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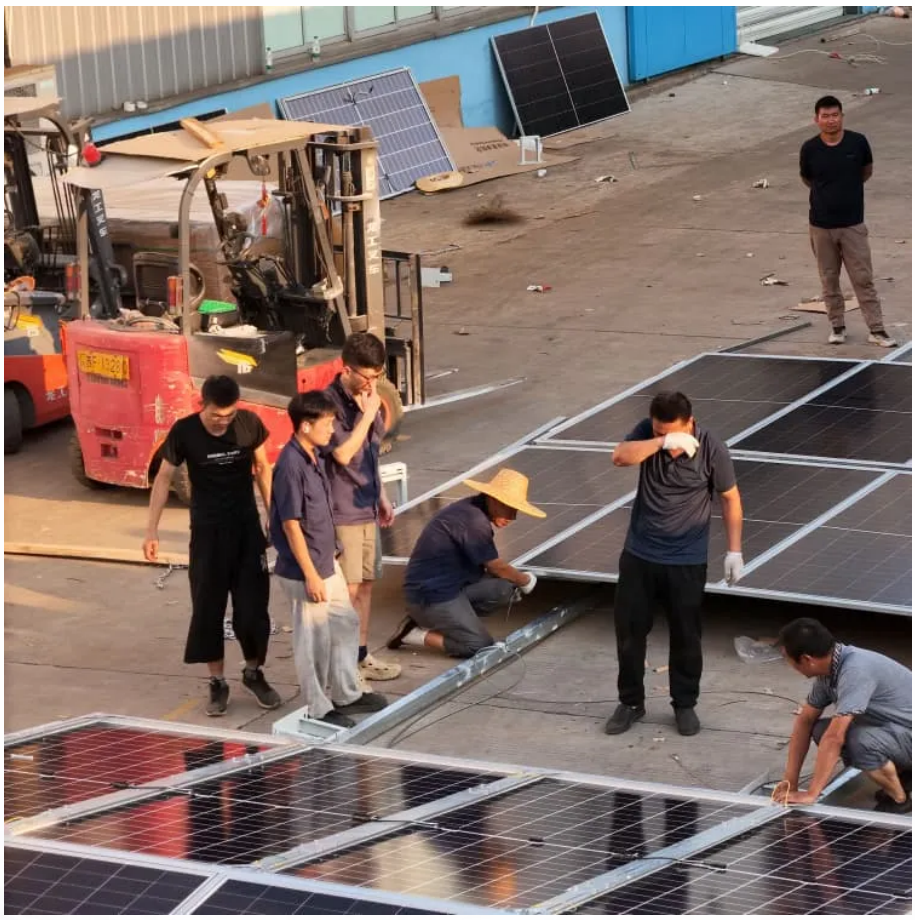
Western European Weather Solar Electricity System



Overview

Weather causes extremes in photovoltaic and wind power production. Here we present a comprehensive climatology of anomalies in photovoltaic and wind power production associated with weather patter.

Does weather affect wind power production in Europe?

Interestingly, the relative share of anomalies in onshore and offshore wind power production for Europe is typically similar independent of the weather patterns, although the estimate of the European mean wind power production for 2050 is by about a factor of four larger offshore (155.8 MW) than onshore (37.1 MW).

How much solar power does Europe produce per hour?

The model yields a mean hourly production for Europe of 130 GW for PV power and 151 GW for wind power for the 2050 installed capacity, which gives a ratio of PV to PV plus wind power production of 46%. Our model captures regional differences in weather impacts accounting for the heterogeneous distribution of installed capacities.

Can weather patterns predict photovoltaic and wind power production anomalies?

Our findings suggest that weather patterns can serve as indicators for expected photovoltaic and wind power production anomalies and may be useful for early warnings in the energy sector. European countries are collectively facing pressing challenges in securing electricity supply with an increasing share of renewable energy.

Where is solar power produced in Europe?

The Iberia peninsula (around 39.9°N, 5.0°W) is investigated due to the high potential for PV power production. The Balkans and surrounding areas (40.3°N, 20.8°E) are analyzed due to the contrast in wind power production relative to Western Europe 7.

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Climate proofing the renewable electricity deployment in Europe

Yet, electricity supply with a large RES share necessitates a detailed assessment of the impact of future climate on the operation of the power system. Indeed, as RES electricity ...

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Meteorologically-Informed Spatial Planning ...

Renewable generation variability over multiple days is a key challenge in decarbonizing the European power system. Weather regimes are one way to quantify this variability, but so far,

A climatology of weather-driven anomalies in European

Weather-driven shortfalls in wind and photovoltaic power production in Europe depend on the installation and event duration, suggest numerical simulations of power ...

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The influence of weather regimes on European ...

The growing share of variable renewable energy increases the meteorological sensitivity of power systems. This study investigates if large-scale weather regimes capture ...

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How much extreme weather events have affected European ...

Extreme weather events (EWE), such as heatwaves, extreme rainfall, or droughts, have potential to interrupt the normal function of the energy system [1, 2]. These events can, ...

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Solar and weather

Can solar power work at night? Yes, solar panels combined with energy storage systems, like batteries, capture and store extra energy produced during the day. Then, when ...

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PVGIS is a free web application that allows the user to get data on solar radiation and photovoltaic system energy production, in most parts of the world.

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Climate variability on Fit for 55 European power systems

In this paper, we investigate the impact of the natural variability of meteorological parameters on the European power system in 2030. We specifically focus on (1) analysing the main European ...

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Static weather patterns caused drop in European Solar

In Western Europe, solar irradiance was up to 20% below average, particularly in the Alpine region. The relatively static low-pressure systems drew in warm, moist air from the ...

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