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## An action-oriented approach to make the most of the wind and solar power complementarity

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Solar and wind power curves typically exhibit inverted daily and annual cycles. However, their monthly anomalies show both positive and negative low correlation values across Europe, which compromises the effectiveness of their integration in the energy grid. This is because the well-known asymmetric response of the resources to the main large-scale teleconnection patterns vanishes and/or shows low synchronicity when the compound effect of these patterns is considered, as we show here. So we propose a step-wise method to help narrowing the monthly deviations of the total wind-plus-solar electricity production at the regional level from a given curve (here, the mean annual cycle of the total production), applied here across five continuous European regions but with straight application elsewhere and at other temporal scales. It detects the optimal shares of each power over previously identified sub-regions with homogeneous temporal variability of the monthly anomalies of the wind and solar capacity factors. Results show that, keeping the current total regional shares, just through a smart distribution of the power units, the standard deviation of the monthly anomalies of the total wind-plus-solar production is reduced up to 20% without loss in the mean capacity factor as compared to a base scenario with uniform distribution of the installations. This reduction grows above 50% if the total regional shares also came into the optimization game.

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