

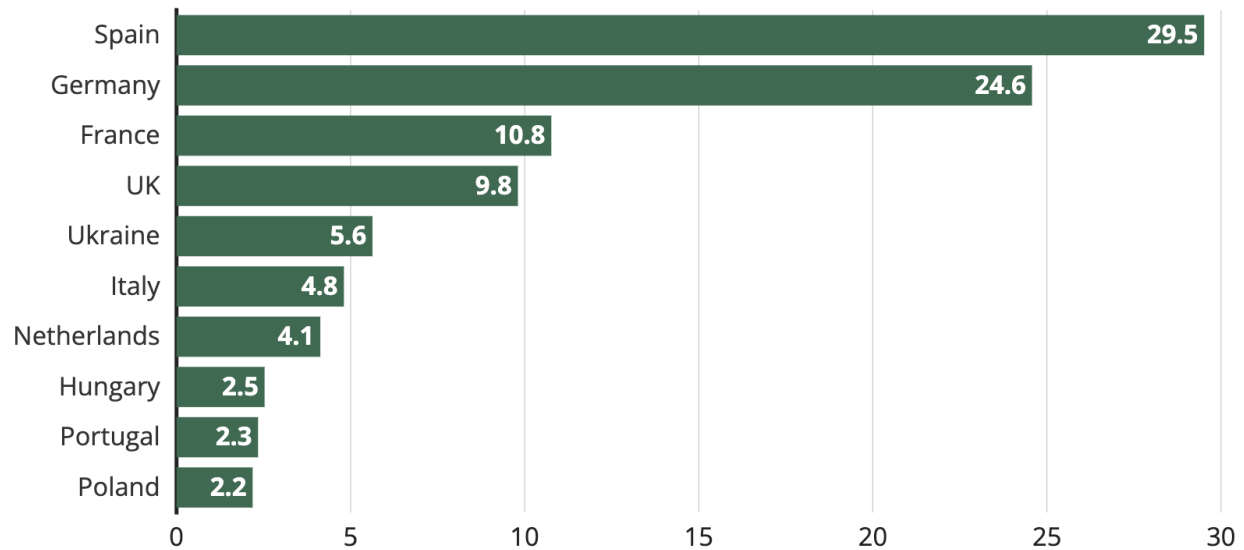
# Spain maintains solar leadership, but needs to accelerate pace to meet 2030 renewables goals

Spain shines brightly as Europe's utility-scale solar energy leader, according to new data from [Global Energy Monitor](#). The country has more utility-scale solar capacity in operation (29.5 GW) than any other European nation, and more capacity under construction (7.8 GW), and in early stages of development (106.1 GW) than the next three European countries combined.

In order to attain its newly expanded [goal](#) of having 62 GW of wind power and 81 GW of solar power installed [by 2030](#), Spain will need to hasten its pace of renewables deployment and overcome obstacles: permitting bottlenecks, anemic growth in rooftop solar, and infrastructure limitations that impede demand. With the right mix of policy strategies in the coming years, though, Spain has a realistic chance of meeting the 2030 renewables targets reaffirmed at COP 28.

## Spain leads Europe in utility-scale operating solar capacity...

Operating utility-scale solar power capacity by country in Europe, in gigawatts (GW)



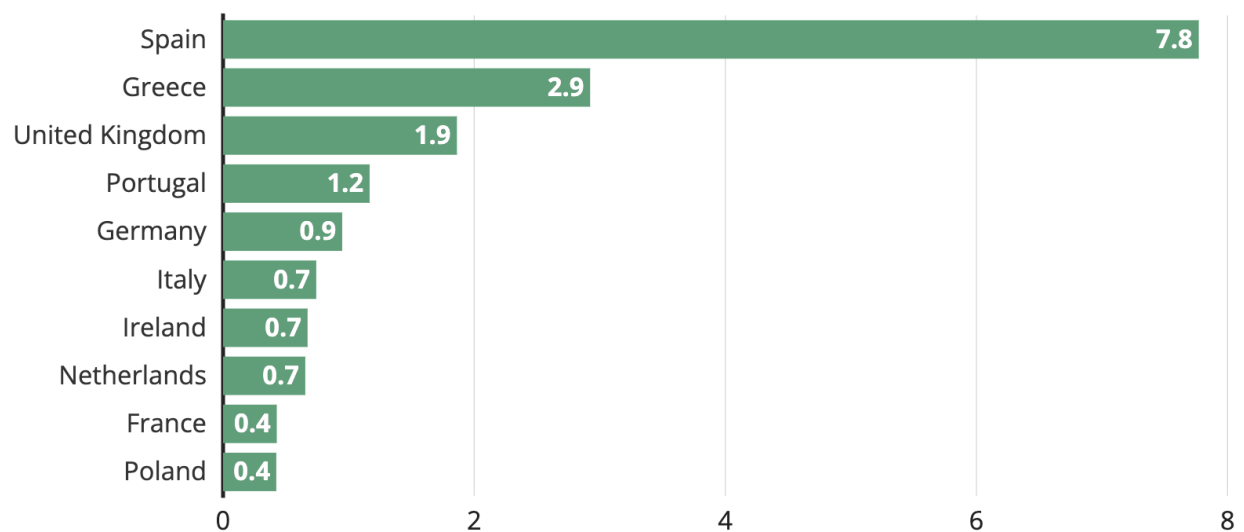
Source: Global Solar Power Tracker, Solar Asset Mapper

Note: Data includes solar project phases with a capacity of 1 megawatt (MW) or more



## ...as well as solar capacity under construction

Utility-scale solar power capacity in construction by country in Europe, in gigawatts (GW)



Source: Global Solar Power Tracker

Note: Data includes solar project phases with a capacity of 20 megawatts (MW) or more



## Spain's leadership in the European energy transition

The abundance of wind and solar in Spain's energy mix reflects natural geographical advantages and years of deliberate policy decisions to promote renewables over fossil fuels. Spain was one of Europe's renewable energy pioneers, installing more than 20 GW of [wind power](#) in the early 2000s. Within the past few years, Spain's innovative coal phase-out has made it a blueprint for a [just transition](#) from coal to clean sources of power. The government has funded [early retirements](#) for coal miners, worked with the EU to create clean energy [apprenticeships](#) for young workers, [invested](#) hundreds of millions of euros to support mining communities, and passed a sweeping [Climate Change and Energy Transition Law](#) in 2021.

In 2023 Spain revised its [National Integrated Energy and Climate Plan](#), establishing more ambitious [2030 targets](#) for utility-scale solar photovoltaic (PV) (57 GW) and solar thermal (5 GW), small-scale PV for residential, commercial and industrial ["self-consumption"](#) (19 GW), onshore wind (59 GW) and offshore wind (3 GW), while accelerating its [coal phase-out](#) date from 2030 to 2025. Spain continues to launch emblematic energy transition projects such as the 1.9 GW [Nudo Mudéjar de Andorra](#), a cluster of [solar](#) (1,204 MW) and [wind](#) (695 MW) projects designed to replace the former 1,102 MW [Teruel coal plant](#); and the 100 MW [Zorita solar farm](#) currently under [construction](#) near the retired [José Cabrera nuclear plant](#).

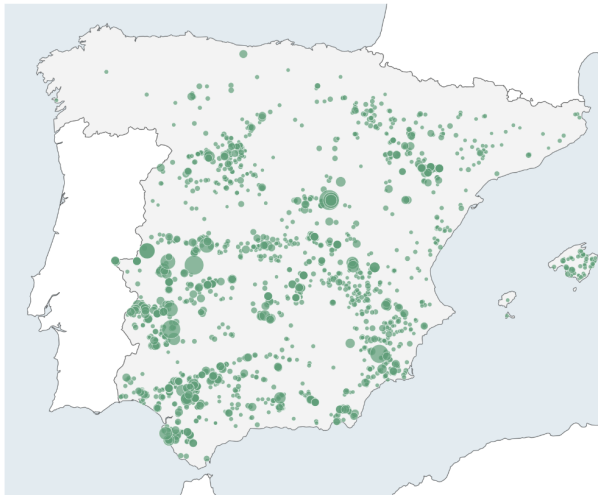
While new solar projects have surged, Spain's early prominence as a wind power leader has ebbed, though the country still ranks third among European nations in operating wind farm capacity (29.5 GW), and sixth in prospective capacity (41.8 GW). Utility-scale solar and wind projects are widely distributed throughout Spain. Given the country's geographical characteristics, northern Spain has the lion's share of operating and prospective wind projects, in regions such as Aragón, Galicia and Castilla y León. Solar

projects are more concentrated in southern and central regions including Extremadura, Andalucía and Castilla-La Mancha.

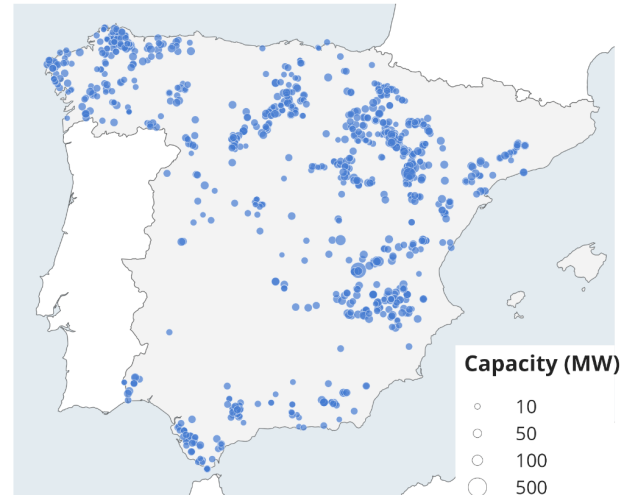
## Solar power in Spain is concentrated in central and southern areas, while wind power dominates in northern regions

Locations of operating utility-scale solar & wind power in Spain, capacity in megawatts (MW)

### Solar



### Wind



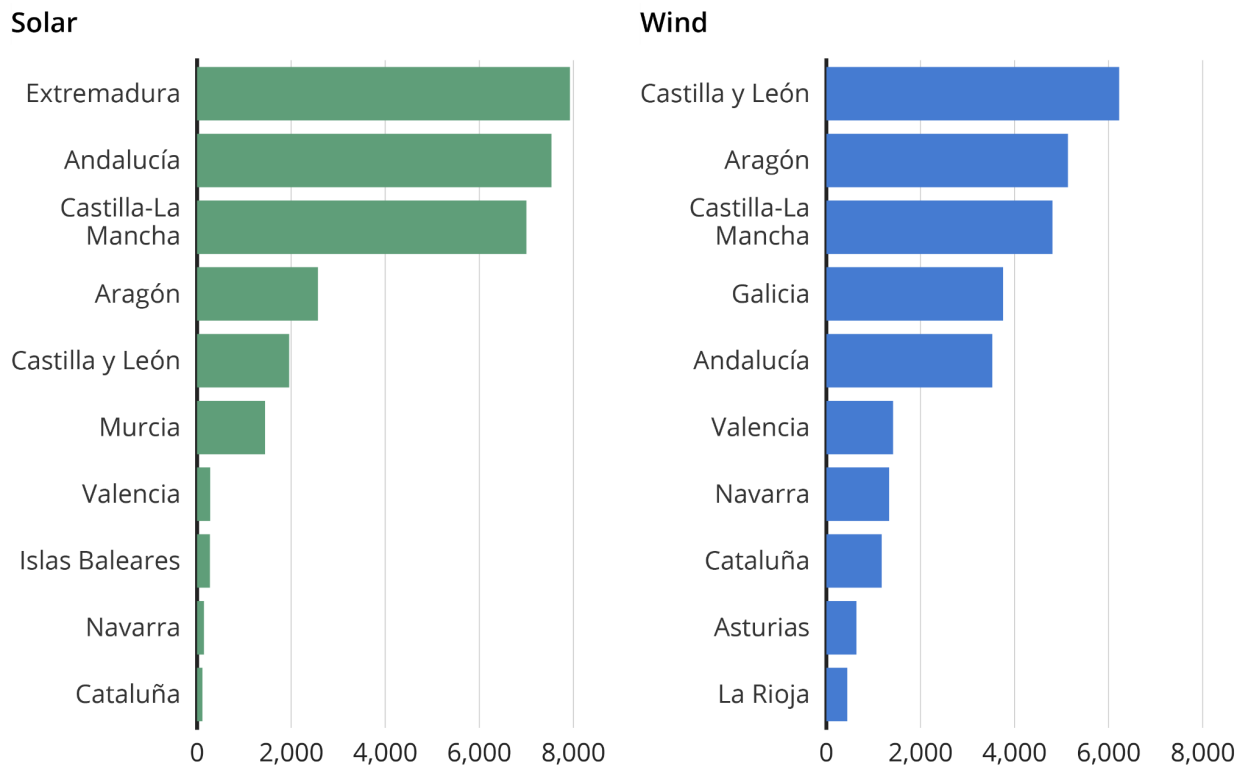
Note: Data includes solar project phases with a capacity of 1 megawatt (MW) or more and wind project phases with a capacity of 10 MW or more

Source: Global Solar Power Tracker, Global Wind Power Tracker, Solar Asset Mapper



## Which regions in Spain have most solar & wind power capacity?

Operating utility-scale solar & wind power capacity in top 10 regions, in megawatts (MW)



Source: Global Solar Power Tracker, Global Wind Power Tracker, Solar Asset Mapper

Note: Data includes solar project phases with a capacity of 1 megawatt (MW) or more and wind project phases with a capacity of 10 MW or more



## Future solar and wind projects: promise and pitfalls

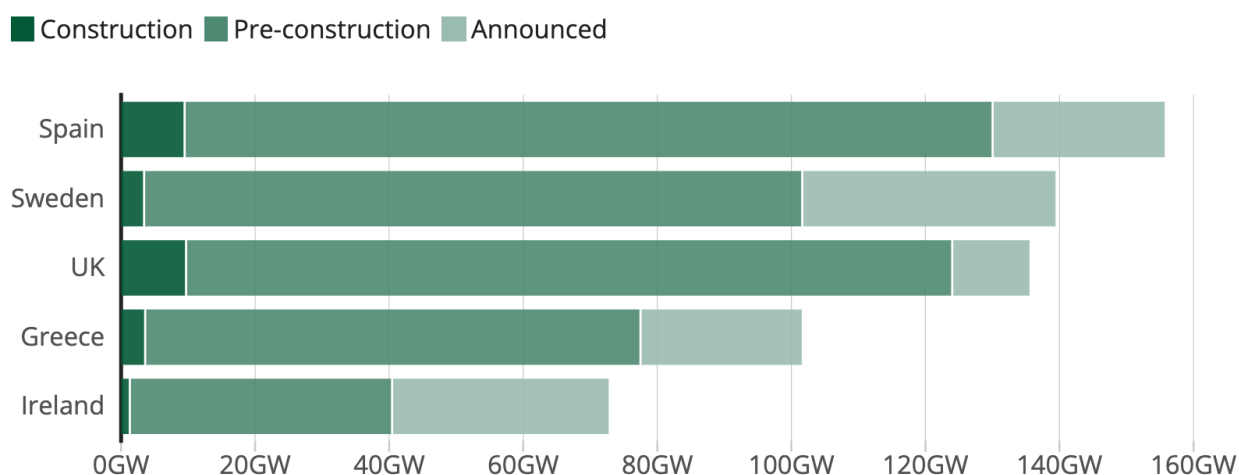
Spain boasts Europe's largest pipeline of utility-scale renewables projects in development – led by utility-scale solar, where Spain's prospective capacity (113.9 GW) is more than the next three countries combined.

GEM data show that as of May 2024, Spain already has 29.5 GW of utility-scale solar energy installed, and 7.8 GW under construction, accounting for 60% of the country's target of 57 GW of utility-scale solar PV and 5 GW of solar thermal installations by 2030.

With 106.1 GW of additional utility-scale solar projects in announced or pre-construction status, Spain could achieve its 2030 solar target by bringing less than a quarter of these existing proposals (24.7 GW) online in the next six years.

## Spain leads Europe in prospective utility-scale solar and wind

Utility-scale solar and wind capacity in top 5 European countries by status, in gigawatts



Source: Global Solar Power Tracker, Global Wind Power Tracker

Data includes solar project phases with a capacity of 20 megawatts (MW) or more and wind project phases with a capacity of 10 MW or more.



A greater challenge, and an important barometer of future success, will be the country's ability to spur the development of small-scale solar (under 1 MW). Rooftop solar, beyond its benefits in democratizing energy access, helps alleviate transmission grid bottlenecks and preserves agricultural land and greenfields from being converted to solar fields. To date, Spain's small-scale sector has lagged far behind other European countries, disincentivized by the country's "[sun tax](#)," which was in effect from 2013 to 2018. Comparing GEM's utility scale [figures](#) to IRENA's total solar [numbers](#) shows that only 5% of Spain's solar capacity is in small-scale and residential rooftop installations, compared to 62% for Europe. Spain's National Integrated Energy and Climate Plan calls for autoconsumo (self-generated solar at residential, commercial and industrial sites) to reach [19 GW by 2030](#), up from an estimated [7 GW in 2023](#). This will require a

reversal of the recent [downturn](#) in [rooftop solar](#) installations, and a renewed emphasis on incentives such as the [0% VAT](#) on rooftop solar proposed by Spain's photovoltaic union UNEF, modelled on the success of similar measures in Germany and the UK.

The prognosis for wind is mixed. Spain has 29.5 GW of utility-scale wind in operation, plus 1.7 GW in construction, meaning that the country has already achieved more than half its national goal of 62 GW by 2030. However, to make up the remaining deficit of 30.8 GW, Spain will need to build 77% of the 40 GW of utility-scale wind farms currently in the pipeline with "announced" or "pre-construction" status, and the pace of new commissioning over the next six years will need to increase nearly fivefold compared to the ~1 GW added annually between 2019 and 2023. The Spanish Wind Energy Association (AEE) has forecast [year-over-year growth](#) in new wind installations for 2024, but acknowledges that Spain is not yet on track to meet its 2030 targets.

Over the long term, offshore wind may help mitigate these challenges. While there are currently no offshore wind projects under construction, current targets call for [3 GW](#) to be installed by 2030, and GWEC estimates Spain's [offshore wind potential](#) to be greater than 200 GW. The industry is welcoming recent government moves to establish a [regulatory framework](#) for offshore renewables, with an official calendar of offshore wind auctions expected soon.

More than 90% of Spain's prospective utility-scale renewables projects have not yet reached the construction phase, meaning that most are still seeking permits or have only recently been announced. A significant number of projects in these early phases may never be built, for various reasons:

- Concern about potential damage to [wildlife](#) and [bird](#) habitat and impacts on [agriculture](#) and traditional land use has led to unfavourable [environmental](#)

[impact assessments](#), citizen [protests](#)<sup>1</sup>, and [lawsuits](#) that have slowed or cancelled many projects. Opposition to large renewables projects is especially strong in Galicia, Aragon and in [Catalonia](#), where renewables-based generation grew only [2.2%](#) in 2023, compared to [15.1%](#) nationally.

- In areas with high wind and solar potential, multiple projects are often proposed for the same piece of land, meaning that several projects must be rejected for every project approved.
- The recent glut of renewable energy proposals has exacerbated [delays](#) in Spain's already time-consuming permitting process, which can take up to [five years](#) to complete. This means that some prospective projects currently listed in GEM's database, even if successful, may not actually be commissioned before 2030.
- [Flagging electricity demand](#) and inadequate infrastructure also pose challenges to deployment of new projects.

Despite these challenges, Spain remains well positioned to maintain and enhance its standing as a European renewables leader. Spain's natural advantages in wind and solar supply, combined with the right mix of policy strategies, offer a realistic chance of meeting the 2030 renewables targets reaffirmed at COP 28. Spain's best path forward calls for enhanced promotion of small-scale solar, judicious and timely commissioning of existing utility-scale wind and solar proposals, continued research on offshore wind, and measures to boost demand and prevent oversupply, including grid and storage expansions, electrification of transport, and development of electricity-intensive industries.

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<sup>1</sup> Spain's Ministry of Ecological Transition has organized public "listening and participation" [workshops](#) to facilitate the socially and environmentally fair distribution of the benefits linked to the energy transition and the integration of renewable energies. In April 2024, the ministry announced plans to incorporate socioeconomic and environmental criteria in future [renewable energy auctions](#).

Civil society organizations have led similar [initiatives](#). In February 2024, following the publication in 2023 of its [report](#) *Renewables and territory: inspirational cases to improve deployment in the territory*, SDSN Spain presented a constructive and proactive [roadmap](#) to balance the narratives around the deployment of renewable energies and guide the actions of public administrations and other key actors in the sector.

## Background on Global Energy Monitor

Global Energy Monitor (GEM) develops and shares information in support of the worldwide movement for clean energy.

By studying the evolving international energy landscape, creating databases, reports, and interactive tools that

enhance understanding, GEM seeks to build an open guide to the world's energy system.

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