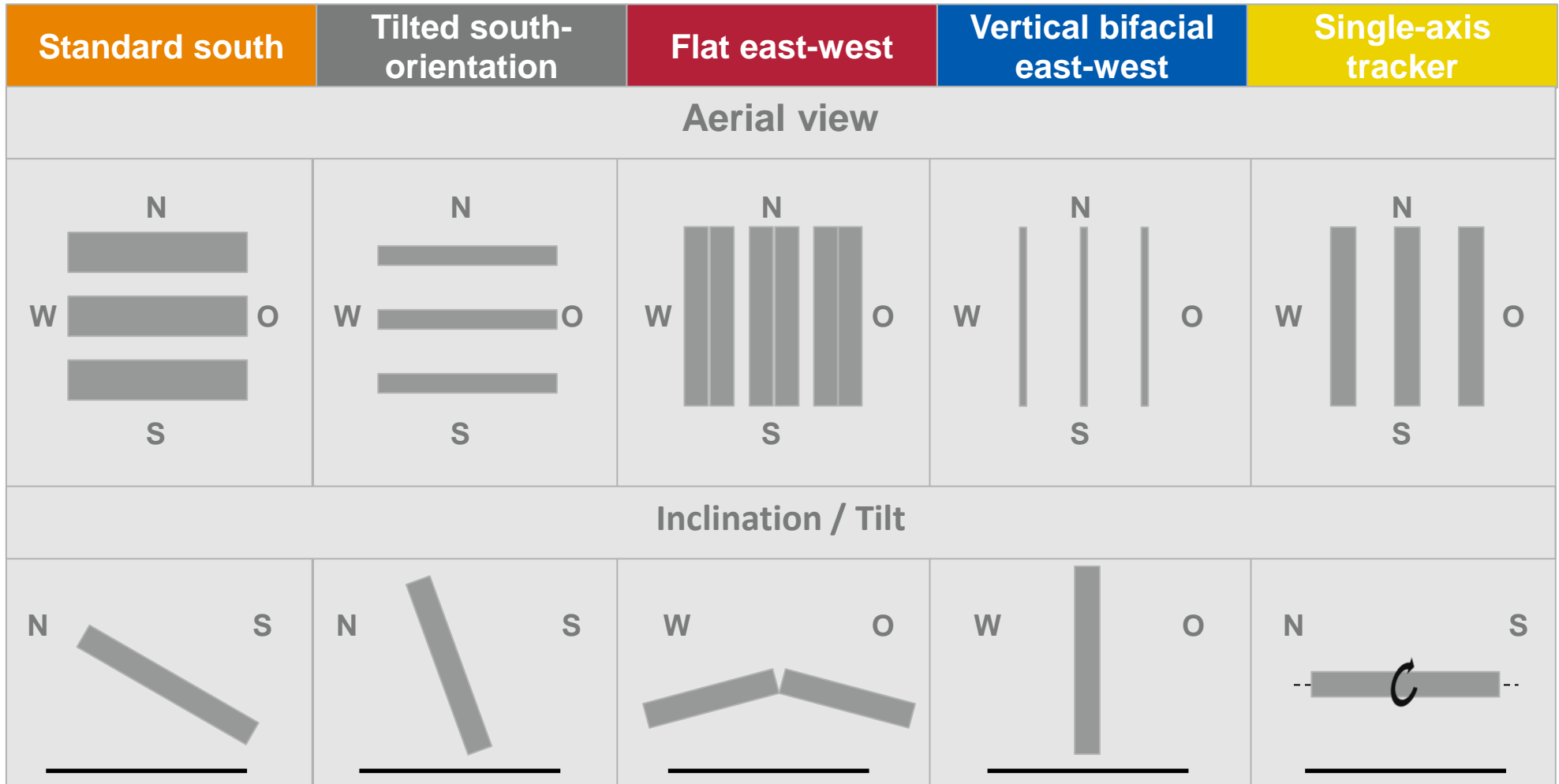
Business case evaluation



Macroeconomic analysis

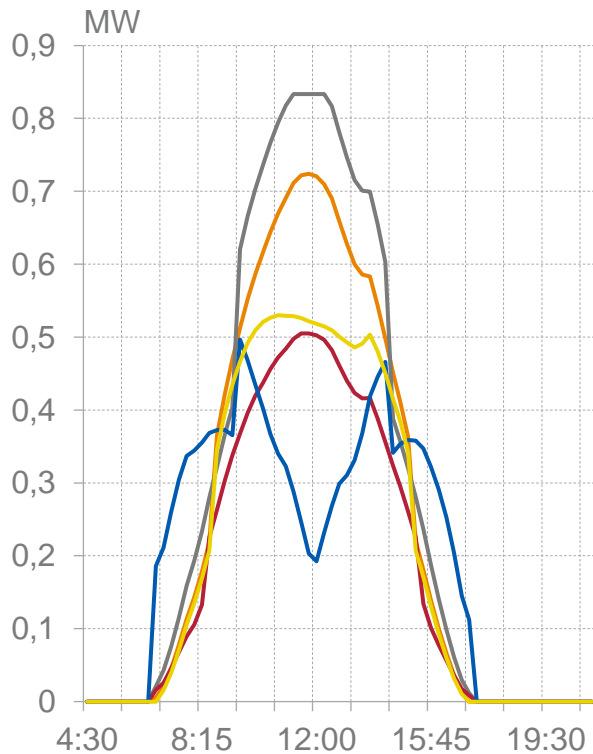


Five different PV systems designs are compared and economically evaluated.

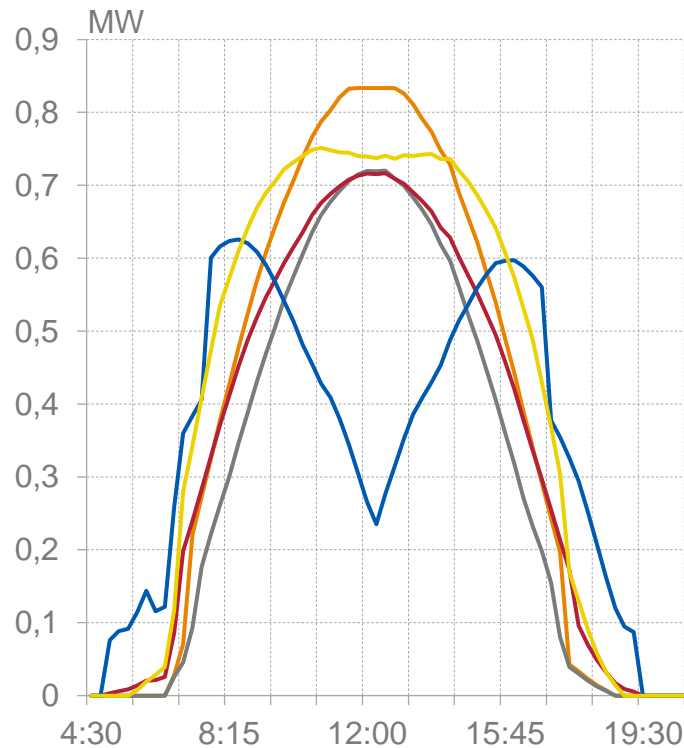


Depending on orientation and tilt, the generation profile varies throughout the seasons.

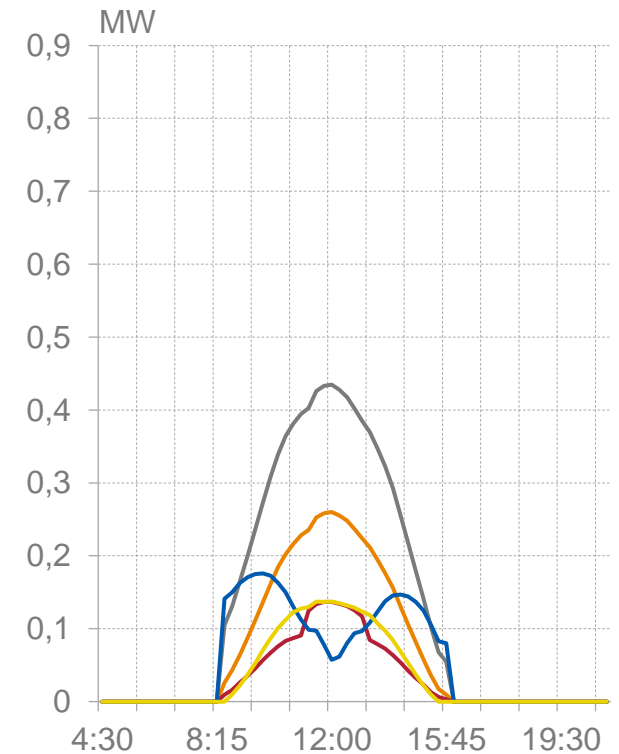
Transitional period



Summer

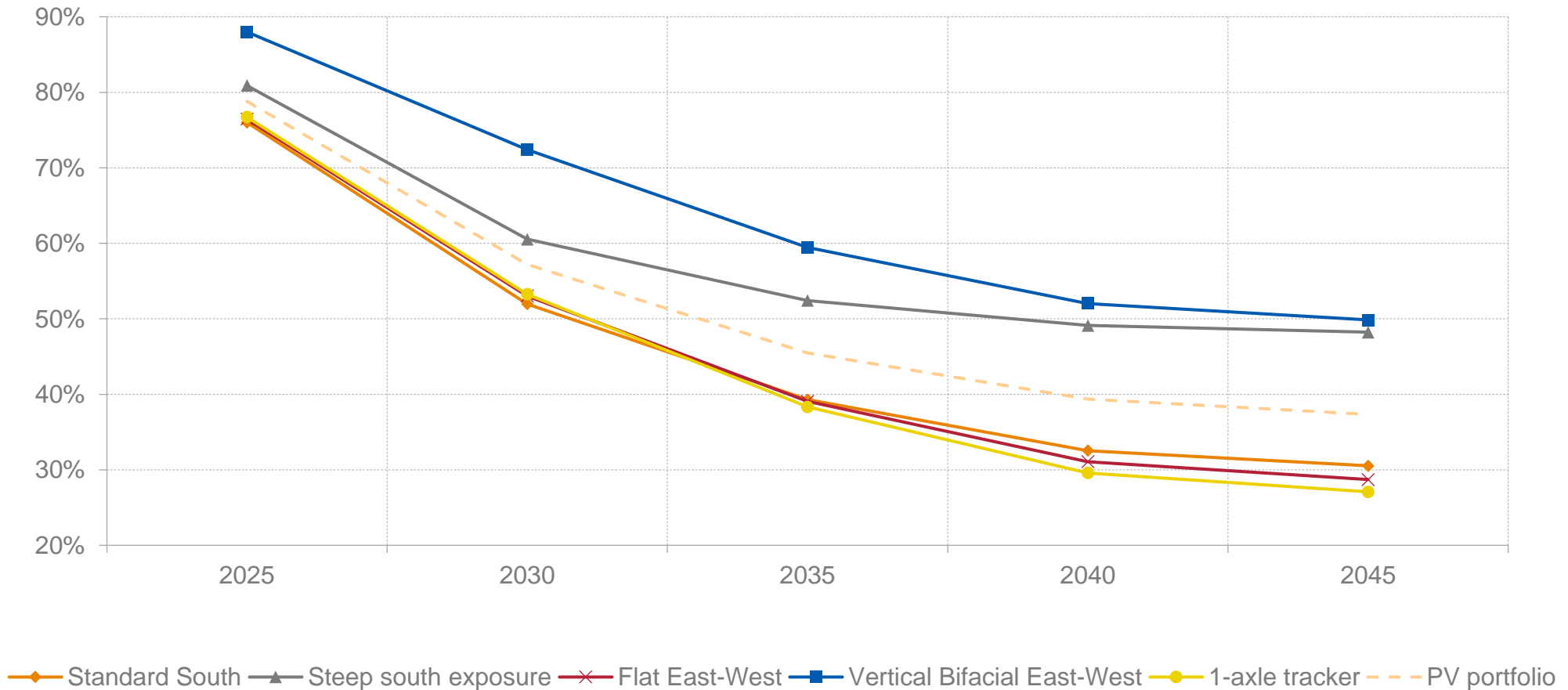


Winter



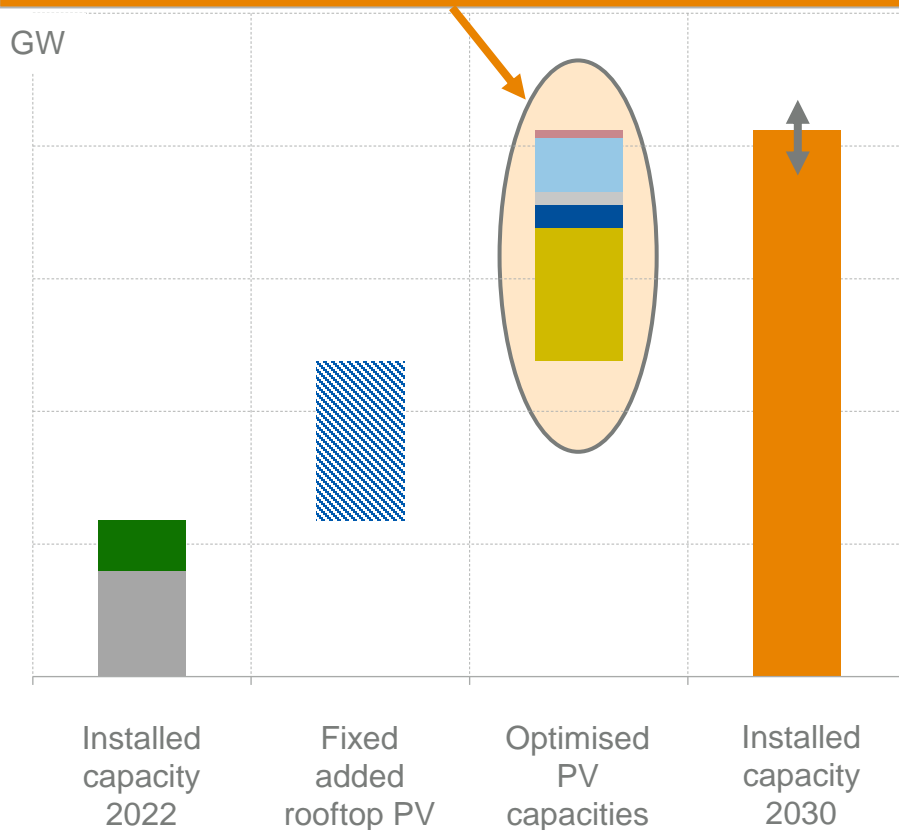
- Standard south
- Tilted south-orientation
- Flat east-west
- Vertical bifacial east-west
- Single-axis tracker

Anticipated growth in RE shares will likely result in lower power prices. However, this trend will also be accompanied by declining capture rates due to the high simultaneity of generation.



Optimizing three different photovoltaic (PV) shares in total generation leads to varying installed capacities of innovative system designs.

Cost-oriented optimisation with innovative system designs until 2030



Modeling objective

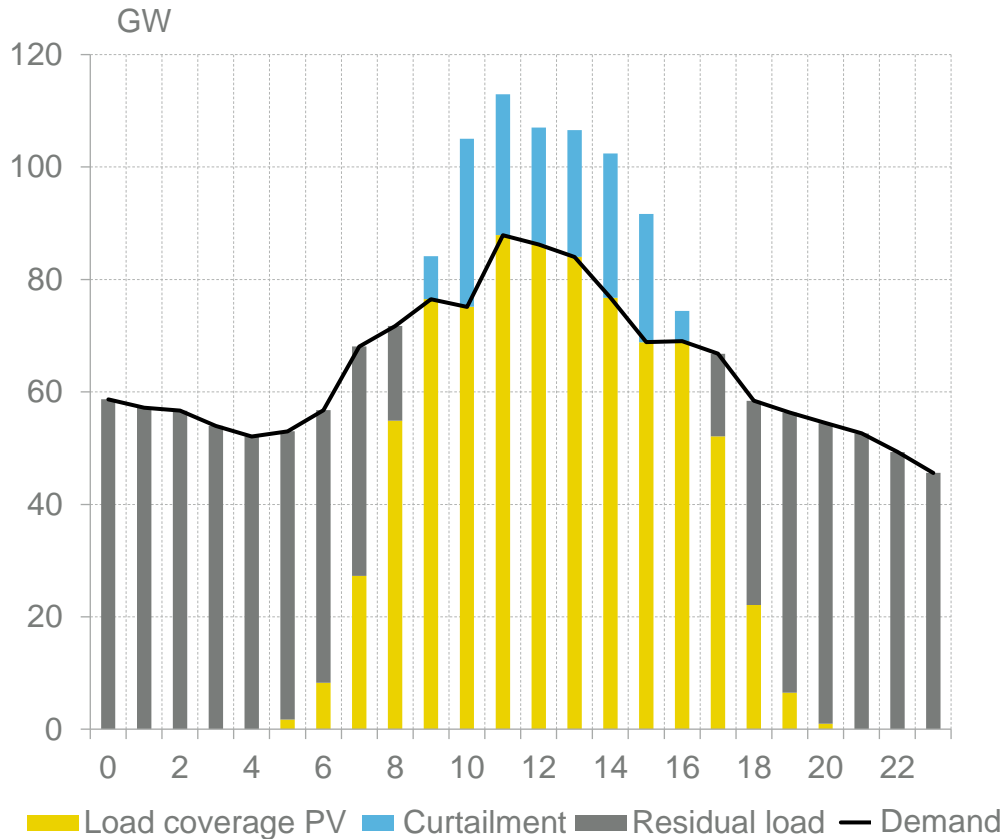
Determination of the cost-optimised composition of the PV portfolio for different shares of PV generation in the total electricity supply in 2030.

Additional assumptions

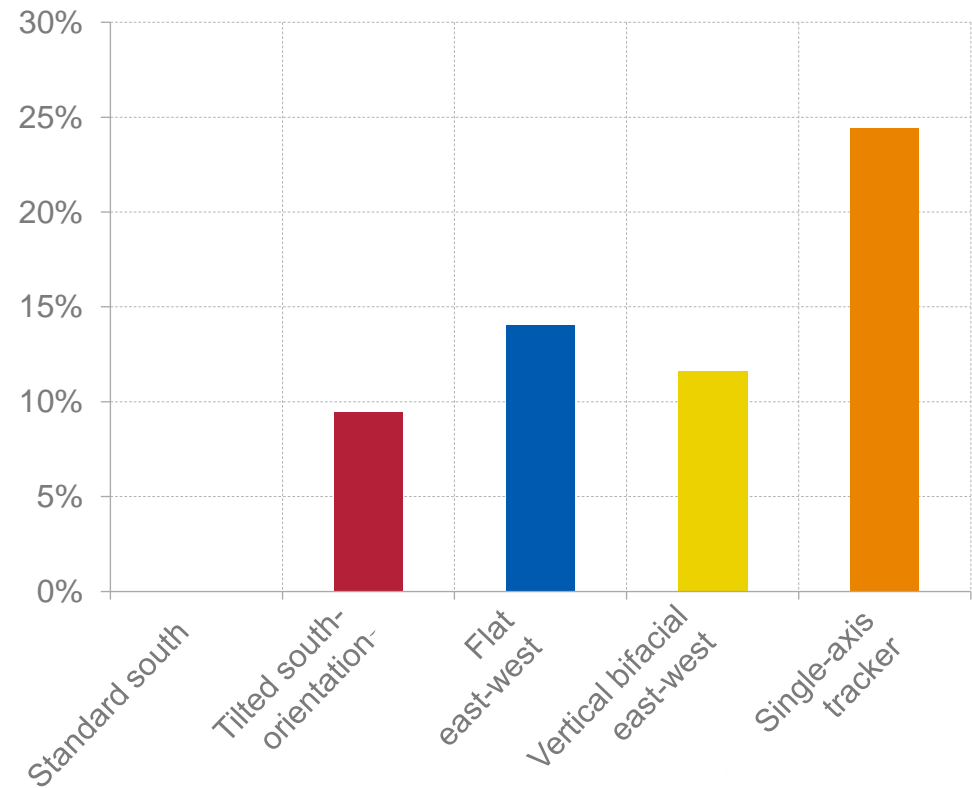
- Independent consideration of the scenarios, no add-on installation of new capacities as in reality
- No minimum installation per system design
- Load flexibilities like batteries, heat pumps etc. as in power price scenario (no additional installations)

In the modelled power system, all innovative PV have higher LCOE than standard southern designs. Generation above the demand is curtailed.

Exemplary day in summer

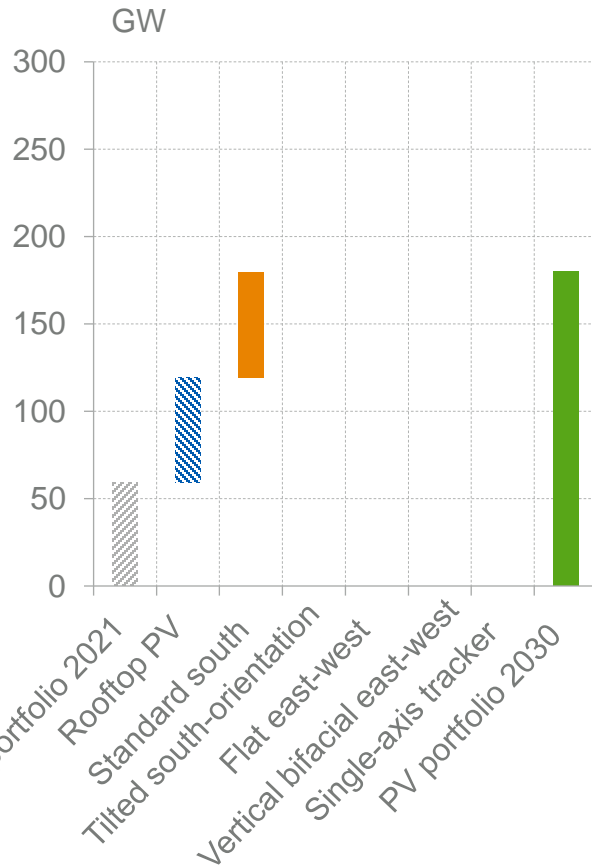


Deviation of the LCOE

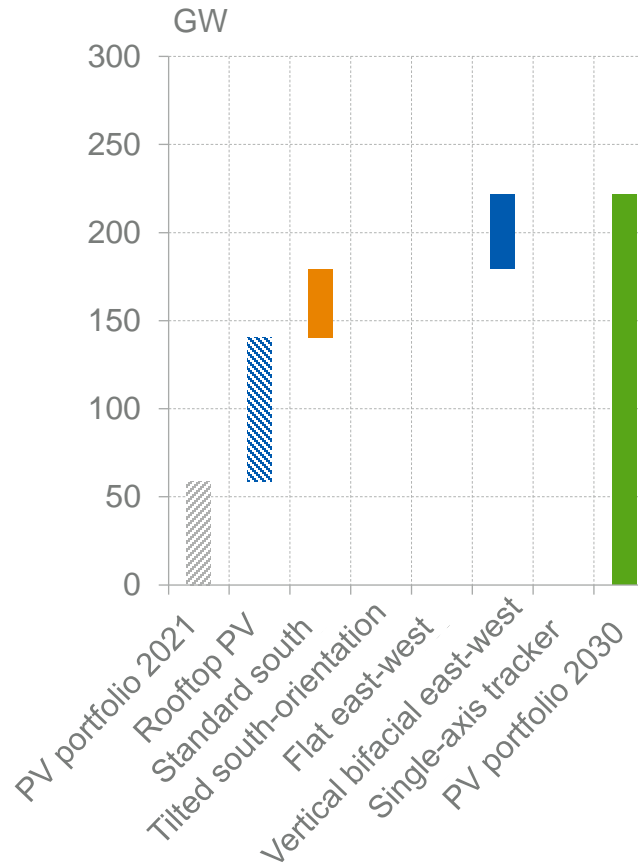


For low shares of PV in electricity supply, standard south designs are preferred. Higher shares require innovative system designs or flexible demand.

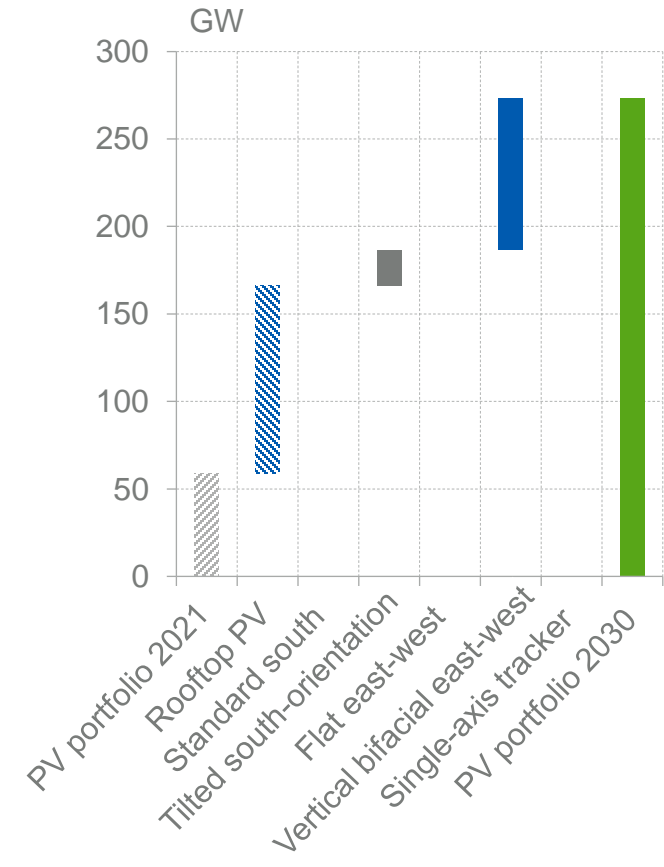
25%



30%

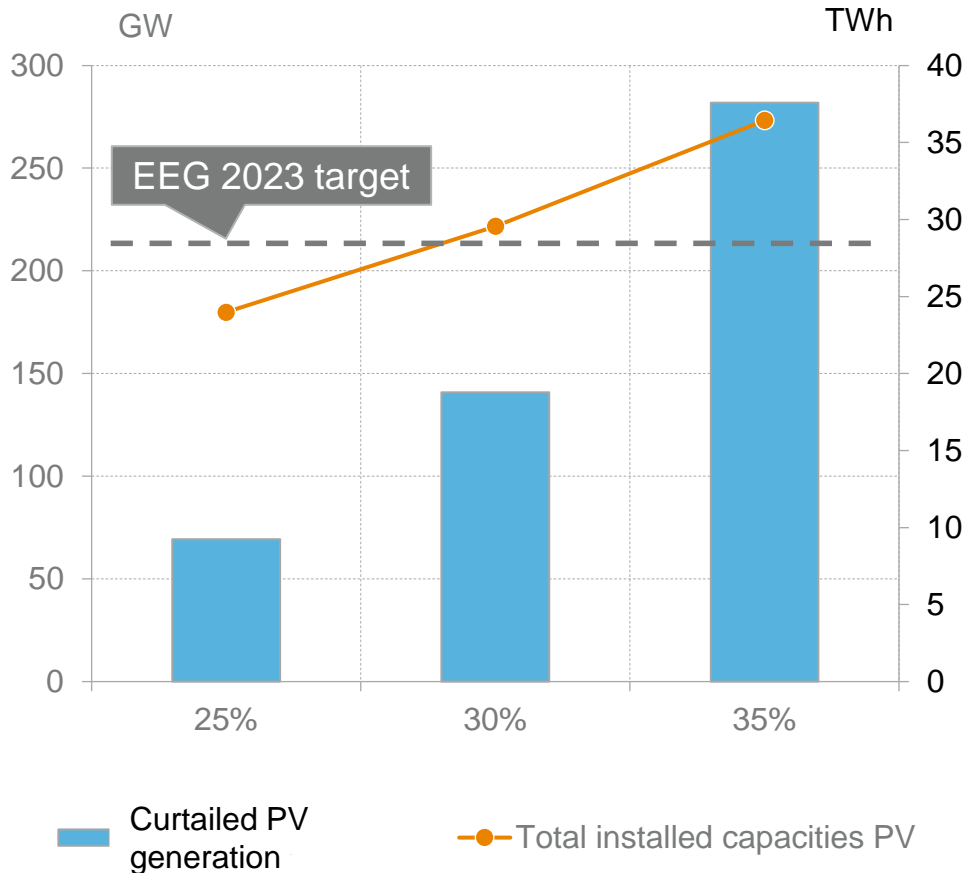


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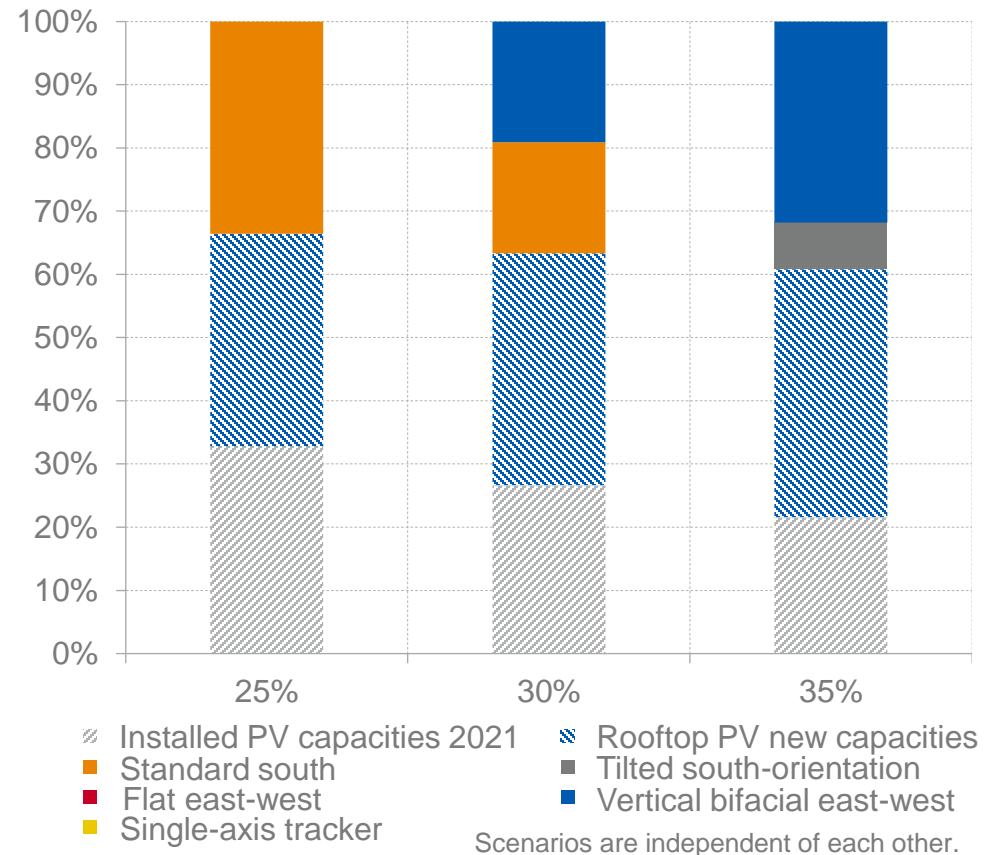


The more shares PV generation will supply, the more important are innovative system designs like tilted south-orientation or vertical bifacial east-west.

Installed PV capacity and curtailed generation

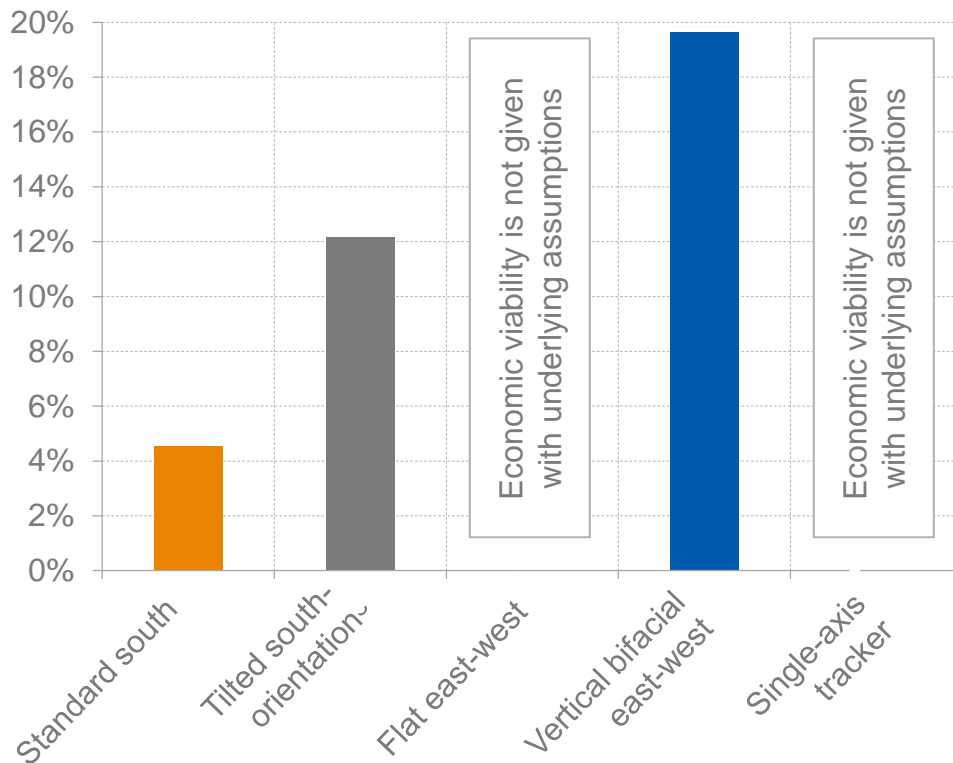


Shares of innovative PV in total new installed capacities



Given the ambitious plans for PV expansion in Germany, the design of PV systems is gaining significant importance as a crucial component of business and macroeconomic optimization.

Business case evaluation



Macroeconomic analysis

- The bigger the share of PV in a power system the higher the influence of the PV generation profile.
 - High simultaneity of PV generation
 - Large curtailment quantities
 - Balanced generation profiles bring advantages
- Lower curtailment quantities with a more balanced generation profile can justify higher LCOE of innovative PV.

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