

Global Solar Market Outlook 2026-2030

Including a focus on Australia



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Foreword

Welcome to the Global Market Outlook for Solar Power 2026-2030

One could almost take it for granted that solar is breaking deployment records year after year. And indeed, the global solar power fleet passed the 3 TW milestone in early 2026, less than two years after reaching 2 TW and only four years after entering the terawatt era. What is even more impressive is that solar now supplies 9% of global electricity demand – three times as much as just five years ago.

In 2025, the world installed a record 664 GW of new solar capacity, a 12% increase over the previous year. Once again, solar was by far the largest contributor to new renewable power generation worldwide, accounting for around 80% of renewable capacity additions. It also outpaced the combined additions of fossil fuel and nuclear power generation. These remarkable achievements reflect the extraordinary pace at which solar has become the backbone of the global energy transition.

But now is not the time for complacency.

In an increasingly uncertain geopolitical and economic environment, shaped by repeated energy security crises and fossil fuel price volatility, solar paired with battery storage is becoming more important than ever. No other technologies can deliver affordable, resilient and rapidly deployable energy at scale while simultaneously strengthening national and individual energy security. This edition therefore includes a dedicated chapter exploring the growing relationship between solar deployment, energy independence and resilience.

The solar message is crystal clear: the technology is ready for much more, the economics are compelling, and the strategic rationale has never been stronger

Yet a closer look at the numbers reveals that the industry is entering a new phase. While solar continues to grow, the pace of expansion is moderating. We expect the global market to contract by 8% in 2026, primarily due to a projected 24% decline in China following major changes to its solar market design. The rest of the world keeps mostly growing, but, as the world's dominant solar market, developments in China inevitably shape global trends.

Looking ahead, growth remains firmly on the horizon. Under our Medium Scenario, global solar capacity is forecast to more than double to 6.6 TW by 2030. Impressive at first sight, this represents a downward revision from last year's forecast of 7.1 TW, reflecting the structural constraints that increasingly accompany solar's success. Grid congestion, insufficient storage, limited system flexibility, permitting delays, financing barriers and supply-chain resilience are already key challenges hampering further growth.

For this reason, the Global Solar Council has expanded its policy recommendations. In addition to longstanding priorities, governments should integrate solar into national energy security strategies and accelerate the deployment of battery storage, recognising its dual role in strengthening resilience and providing system flexibility.

The case of Australia, our region in focus this year and the upcoming COP31 co-host, demonstrates the benefits of strategic investment in storage, showing how even a very mature solar market can continue to unlock new opportunities. Policy support has triggered an unprecedented battery storage boom in the country already home to the highest per-capita solar deployment globally, adding more than 10 GWh of residential storage in less than a year and beginning to decrease gas generation during evening peak demand periods.

If more countries follow the Australian approach, our High Scenario could turn into reality, pointing to over 15% additional upside potential, with the global solar fleet reaching 7.6 TW by 2030. That pathway becomes increasingly achievable, and could be even conservative, if governments accelerate electrification, modernise power systems and draw the appropriate lessons from the recent fossil fuel energy crises.

The COP31 Presidency's proposal for a 35% global electrification target sends a strong and positive signal. At the same time, promising solar developments in Southeast Asia in response to the latest fossil fuel crisis in particular highlight the region's growing momentum. Home to more than half of the world's population and heavily dependent on imported fossil fuels, the region has a unique opportunity to strengthen both its energy security and economic competitiveness through solar and storage deployment.

The solar message is crystal clear: the technology is ready for much more, the economics are compelling, and the strategic rationale has never been stronger. The task now is to ensure that policy frameworks keep pace with the extraordinary momentum of solar and battery storage. If they do, the next terawatts will arrive even sooner than currently expected.

Finally, we would like to thank the national solar and renewable energy associations that contributed their expertise and market intelligence to this report. Their insights and feature articles help make the Global Solar Market Outlook a unique and comprehensive assessment of solar market developments around the world.

Enjoy reading our report.



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**Methodology:**

SolarPower Europe's five-year forecast consists of Low, Medium and High Scenarios. The Medium scenario anticipates the most likely development given the current state of play of the market. The Low Scenario forecast is based on the assumption that policymakers halt solar support and other issues arise, including interest rate hikes and severe financial crisis situations. Conversely, the High Scenario forecasts the best optimal case in which policy support, financial conditions and other factors are enhanced.

Segmentation is based on the following system size: Residential (<10 kW); Commercial (<250 kW); Industrial (<1,000 kW); Utility-scale (>1,000 kW, ground-mounted). SolarPower Europe's methodology includes only grid-connected systems. Installed capacity is always expressed in DC, unless otherwise stated.

All figures are based on SolarPower Europe's best knowledge at the time of publication. In the preparation of reports, SolarPower Europe consults and gathers inputs from a wide range of industry associations, institutions, and stakeholders. Nevertheless, the figures and estimates presented in this report are the result of our own independent analysis and methodology.

The data published in this report do not necessarily reflect the views, estimates, or positions of the external sources we consulted. Differences between SolarPower Europe's figures and those of other organisations may arise due to variations in scope, definitions, assumptions, or calculation methods.

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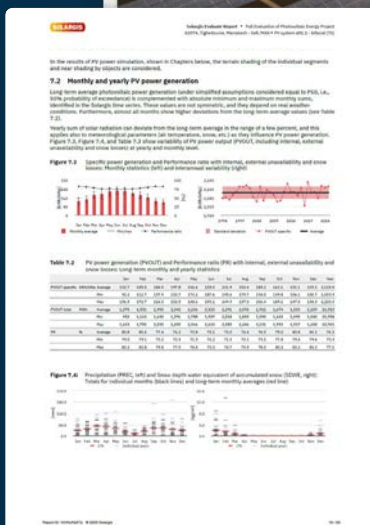
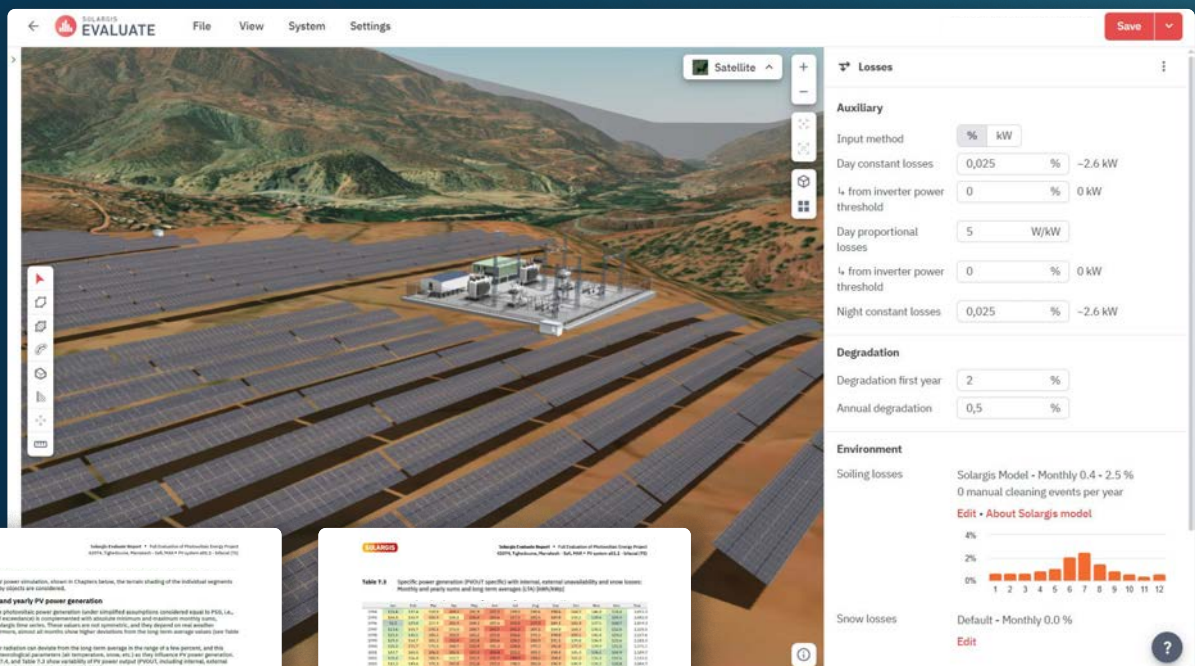
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A record 664 GW of new solar PV capacity was added in 2025 despite growth slowing to 12%; Asia-Pacific reached 73% annual market share

664 GW

664 GW installed in 2025:
an all-time record

12%

12% annual market growth:
a continued decrease from 32%
in 2024 and 85% in 2023

6.6 TW

6.6 TW total solar capacity reached by
2030, doubling in five years

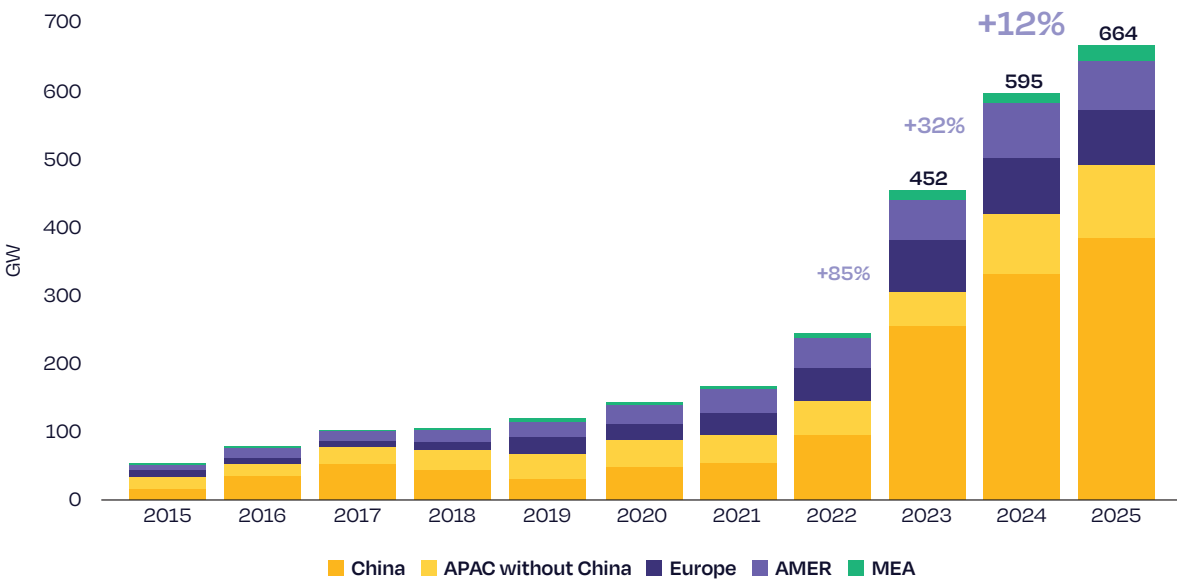
The global solar market reached a new record in 2025, with 664 GW of new installed capacity (Fig. 1). This represents an increase of 69 GW compared with 2024 and 212 GW compared with 2023. However, although the market continues to set new records, growth is steadily slowing, from 85% in 2023 to 32% in 2024 and 12% in 2025. Despite this deceleration, solar PV remained the leading driver of the global energy transition in 2025, accounting for 77% of all renewable capacity additions and reaching 2,778 TWh of generated electricity. Solar’s share of global electricity production rose to 9%, doubling in just four years and surpassing wind power for the first time. The Asia-Pacific region was more than ever the engine of global solar growth. It accounted for 73% of

worldwide additions, with 487 GW installed in 2025, representing annual growth of 17%, well above the global average of 12%. Europe became the second-largest market, adding 81.6 GW, recording a modest 3% growth. The Americas ranked third, with 43.2 GW and accounting for 12% of global addition, but were the only region to experience a year-on-year decline, with installations falling by 13%. Meanwhile, the Middle East and Africa remained the smallest regional market, adding 23.7 GW, yet recorded the fastest growth rate, with installations increasing by 51% compared with 2024. In total capacity terms, the world reached 2.9 TW of operating solar PV systems at the end of 2025. This corresponds to a doubling of the solar fleet in three years, and a tripling in four years.

Figure 1

Although solar added a record level of 664 GW in 2025, growth slows down to 12%

Annual solar PV installed capacity 2015-2025



China extends its dominance to a record 57% annual market share, while India emerges as the world’s second-largest solar market

The global solar market remained highly concentrated in 2025, with the top 10 countries accounting for 82% of all newly installed capacity worldwide, one percentage point more than in 2024 (Fig. 2). China further reinforced its dominant position, adding a record 382 GW and representing 57% of global installations. For the third consecutive year, China alone installed more solar capacity than all other top 10 markets combined.

The most notable shift in the rankings was India's rise to second place. With 45.7 GW of new installations and annual growth of 49%, India overtook the United States and strengthened its position as the world's leading growth market outside China. Despite a 14% decline to 43.2 GW, the United States was the third-largest market in 2025. Germany climbed

to fourth place with 17.4 GW, overtaking Brazil, which saw installations drop to 14.5 GW. Spain retained sixth position with 11.3 GW of new capacity. Saudi Arabia emerged as one of the year's standout performers, tripling its annual installations to 8.4 GW and securing seventh place. It was the only country from the Middle East and Africa (MEA) region represented in the global top 10.

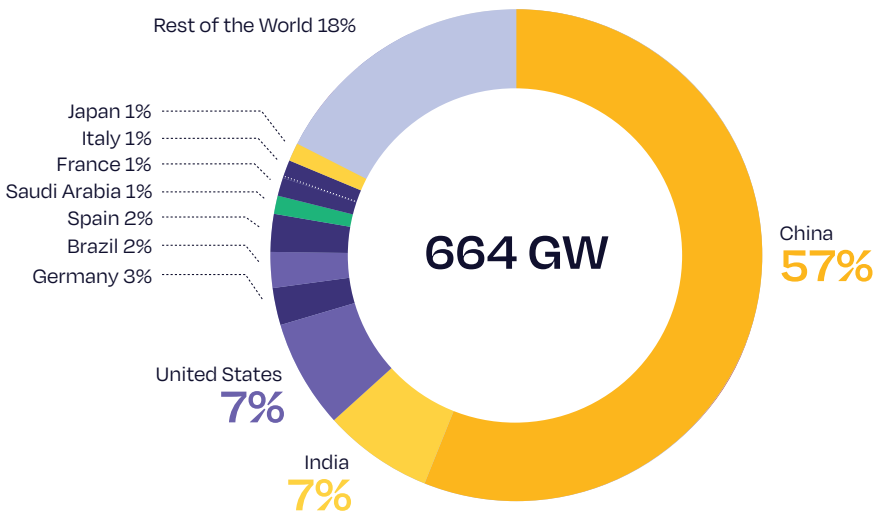
The threshold for entering the global top 10 increased from 4.7 GW in 2024 to 5.8 GW in 2025, reflecting the continued expansion of solar deployment across a growing number of markets.

Notably, as a single market, the European Union ranked second globally, adding 67.2 GW in 2025 and representing a 10% market share.

Figure 2

The top 10 markets account for 82% of new solar installations in 2025

Top 10 annual solar PV market shares 2025



Note: Colours represent world regions.
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In 2026 the global solar market is expected to decline for the first time in two decades, with an 8% drop to 612 GW; but the long-term growth trajectory remains intact

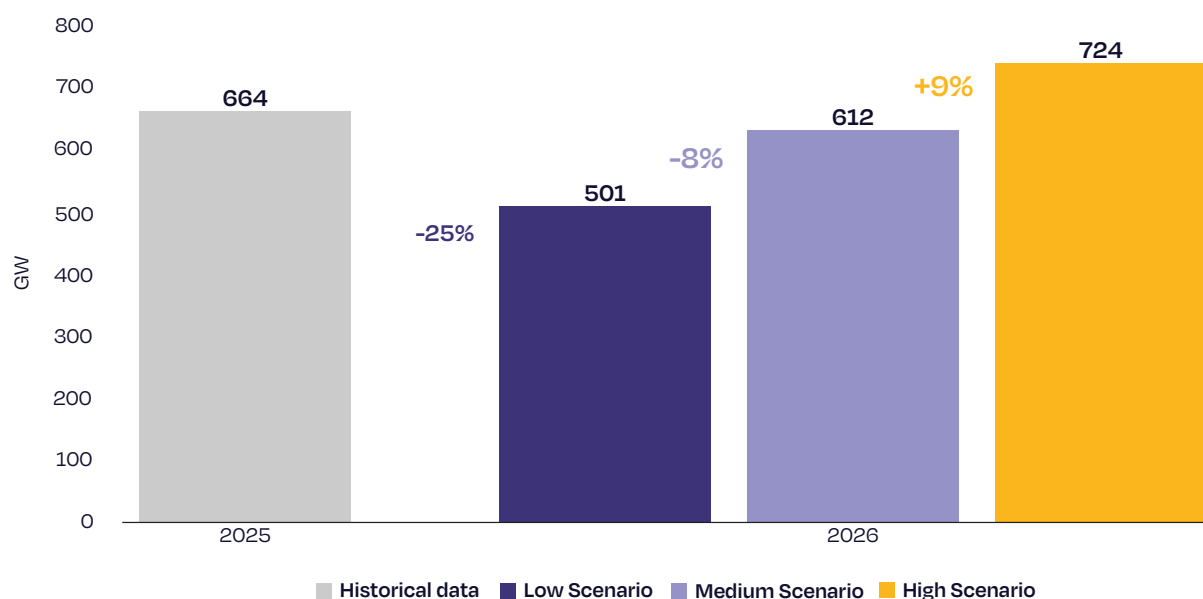
After several years of rapid expansion and a new all-time high of 664 GW in 2025, the global solar PV market is expected to decline in 2026, marking the first contraction in over 20 years. Under the most likely Medium Scenario, annual installations fall to 612 GW, representing an 8% contraction (see Fig 3). This turning point reflects increasingly diverging forces shaping the global solar market. On the one hand, a projected 24% decline in China's solar market is expected to weigh heavily on global volumes. At the same time, growing curtailment rates and more frequent episodes of negative electricity prices in mature markets are slowing deployment. These system constraints highlight the growing need for faster progress on grids, storage, and system flexibility. On the other hand, the fundamental drivers of solar energy remain firmly intact. Solar PV continues to be one of the most cost-competitive and fastest-to-deploy energy technologies. Moreover, the current geopolitical environment and tensions in the

Middle East are increasing uncertainty around fossil fuel supply and prices. In this context, solar PV is further strengthening its role as a strategic asset for governments, supporting both energy security and climate objectives. These opposing dynamics are reflected in the scenario range for 2026. The Low Scenario assumes a combination of a sharper decline in China and a broader slowdown in mature markets, bringing global installations down to 501 GW, a 25% contraction. By contrast, the High Scenario points to continued, albeit slower, growth of 9% to 724 GW, driven by stronger deployment outside China. This pattern would echo the acceleration observed during the 2022 energy crisis. Despite this short-term divergence, all scenarios confirm that 2026 represents a temporary adjustment rather than a structural decline. Growth is expected to resume from 2027 onwards, reaching an annual market of 864 GW in 2030 under our Medium Scenario, representing a 7% compound annual growth rate over the next five years.

Figure 3

The global solar market is expected to decline by 8% in 2026, marking the first contraction in two decades

Annual solar PV market scenarios 2025-2026



The global solar market compression in 2026 is largely driven by a 24% drop in China, which cannot be compensated through the growth expected in other regions

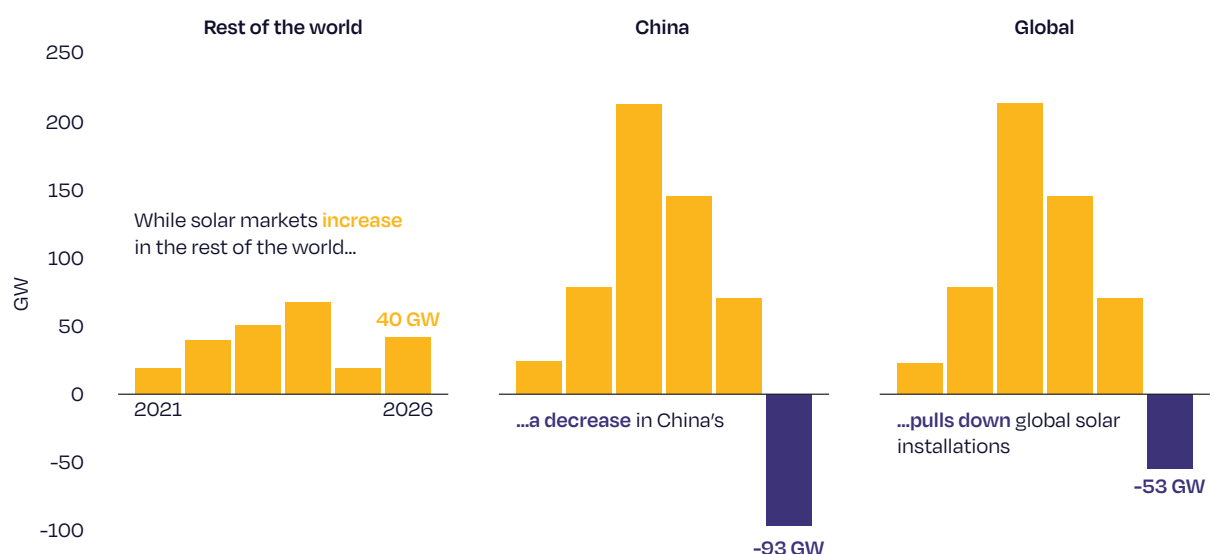
The expected decline in the global solar market in 2026 is first and foremost a China-driven story. Under our Medium Scenario, Chinese annual solar installations in 2026 are expected to be 93 GW lower than in 2025, dragging down global installations by around 53 GW. The decrease in China will more than offset continued growth of about 40 GW across the rest of the world. This imbalance highlights the scale of China's solar market and its decisive influence on global trends (see Fig 4). Both the exceptional growth in 2025 and the expected decline in the Chinese market in 2026 are driven by policy changes. Starting from 1 June 2025, the previous fixed feed-in tariff regime was discontinued, and new projects must sell electricity on the power market instead of receiving a guaranteed tariffs payment. As a result, developers front-loaded installations ahead of this date to benefit from the last feed-in tariffs. Following this, monthly installations sharply decreased in the second half of 2025 and, so

far, also in 2026. In contrast, solar deployment outside China continues to expand across all regions in 2026, supported by solid underlying fundamentals. Asia-Pacific excluding China is expected to increase by 18%, driven by India and several emerging markets. Europe is projected to grow modestly by around 3%, reflecting increasing market maturity, while the Americas are expected to expand by 11%. The Middle East and Africa region leads in relative terms, with installations forecast to surge by 48% from a low base. Due to the contraction in China, all other regions are set to gain global solar market share in 2026. This divergence between a contracting Chinese market and a growing rest of the world underlines a key message for 2026: the global decline should not be mistaken for a structural slowdown. Instead, it reflects the weight of China as a single dominant market, whose variations are inevitably reflected in global installations.

Figure 4

Due to its dominant share, a decrease in the Chinese solar market is expected to cause a decline in total annual installations in 2026

Net changes in annual solar additions, 2021-2026



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Cumulative capacity surpassed 3 TW in early 2026, and is expected to reach 6.6 TW by 2030

After crossing the 2 TW threshold in 2024 and reaching around 2.9 TW in 2025, global capacity surpassed 3 TW in early 2026, confirming the unprecedented speed of solar deployment in recent years. It took nearly seven decades to install the first terawatt of solar capacity, yet less than four years to triple it.

Looking ahead, the global solar fleet is projected to more than double again, reaching 6.6 TW by 2030 under the Medium Scenario. While this outlook implies strong growth rates, it represents a downward revision compared to last year's forecast of 7.1 TW, reflecting increasing system constraints and a more cautious near-term

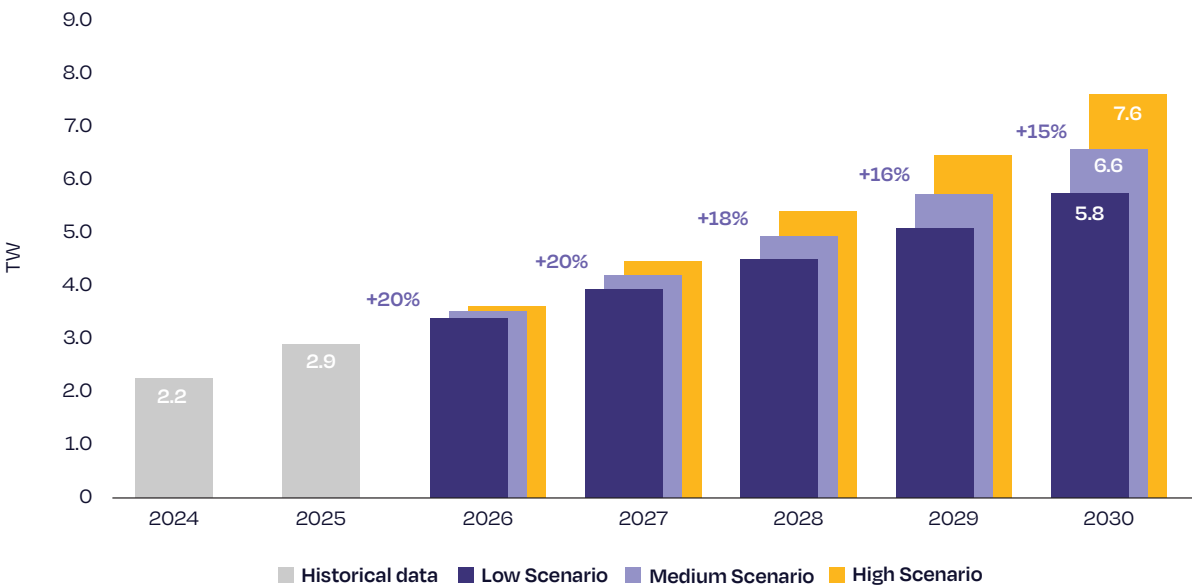
trajectory. In the context of the COP28 pledge to triple renewable energy capacity to 11 TW by 2030, solar PV is expected to play the central role: under current market developments, solar alone would deliver around 60% of this target, underlining its unmatched scalability, cost-competitiveness, and speed of deployment.

Overall, while short-term uncertainties persist, the long-term outlook for solar remains strong, with the technology continuing to expand at an unprecedented pace and cementing its role at the core of global decarbonisation efforts, and its new role as the key technology for countries striving for more energy security.

Figure 5

Double-digit growth rates expected for the global solar fleet, with 6 TW crossed in 2030

World cumulative solar PV market scenarios 2026-2030





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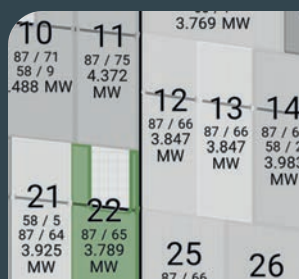


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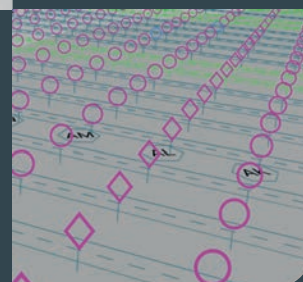
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Policy recommendations

Policy recommendations for global solar PV deployment

By Global Solar Council

Authors: *Anjali Lathigara and Abdallah Alshamali*, GSC; *Gianni Chianetta*, Greening the Islands Foundation; *Hinde Liepmannsohn*, Middle East Solar Industry Association

Not only has solar broken another installation record in 2025, but the fastest growing power technology has also now reached another evolutionary level, as it started to play a role in governments' energy security strategies. However, PV's energy security benefits are not automatic. In many countries, solar deployment still faces barriers including weak grids, slow permitting, high financing costs, unclear regulations, limited storage, shortages of skilled workers, and unequal access for low-income consumers. To make solar PV a true energy security instrument, governments need to move beyond simple deployment targets and create enabling frameworks that connect solar expansion with grid planning, market reform, resilience policy and industrial strategy. The Global Solar Council recommends to:

1

Integrate solar PV into national energy security strategies

Governments should explicitly recognise solar PV as part of national energy security planning, not only as a climate or renewable energy target. Energy security strategies should assess how much imported gas, coal, diesel or heavy fuel oil can be displaced by solar in the power sector, and how solar can reduce exposure to fuel-price volatility, currency depreciation and geopolitical supply risks.

This requires energy ministries, system operators, regulators and finance ministries to jointly model solar's role in reducing fuel import bills, emergency fuel procurement and subsidy exposure. Solar targets should be linked to national risk assessments, including fossil-fuel import dependence, exposure to maritime chokepoints, blackout risks, and climate-related threats to energy infrastructure.

2

Accelerate grid investment and connection readiness

Solar cannot deliver its full energy security value if grids are congested, outdated or unable to connect new projects. Governments should therefore treat transmission and distribution investment as a core part of solar policy. This includes expanding grid capacity, modernising substations, digitalising distribution networks, improving forecasting and reducing connection queues.

Grid planning should anticipate future solar growth rather than respond after bottlenecks appear. Regulators should require transparent grid-capacity maps, clear connection timelines and fair cost-sharing rules for grid upgrades. In weak-grid contexts, distributed solar, mini-grids and embedded generation should be planned as complements to grid expansion, especially for rural areas, industrial zones and critical public services.

3

Incentivise battery storage deployment

Solar PV strengthens energy security most effectively when paired with battery storage and other flexibility solutions. Without energy storage, solar mainly reduces daytime demand, with storage, it can support evening peaks, backup power, grid stability and emergency resilience.

Governments should develop dedicated storage policies, including procurement targets, tariff structures that reward flexibility, rules for storage participation in electricity markets and incentives for behind-the-meter batteries. Priority should be given to solar plus storage for hospitals, water systems, telecom infrastructure, emergency shelters, schools and public buildings. For isolated grids and islands, solar-plus-storage should be treated as critical infrastructure that reduces diesel dependence and strengthens resilience during fuel shortages or extreme weather.

Consideration should also be given in national energy storage strategies to including other types of storage, such as pumped hydro storage and Long Duration Energy Storage, which stores energy for more than 8 hours as heat, movement and more.

4

Reform electricity markets and tariffs to reward flexibility and self-consumption

Poorly designed electricity tariffs can slow solar deployment or create unfair cost-shifting between solar users and non-solar users. Governments should update market rules so that solar, storage, demand response and distributed generation are properly valued.

Net metering, net billing and feed-in tariff schemes should be designed to support early adoption while ensuring sustainable grid cost recovery. Time-of-use tariffs can encourage consumers to shift demand to solar generation hours, while capacity and flexibility markets can reward storage and demand-side resources. In any case, regulators should avoid abrupt policy reversals that undermine investor confidence but also ensure that low-income consumers are not left paying disproportionate grid costs.

5

Reduce the cost of capital for solar PV

Though capital expenditures for solar projects have decreased dramatically in the last few years, solar PV is still capital-intensive, so financing conditions are central to its affordability. In many emerging and developing economies, high interest rates, currency risks, weak creditworthiness and limited access to long-term finance make solar more expensive than it should be.

Governments and development finance institutions should use guarantees, concessional loans, blended finance, local-currency lending and risk-sharing instruments to lower financing costs. Dedicated credit lines should be created for rooftop solar, commercial and industrial solar, mini-grids and agricultural solar applications. For small consumers, financing should move beyond large project finance and include leasing, pay-as-you-go models, consumer credit, on-bill financing and aggregation platforms.

6

Prioritise distributed solar & storage for critical services

Solar PV should be used strategically to protect essential services during grid failures, fuel shortages, disasters or conflict. Governments should identify critical facilities and create dedicated programmes to install solar plus storage systems for hospitals, clinics, water pumping and treatment facilities, emergency response centres, telecom towers, schools and food-storage infrastructure.

These programmes should include technical standards, maintenance budgets and backup requirements. Systems should be designed not only to reduce bills, but to maintain essential operations during outages. Public procurement can also aggregate demand, reduce costs and create local solar service markets.

7

Expand access to solar for low-income households and vulnerable communities

If solar deployment is left only to wealthier consumers and large businesses, it can worsen inequality. Energy security policy should therefore ensure that low-income households, renters, informal settlements, rural communities and small businesses can also benefit from solar.

Governments can support this through targeted subsidies, grants, concessional finance, community solar schemes, social housing solar programmes and public-sector aggregation. For off-grid areas, solar home systems and mini-grids should be integrated into national electrification strategies. Consumer protection rules are also needed to ensure quality equipment, fair contracts, transparent pricing and reliable after-sales service.



4.1 MWh / 4MW installation, Corsica, France

8

Streamline permitting, licensing and administrative procedures

Slow permitting and unclear administrative processes can delay solar deployment even when projects are economically viable. Governments should simplify licensing, land approval, environmental review and grid-connection procedures, especially for rooftop solar, commercial and industrial systems, mini-grids and small utility-scale projects.

One-stop-shop permitting platforms can reduce delays and improve transparency. For larger projects, governments should identify suitable low-conflict zones, such as degraded land, marginal agricultural lands, industrial sites, reservoirs, parking areas and public buildings. Permitting reform should accelerate deployment while maintaining environmental and social safeguards.

9

Strengthen solar supply chain resilience

While solar provides clear energy security benefits in reducing fossil fuel import dependence, it is important to evaluate the resilience of trade routes for PV modules, inverters, batteries, and other components. Energy security strategies should therefore include solar supply chain resilience.

Governments should diversify suppliers, support responsible sourcing, support regional manufacturing where economically viable, and develop recycling and circularity systems for PV components and batteries as we slowly move towards a fully circular industry. Strategic procurement rules should balance supply chain security with affordability. Trade and industrial policies should avoid unnecessarily slowing deployment, especially in countries where solar is urgently needed to reduce fuel dependence and address the cost of living crisis.



Façade PV system, Heerbrugg, Switzerland — 275 kW on a 25-metre-high façade

10

Build local skills, standards and quality assurance systems

Poor-quality installations can undermine public confidence, reduce system performance and create safety risks. Solar energy security depends not only on installing PV systems, but on ensuring systems are well designed, safely installed and properly maintained.

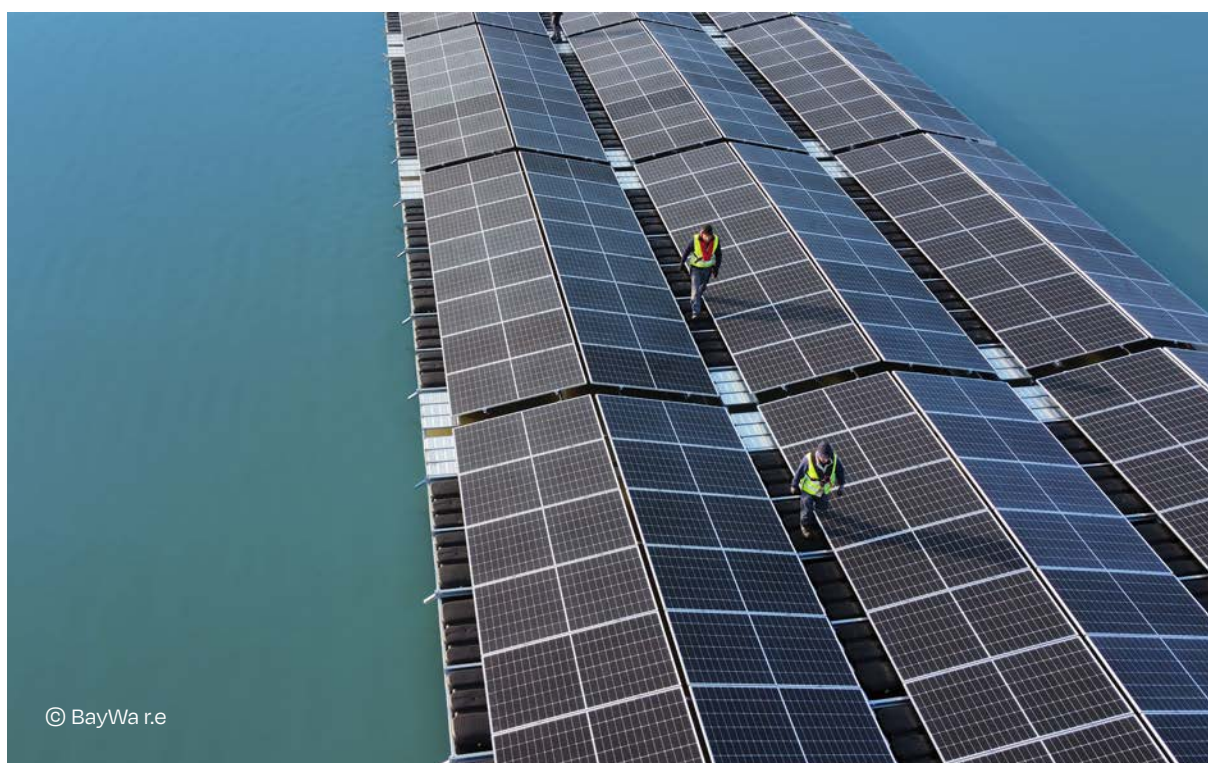
Governments and industry should adopt and align national curricula with recognised training and quality benchmarks, such as the [Global Solar Training Standards](#) to ensure consistency, safety, and professionalisation of the sector. Investments in installer certification, technical training, inspection systems and vocational programmes are additional key aspects. Training should cover rooftop systems, utility-scale projects, batteries, inverters, mini-grids and operations & maintenance. Skills development should be linked to job creation and local economic development, especially in emerging solar markets.

11

Support solar for productive uses and economic resilience

Solar PV can strengthen energy security by helping households, businesses, and public institutions reduce exposure to unreliable grids and diesel costs. Governments should support solar in applications such as irrigation, cold storage, manufacturing, telecoms, mining, and tourism, among others.

Policy tools can include concessional finance, tax incentives, standardised power purchase agreements, leasing models and technical assistance for small and medium-sized enterprises. Solar energy should be integrated into agricultural, industrial and rural development strategies, not treated only as an electricity-sector intervention.



3 MWp floating solar PV plant. Quarzwerke, Haltern am See, Germany

12

Equip public buildings with solar to increase emergency readiness and serve as an anchor for demand

Public buildings can provide a fast and visible pathway for solar deployment. Governments should install solar and storage on schools, hospitals, ministries, municipal buildings, universities, water facilities and public housing where technically feasible.

This reduces public electricity bills, strengthens resilience of essential services and creates predictable demand for local installers. Public-sector solar programmes can also demonstrate quality standards, aggregate procurement and build market confidence.

13

Coordinate solar policy with electrification of transport, heating and industry

Solar's energy security value grows when more sectors shift from imported fossil fuels to electricity. Governments should therefore link solar deployment with electric vehicles, electric public transport, heat pumps, electric cooking, green industrial processes and agricultural electrification.

This must be planned carefully to avoid new grid stress. Smart charging, demand response, storage and time-of-use tariffs can align new electricity demand with solar generation. Over time, this allows solar to reduce not only power-sector fuel dependence, but also oil and gas exposure across the wider economy.



Sombornon Agrivoltaic Solar Park, Sombornon, Côte-d'Or, France — 34 MW solar PV project

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Global solar market

Global solar PV installations reached another record of 664 GW in 2025, with the Asia-Pacific region accounting for 73% of new capacity additions. China again dominated the market, adding 382 GW, more than all other top 10 markets combined, while cumulative global capacity reached 2.9 TW. However, the global solar market is expected to decline by 8% in 2026 to 612 GW, marking the first contraction in two decades. China's projected decrease will not be offset by growth in other regions, where rising system integration challenges are slowing expansion in key markets. Despite this brief decline, growth in annual installations is expected from 2027 onwards, reaching 864 GW in 2030. Total installed capacity is projected to reach 6.6 TW by the end of the decade, with solar PV contributing 60% of the global 11 TW renewable energy target set at COP28.

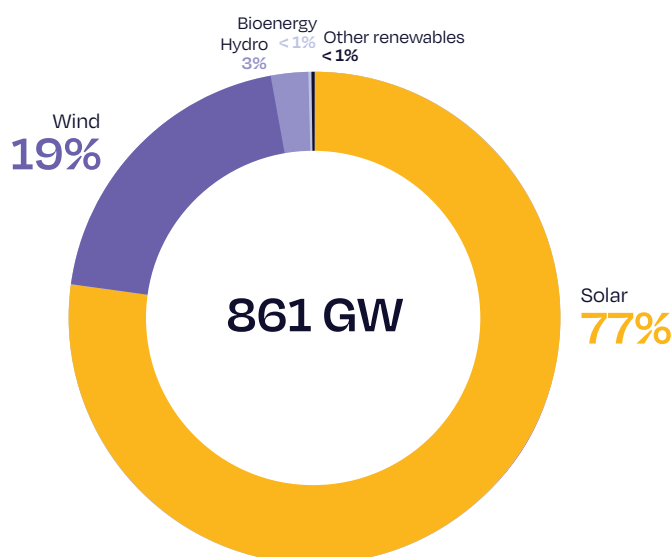
Solar is now both the primary source of new renewable capacity and power generation, and the leading contributor to overall energy demand growth across sectors

In 2025, solar power continued to dominate global renewable capacity expansion, securing its place as the fastest-growing renewable electricity source for the 21st consecutive year. With a 30% increase in annual capacity deployed, solar recorded another year of strong growth, grid-connecting 664 GW. Confirming its role as the cornerstone technology in the global energy system, solar PV accounted for 77% of the estimated 861 GW of new renewable capacity installed worldwide in 2025 (see Fig. 6). This constitutes a slight decrease compared to the 81% market share observed in 2024, due to a partial rebound in the wind sector, which grew 15% year on year. Thanks to the positive performance of solar and wind, net renewable capacity additions increased by 17% or 126 GW in 2025.

Figure 6

With 664 GW added in 2025, solar once again accounts for over three-quarters of global renewable capacity additions

Net renewable power generation capacity installed in 2025



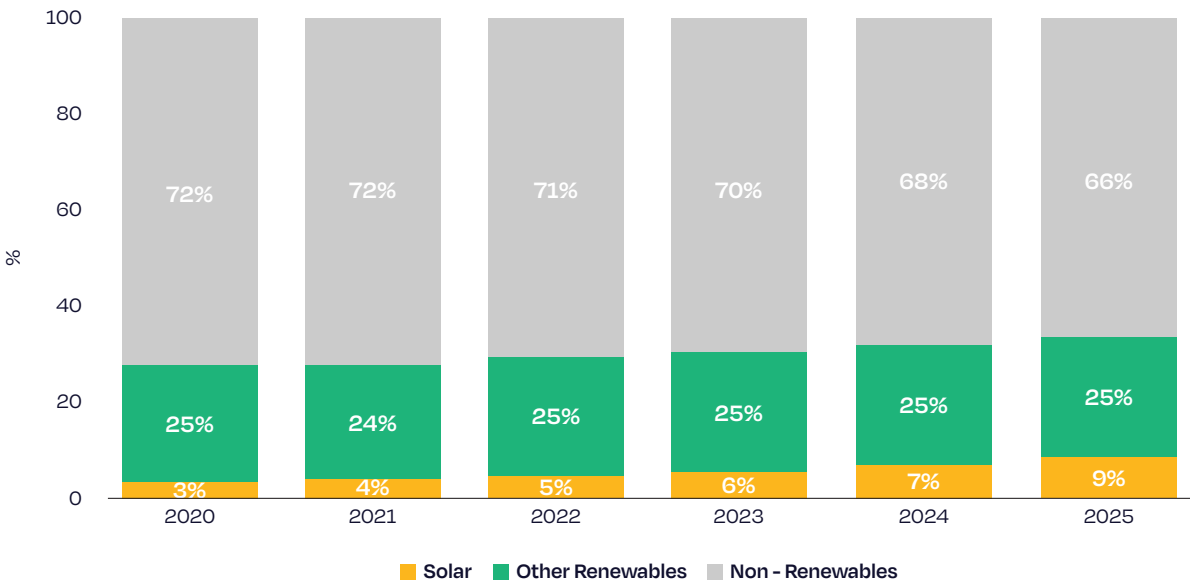
© SolarPower Europe. Sources : SolarPower Europe, GWEC, IRENA (2026)

The sustained growth of installed renewable capacity also led to a new record in renewable power generation in 2025, with renewable energy sources supplying 34% of global electricity, a 1.7 percentage point increase year-on-year. Solar continued to drive renewable penetration, increasing its contribution to global electricity by 1.9 percentage points to 8.8%, up from 6.9% in 2024 (see Fig. 7). With annual generation rising by 636 TWh (+30%), solar output reached a new high of 2,778 TWh. Solar's 1.8 percentage point increase in 2025 marks a clear acceleration compared to previous years (1.3% pts in 2024, 1.0% pts in 2023 and 0.9% pts in 2022). Solar PV has been the driving force in pushing conventional electricity sources to a new low: since the start of the decade, solar electricity generation has almost tripled its share, increasing by more than 5 percentage points, while the share of all other renewables only increased by less than 1%.

Figure 7

Solar continues to drive renewable penetration in global electricity generation, reaching an 8.8% share in 2025

Solar and renewable power as a share of global power 2019-2025



© SolarPower Europe. Source: Ember (2026)

In 2025, solar was, once again, the fastest growing source of electricity generation, both in absolute and relative terms. With 30% of annual growth and 636 TWh of additional electricity generation, solar outpaced any other technology by a wide margin (Fig. 8). Wind came as a distant second, with 205 TWh and an 8% increase, while conventional generation technologies such as gas and nuclear basically stagnated with 0-1% growth.

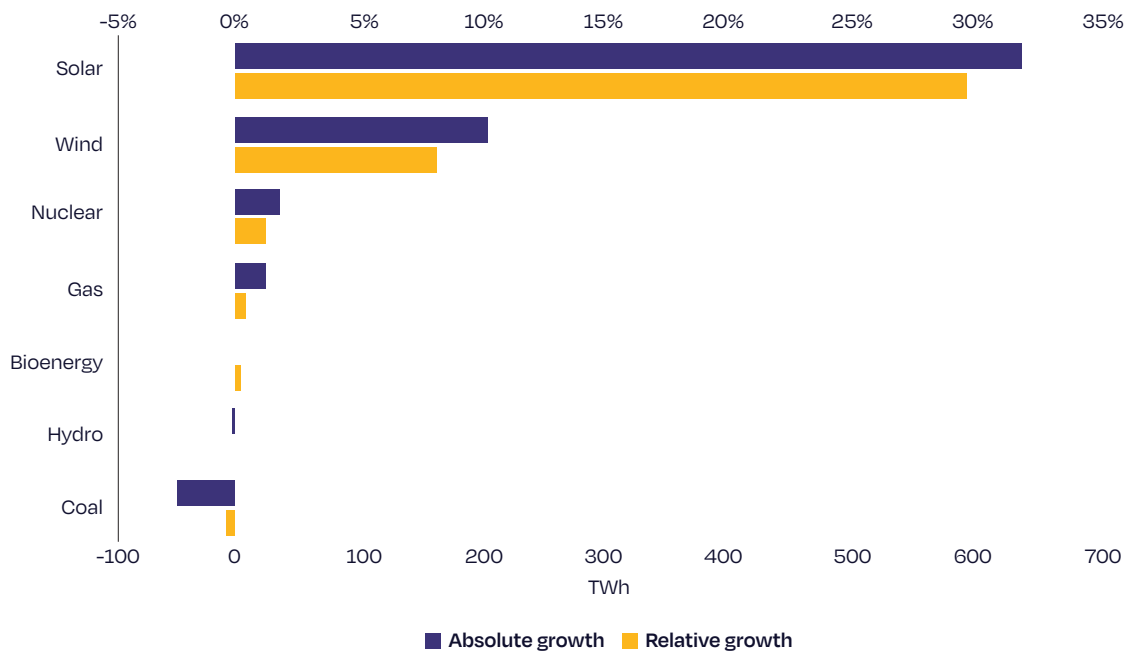
As a result, solar met the vast majority of new electricity demand in 2025, capturing a 75% share. According to Ember data, the entire additional demand for electricity in 2025 was covered by renewable sources, thanks to solar's exceptional performance. This is also well distributed across the globe, given that 50 countries generated at least 10% of their electricity from solar in 2025.¹

1 Ember (2026): Global Electricity Review 2026.

Figure 8

Solar power generation growth outpaces all other technologies in 2025, with an additional 636 TWh and a 30% annual increase

Absolute and relative growth of electricity generation by technology



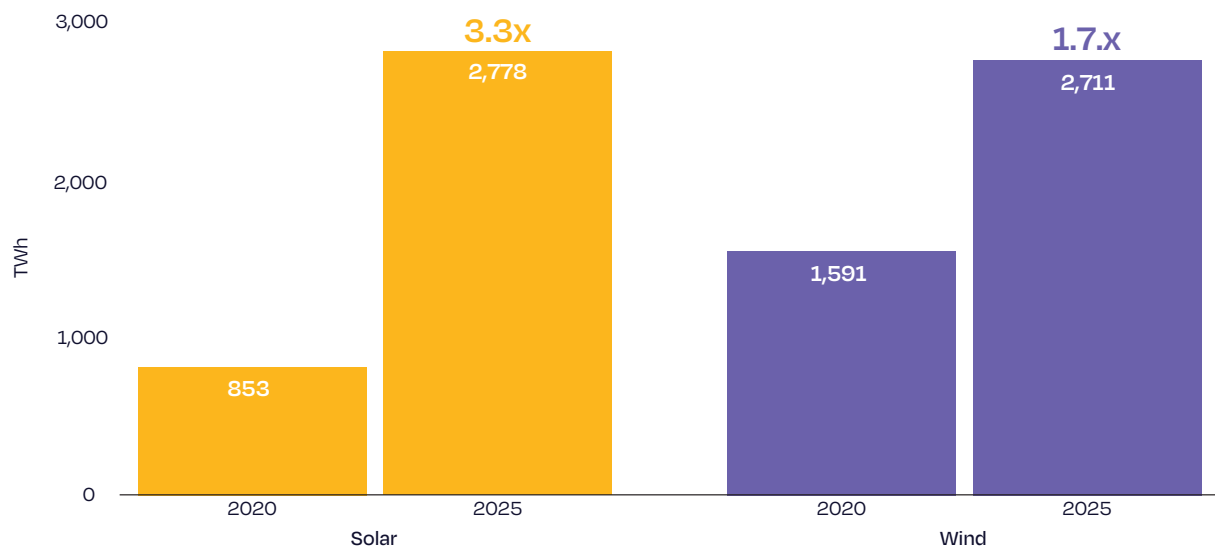
© SolarPower Europe. Source: Ember (2026)

Solar's strong growth reached another milestone in 2025, as global solar generation (2,778 TWh) overtook wind (2,715 TWh) for the first time (Fig. 9). Compared to 2020, solar generation more than tripled, while wind generation increased by 70%. Both technologies are poised to surpass nuclear generation in 2026.

Figure 9

Solar surpasses wind in global electricity generation in 2025

Global solar PV and wind electricity generation, 2020 and 2025



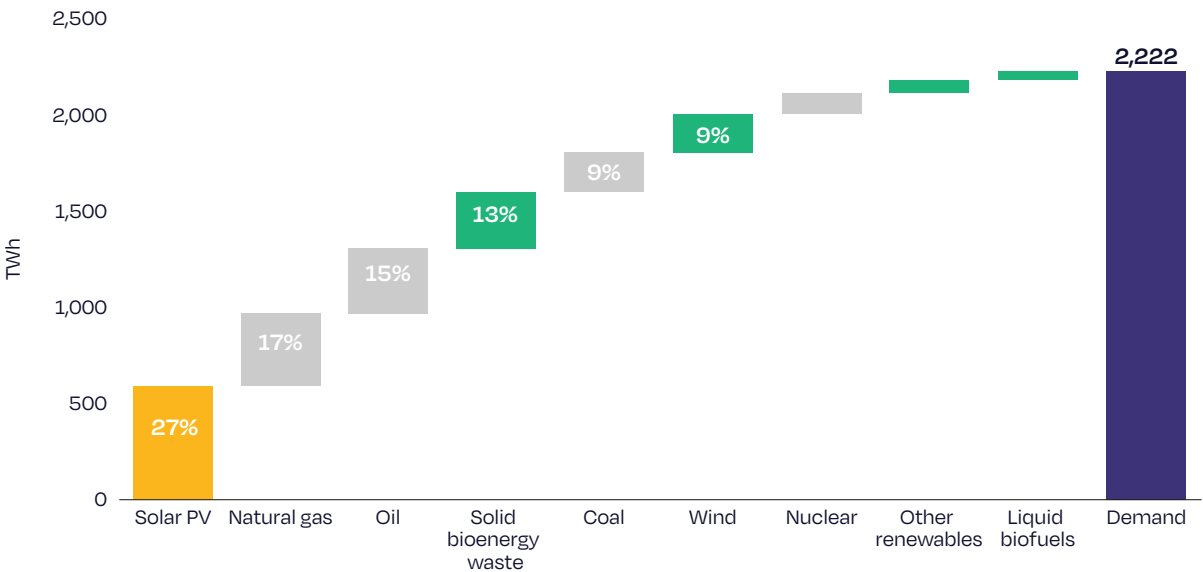
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In 2025, solar reached a new milestone in the energy transition, extending its role beyond electricity by becoming the leading contributor to global primary energy demand growth for the first time. Solar PV was the largest contributor to global energy demand growth totaling 2,222 TWh, capturing a 27% share, according to IEA (see Fig. 10). Clean technologies grew by 4.6% and are approaching a two third market share, providing nearly 60% of the total 2,222 TWh of additional energy demand. But the global energy mix continues to have a large share of fossils – especially in the heat and transport sectors – and recorded a moderate growth of 1%, 0.6%, and 0.4% in demand for gas, oil, and coal respectively.

Figure 10

Solar PV leads global primary energy growth for the first time in 2025, meeting 27% of additional energy demand and overtaking gas

Energy demand growth breakdown by energy source, 2025



© SolarPower Europe. Source: IEA (2026)

Record solar generation in 2025 not only increased the share of renewables in the global power mix, but also reduced reliance on imported fossil fuels. Many regions remain highly dependent on external oil and gas supplies, whose availability and cost can be disrupted by geopolitical tensions. This vulnerability was evident in 2025, when conflict in the Middle East and disruptions to the Strait of Hormuz affected key oil and LNG trade routes.

In 2025 alone, solar generation reached 2,778 TWh, equivalent to approximately 540 billion cubic meters (bcm) of natural gas used for producing electricity. This is about five times higher than the 110 bcm of LNG that transit annually through the Strait of Hormuz, according to IEA estimates. Even when focusing only on newly added solar capacity, the impact is substantial. The additional 636 TWh of solar electricity generated in 2025 correspond to around 129 bcm of natural gas, exceeding the volume of LNG flows through the Strait by around 20%. In other words, one year of solar additions alone can more than offset the gas equivalent of one of the world's most strategically exposed energy corridors.

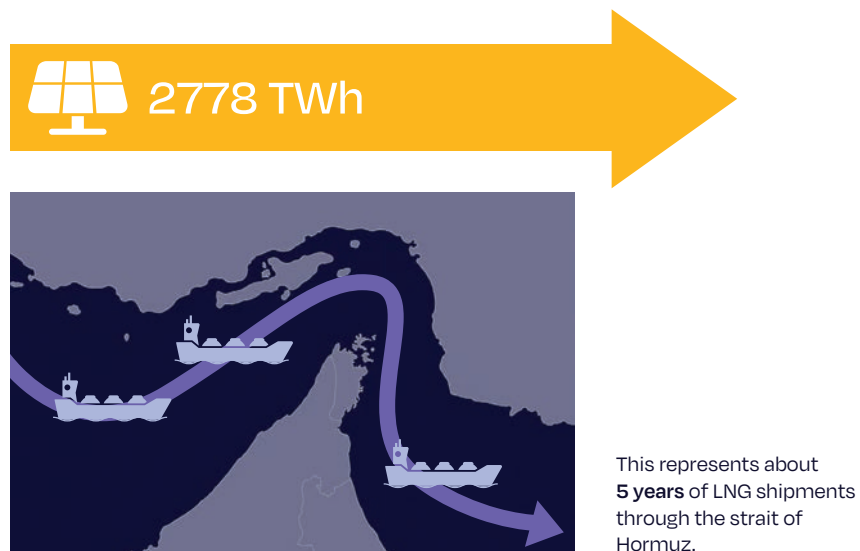
This structural shift has important implications for energy security; each incremental increase of solar capacity reduces exposure to external supply shocks and strengthens system resilience.

Figure 11

Solar generated 2,778 TWh of electricity in 2025, equivalent to 540 bcm of natural gas, or five years of LNG shipments through the Strait of Hormuz

Solar generation 2025 equivalent to natural gas

Solar generated 2778 TWh of electricity in 2025, equivalent to about 540 bcm of LNG used for power generation.



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Global solar capacity additions reach another record at 664 GW in 2025, with China further increasing its dominant share

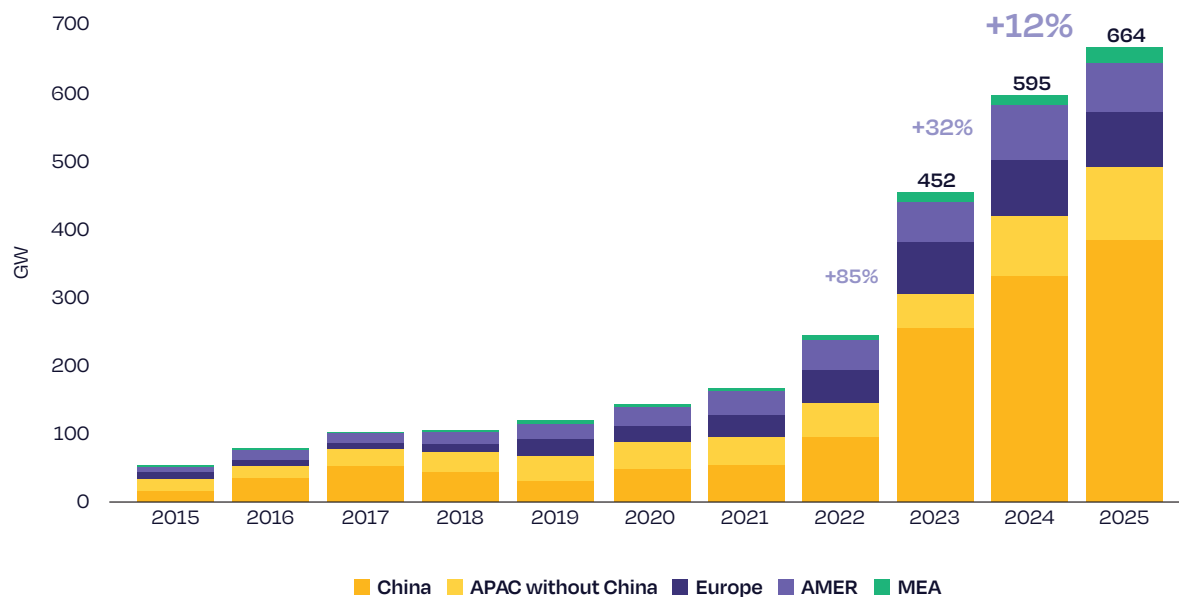
Annual market

Solar PV added 664 GW in 2025, setting a new all-time record for the industry despite continuously slowing growth rates. After expanding by 85% in 2023 and 32% in 2024, annual growth slowed to 12% in 2025, the lowest level since 2019 (see Fig. 12). In a global context with increased focus on energy security, affordability, and electrification, solar positions itself as the cornerstone technology for achieving decarbonisation goals and energy independence.

Figure 12

Although solar added a record level of 664 GW in 2025, growth slows down to 12%

Annual solar PV installed capacity 2015-2025



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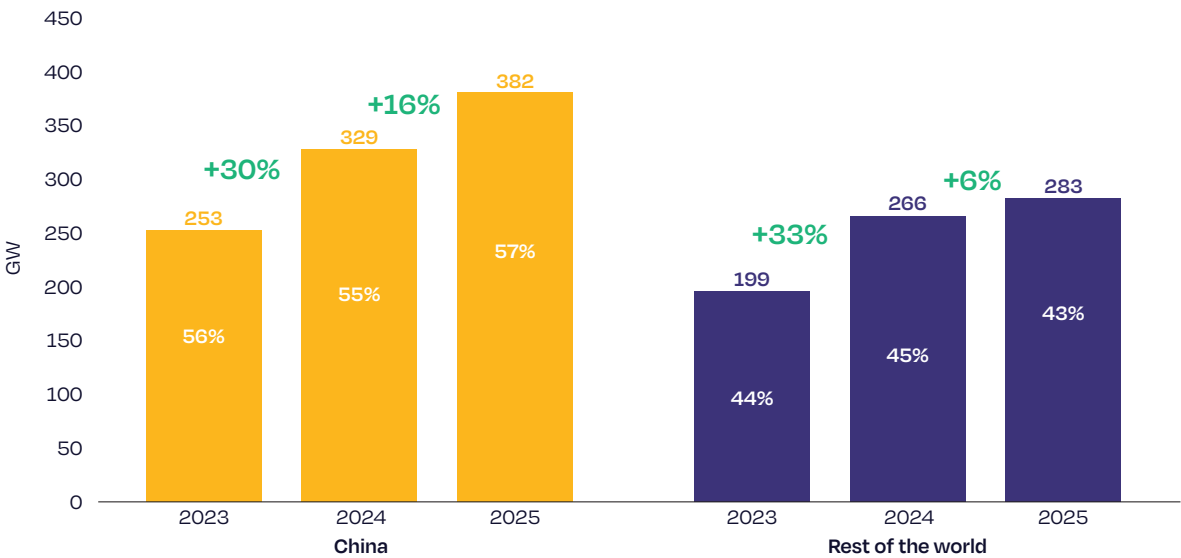
In 2025, China remained by far the leading solar market, with a record 382 GW of new capacity added, about 100 GW more than all other markets combined (Fig. 13). Market dynamics between China and the rest of the world shifted compared to 2024. Growth rates in both parts slowed down, but the rest of the world's deceleration was far more pronounced, falling from 33% in 2024 to just 6% in 2025. In comparison, China growth decline was more gradual, from 30% to 16%. As a result, China's share of global annual installations rose to a record 57%.

While this deceleration trend reflects a growth phase where solar markets reach maturity in several regions across the world, it also highlights the structural limits that solar PV is hitting in several regions, where its development is outpacing system infrastructure.

Figure 13

China grows faster than the rest of the world, increasing its share to 57% in 2025

Annual regional solar PV market 2023-2025



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In the previous edition of this report, published in May 2025, we projected global solar PV additions to grow by 10% and reach 655 GW under our Medium Scenario. Like in the past, actual installations were slightly above our expectations, by 9 GW or 2 percentage points higher than our forecast.

China's expansion exceeded our Medium Scenario expectations by 32 GW or 9 percentage points, but remained within the upper range of 402 GW projected in the High Scenario. This positive performance compensated the slower market growth outside of China, as installations were 21 GW or 8 percentage points below our central estimate.

China further expands its solar lead, while shifts occur across the rest of the top 10 markets

Top 10 countries

With 382 GW installed in 2025, China further cemented its position as the world's largest solar market. However, several shifts occurred in the other top 10 markets (see Fig. 14). After a leap from 5th to 3rd position in 2024, India surpassed the United States in 2025 to become the second largest solar market with 45.7 GW installed, and an impressive 49% year-on-year (YoY) growth rate. The US market decreased by 14% from 50.0 GW in 2024 to 43.2 GW in 2025, but still comfortably securing the 3rd place. The bar to reach second place was lowered, as the United States ranked second in 2024 with a market size of 50 GW, whereas India achieved this level in 2025 with a slightly smaller market size.

Similarly, the decrease in the Brazilian market caused it to fall to the 5th place, overtaken by Germany for the 4th position, whose market remained stable. Spain maintains its 6th position, followed by Saudi Arabia, which impressively tripled its market size in a year, and became the only country from the Middle East and Africa (MEA) region represented in the top 10. France climbed two positions to 8th while Italy slipped one place to 9th. Losing two places from 2024, Japan closes the top 10 with 5.8 GW, the lowest ranking the country has ever reached.

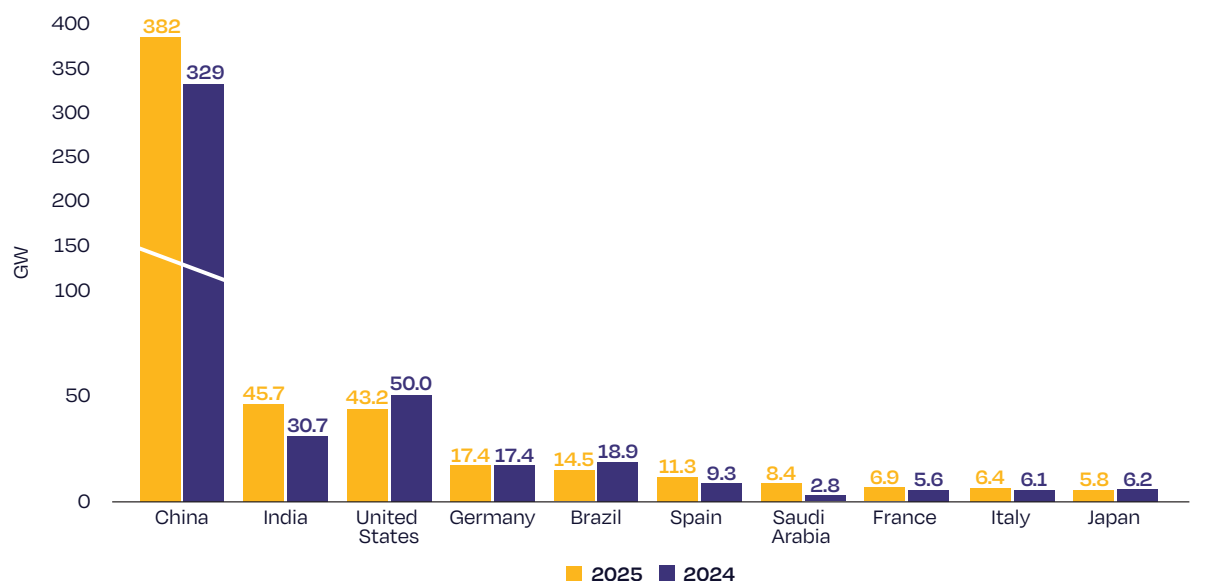
Notably, if the EU was counted as a single market, it would have consistently ranked second since 2019. In 2025, the EU installed 67.2 GW, over 20 GW more than India, the second of our top 10 list.

In 2025, an annual market size of 5.8 GW was necessary to be part of the top 10, compared to 4.7 in 2024, and 4.9 in 2023, reflecting the acceleration of solar deployment in relatively smaller markets.

Figure 14

China again leads new solar installations by a wide margin, India overtakes the United States for the second place

Top 10 annual solar PV markets 2024-2025



Note: Y axis is cut due to China larger size.
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Looking at the top 10 markets alone, China accounted for 70% of the group's combined installations, an increase from 68% a year before. None of the other top 10 markets reached a 10% share of the group.

Figure 15

For the third consecutive year, China installs more than twice as much solar as all other top 10 markets combined

Top 10 annual solar PV markets 2025



Note: Percentage indicates the share of aggregate top 10 installed capacity. Colours represent world regions.

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project team



Overview of top 10 PV markets 2025

1

China remained the centre of the global solar market in 2025, adding 382 GW and accounting for 57% of installations. While growth remained solid at around 16% YoY, it reflects a slowdown compared to the extraordinary expansion of previous years. The slowdown was particularly visible as of June 2025, after China ended feed-in tariffs for new projects. New solar projects now have to participate on wholesale electricity markets, increasing uncertainty on future revenues, which are already under pressure as high solar penetration intensifies price cannibalisation effects. While utility-scale projects still dominate, distributed solar continues to expand. Overall, China is entering a new phase where system integration, grid capacity and market design are becoming the key drivers of growth, rather than pure installation volumes.

China



2025
Annual
Capacity

382 GW
+52 GW & + 16% from 2024

48%
Rooftop



52%
Utility



2025
Cumulative
capacity

1,367 GW
#1

2

India strengthened its position as a leading global solar market in 2025, installing 45.7 GW and showing a strong growth of nearly 50% annually. The market remains overwhelmingly driven by utility-scale projects, supported by a large and maturing pipeline coming online. Following a period of market volatility, 2025 reflects a more stable expansion phase, where execution and project delivery play a central role. Rooftop solar is also gaining momentum, supported by targeted policy initiatives, but still represents a small share of total additions. On top of it, India is also fastly building important manufacturing capacities all along the value chain, further supporting solar growth.

India



2025
Annual
Capacity

45.7 GW
+15 GW & + 49% from 2024

22%
Rooftop



78%
Utility



2025
Cumulative
capacity

166 GW
#3

3

The United States experienced a 14% slowdown in 2025, with annual solar PV additions declining to 43.2 GW following the strong IRA-driven, record-setting expansion of 2024. While the IRA continues to underpin project economics, the market in 2025 was shaped by project timing, permitting, and interconnection constraints rather than by demand alone. This reflects a phase of adjustment after rapid growth, with some projects' timeline delayed or reshuffled to adapt to new tax credits deadlines. Despite the decline, underlying drivers remain strong – including rising electricity demand from data centres, manufacturing and electrification. Overall, the US market remains robust, but 2025 highlighted volatility tied to execution and system constraints.

United States



2025
Annual
Capacity

43.2 GW
-6.8 GW & - 14% from 2024

20%
Rooftop



80%
Utility



2025
Cumulative
capacity

266 GW
#2

4

Germany remained Europe's largest solar market in 2025, but growth plateaued, with installations holding steady at exactly 17.4 GW. Residential demand continued to soften under more difficult market conditions, while the C&I segment showed mixed performance. Utility-scale deployment remained relatively stable, supported by auctions, but increasingly influenced by grid constraints. The introduction of Solarpaket I helped simplify procedures and provided additional momentum, particularly for C&I and small-scale applications such as balcony solar.

Germany



2025
Annual
Capacity

17.4 GW
+8 GW & + 0% from 2024

50%
Rooftop



50%
Utility



2025
Cumulative
capacity

118 GW
#4

5

Brazil's solar market subsided in 2025 after reaching a record in 2024, with installations falling 23% to 14.5 GW and the country dropping 5th in the global ranking. Following a period of rapid growth, this contraction indicates a shift toward a more constrained growth phase. While the market remains structurally strong, particularly in distributed generation, it is increasingly impacted by grid limitations, curtailment risks and regulatory changes. Future growth will depend more on infrastructure and system integration than demand alone.

Brazil



2025
Annual
Capacity

14.5 GW
-4.4 GW & - 23% from 2024

76%
Rooftop



24%
Utility



2025
Cumulative
capacity

81.2 GW
#6

6

Spain's capacity additions rebounded in 2025, with installations increasing to 11.3 GW (+22% YoY), marking a return to growth. Deployment remained strongly driven by utility-scale projects, supported by a solid pipeline and corporate demand. Rooftop solar stabilised after the 2024 slowdown, although it did not fully return to previous levels, with C&I still leading the segment. At the same time, the market continues to face structural constraints, particularly grid bottlenecks and declining capture prices.

Spain



2025
Annual
Capacity

11.3 GW
+2.0 GW & +22% from 2024

11%
Rooftop



89%
Utility



2025
Cumulative
capacity

57.6 GW
#7

7

Saudi Arabia experienced a major step-change in 2025, with installations rising to 7.9 GW, bringing the country into the global top 10 for the first time. Growth is almost entirely driven by large utility-scale projects, meaning volumes are closely tied to the commissioning of specific tenders. This results in highly volatile year-on-year growth, but enables rapid scaling when projects are delivered. Distributed solar, on the other hand, still provides a very limited contribution.

Saudi Arabia



2025
Annual
Capacity

7.9 GW

5.3 GW & + 211% from 2024

3%

Rooftop



97%

Utility



2025
Cumulative
capacity

12.9 GW

#19

8

France continued its strong momentum in 2025, with installations rising to 6.9 GW, confirming a steady growth trajectory after the acceleration seen in 2024. The market remains strongly driven by rooftop solar, with residential and especially commercial-sized installations continuing to expand. This distributed-led dynamic remains the key structural feature of the French market. Ground-mounted deployment also increased, although it continues to face constraints related to permitting and land availability.

France



2025
Annual
Capacity

6.9 GW

+1.3 GW & + 23% from 2024

74%

Rooftop



26%

Utility



2025
Cumulative
capacity

34.0 GW

#11

9

Italy's solar market stabilised in 2025, with installations reaching 6.4 GW or 5% less than the year before. Following strong expansion driven by utility-scale projects in 2024, the market entered a more balanced phase, with continued contribution from larger projects but limited further acceleration. Rooftop deployment remained the backbone of the market, while utility-scale expanded more gradually, still facing permitting and grid connection constraints. The commercial and industrial segment showed steady growth, supported by larger installations, while residential demand remained softer compared to earlier peaks.

Italy



2025
Annual
Capacity

6.4 GW

+0.3 GW & + 5% from 2024

53%

Rooftop



47%

Utility



2025
Cumulative
capacity

42.4 GW

#9

10

Japan's solar market declined in 2025, with deployment dropping to 5.8 GW (–7% year on year), continuing the downward trend. The market remains constrained by structural limits, with limited space for large-scale projects and increasing grid restrictions. The transition from feed-in tariffs to the feed-in premium scheme has also made returns less predictable, weighing on investments into solar projects. Rooftop solar remains relevant, but growth is moderate and does not offset these broader constraints.

Japan



2025
Annual
Capacity

5.8 GW

–0.4 GW & – 7% from 2024

62%

Rooftop



38%

Utility



2025
Cumulative
capacity

102 GW

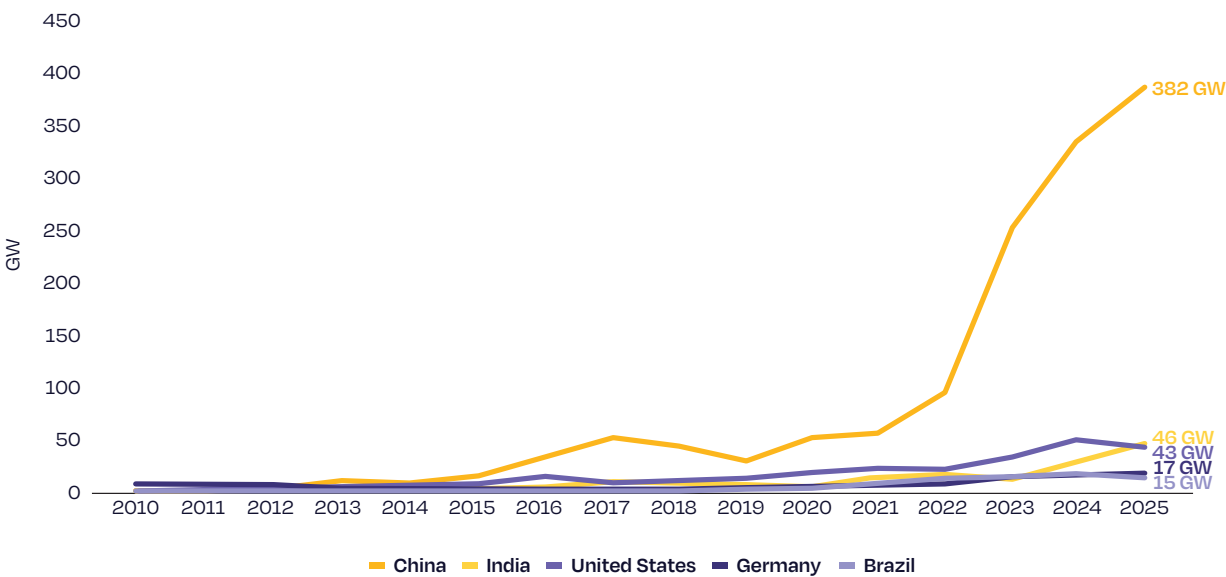
#5

As in 2023 and in 2024, the gap between China and the other top 5 solar markets widened (see Fig. 16). China installed 336 GW more than India, the second largest market. This is more than twice the cumulative installed capacity of India at the end of 2025. China is 8 times larger than the second market, 9 times bigger than the third, and has 26 times more solar capacity deployed than the fifth. In 2024, the same ratios were 6, 10, and 25, illustrating the continued expansion of China’s market relative to its global peers.

Figure 16

The gap between China and the other top 5 markets keeps widening

Top 5 annual solar PV markets 2010–2025



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Mouruen photovoltaic solar plant, Signes, France

Solar PV deployment remained concentrated in a limited number of markets in 2025 (see Fig. 17). The top 10 markets represented 82% of global installations in 2025, leaving just 18% for the rest of the world, 1% less compared to the previous year.

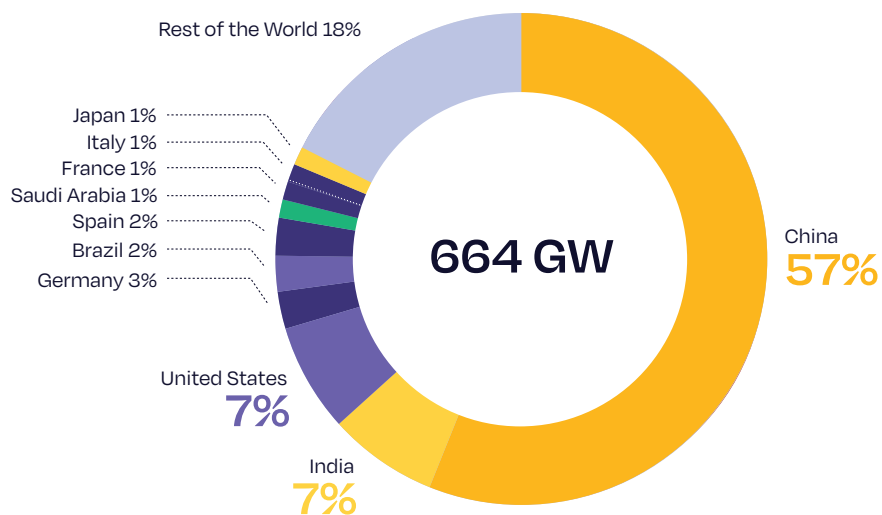
China accounted for 57% of global annual additions, up 2% from 2024. India and the United States each represented 7% of the global market – a 2 percentage point increase for the former and 1 percentage point decrease for the latter. All other markets are below the 5% level: Germany accounted for 3%, Brazil and Spain for 2% each, and the remaining top 10 markets each held a 1% market share.

More detailed information on country-specific trends in the top 10 global markets is available in SolarPower Europe's member-exclusive [Market and Policy Navigator](#).

Figure 17

The top 10 markets account for 82% of new solar installations in 2025

Top 10 annual solar PV market shares 2025



Note: Colours represent world regions.
© SolarPower Europe



574 kWp solar carports, The Netherlands

Asia-Pacific region remains largely in the lead for solar additions, while Europe surpasses the Americas

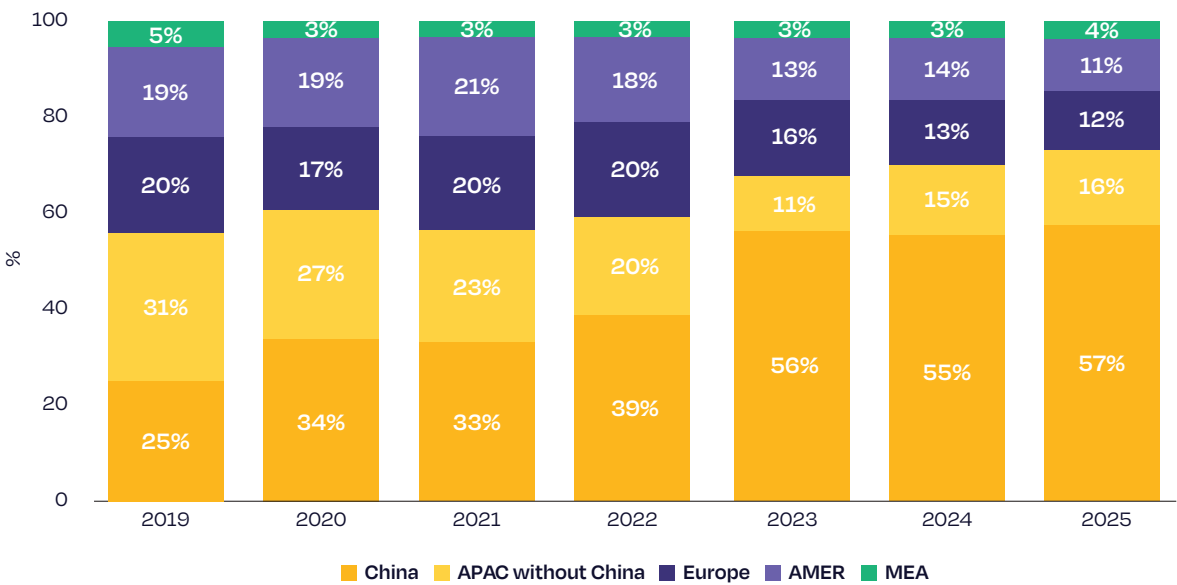
Regional update 2025

In 2025, the **Asia Pacific (APAC)** region, including China, further strengthened its outstanding position in the global solar market, reaching 487 GW of newly installed capacity, a 17% YoY increase (see Fig. 18). China remained the main driver, expanding its share of global additions by 2 percentage points to 57%. Meanwhile, APAC markets excluding China also increased their contribution, gaining 1 percentage point to account for 16% of global installations. Altogether, APAC represented almost three quarters of global solar demand in 2025, with a combined share of 73%.

Figure 18

Europe surpasses the Americas while APAC strengthens its leading solar position

Annual solar PV installed capacity shares 2019-2025



© SolarPower Europe

Alongside another record year for China, the broader APAC region showed a diversified growth pattern. India is confirming its sustained expansion, with installations rising by 49% year-on-year to 45.7 GW, building on an already exceptional 145% surge in 2023. Apart from China and India, Australia also returned to growth reaching 5.1 GW, up from 4.3 GW in 2024, but not reaching its previous peak of 6.0 GW in 2021. Similarly, South Korea moved back into positive territory, with installations increasing by 16% to 4.4 GW, despite ongoing policy uncertainty and a fluctuating political narrative between support for renewables and renewed emphasis on nuclear energy. In contrast, Japan continued its gradual contraction, with new capacity declining by 7% from 6.2 GW in 2024 to 5.8 GW in 2025, reflecting persistent system constraints, but still enough to remain the third largest market in the region.

One of the most active countries in the region was Pakistan, which imported over 50 GW of PV module capacity over the last five years, largely driven by households and small businesses seeking affordable and reliable power amid frequent outages and rising energy costs. However, the rapid expansion is only partially captured in official statistics under the official net-metering scheme. In 2025, just 3.7 GW were registered under the official net-metering scheme, suggesting that a large share of deployed capacity remains unaccounted for, either operating off-grid, outside formal schemes, or potentially re-exported. As a result, a large uncertainty persists regarding the true scale of actual on-grid installed capacities in the country. Solar development is driven purely by electricity prices and power supply unreliability, highlighting solar's role not just as a clean energy solution, but as an increasingly compelling economic and energy security choice. More information on Pakistan solar market can be found in a dedicated article at p. 145 of this report.

Europe overtook the Americas in 2025 with 81.6 GW of new installations, ranking as the second largest solar region after APAC with a 12% share. However, the deceleration is pronounced, with annual growth dropping from 52% in 2023 to 6% in 2024 and just 3% in 2025. Within the region, Germany (17.4 GW) and Spain (11.3 GW) remained the two largest markets, with utility-scale deployment offsetting declining rooftop segments in both countries. France (6.9 GW) and Italy (6.4 GW) followed in third and fourth positions respectively, maintaining their growth trajectory in line with previous years. Beyond the EU, Türkiye and the United Kingdom both expanded their markets further. Türkiye recorded another strong year, adding 4.7 GW, largely driven by commercial and industrial self-consumption as rising electricity prices and auctions continued to support demand. The UK also returned to growth, reaching 3.7 GW in 2025. This expansion was supported by the commissioning of large-scale projects such as the 370 MW Cleve Hill Solar Park, the largest in the country, alongside a marked rebound in rooftop installations driven by supportive policy measures.



6.9 kWp rooftop solar installation, Germany

Within Europe, growth in the EU-27 was even smaller at just 1.4%. Despite this near-stagnation, the bloc continued to account for the bulk of European installations, with 67.2 GW out of a total of 81.6 GW, representing an 82% share. This corresponds to a slight decline of 1 percentage point compared to 2024. Notably, 13 out of 27 EU Member States recorded lower installation levels in 2025 than in the previous year. Further details on the EU-27 market are provided in the dedicated article at p. 104.

If Europe has moved up in the ranking, it is also because **the Americas** experienced its weakest performance in recent years, with installations declining by 13% to 71.9 GW, more than 10 GW below the 82.4 GW recorded in 2024. The region accounted for 11% of the global annual market in 2025, down from 14% in 2024. This contraction was primarily driven by a slowdown in the two dominant markets, the United States in the north and Brazil in the south.

The United States remained by far the region's largest market, but installations fell 14% to 43.2 GW in 2025. The market was shaped by a shifting federal policy landscape and revised tax credit timelines, which altered project commissioning patterns and encouraged developers to focus on pipeline management rather than year-end connection rushes. Brazil also experienced a marked slowdown, with installations dropping notably by 23% YoY, from 18.9 GW to 14.5 GW. Rapid capacity expansion in recent years has exposed structural constraints, with rising curtailment, transmission bottlenecks, and growing delays affecting both utility-scale projects and distributed generation.

Performance across Latin America was uneven and generally weaker. Chile remained the third largest market at 1.3 GW, contracting by 37% compared to 2024. The market is increasingly constrained by limited system absorption capacity, including high curtailment, grid congestion and insufficient flexibility, prompting a growing policy focus on storage deployment and grid reinforcement. Mexico also saw a sharp decline, with installations falling from 1.6 GW to 0.8 GW (–51% YoY). This downturn reflects a broader restructuring of the power sector in 2024–2025, strengthening the role of state-owned entities and altering the framework for private sector participation.



235 kWp on Vienna City Hall

In 2025, the **Middle East and Africa (MEA)** remained the smallest solar region globally, but also the fastest growing, with deployment augmenting by 51% from 15.6 GW in 2024 to 23.7 GW in 2025. This strong growth was driven primarily by large utility-scale projects commissioned in the Middle East, alongside steady expansion across African markets, increasing the region's global share from 3% to 4%. Growth remained highly concentrated at country level. Saudi Arabia clearly stood out, with installations rising from 2.5 GW to 7.9 GW, reflecting the delivery of several large projects awarded through national tender programmes. The United Arab Emirates and Israel followed at around 880 MW and 845 MW respectively, while Iran crossed the 1 GW mark. In Sub-Saharan Africa, South Africa remained the leading market, growing from 1.1 GW to 1.6 GW, driven by strong self-consumption demand linked to recurring power shortages. Beyond this, deployment continued to spread across smaller markets, although development remains uneven across the continent.

Overall, 2025 marked a year of continued expansion for solar PV globally, but with a clear shift toward slower and more uneven growth across regions. While installations increased, momentum weakened compared to previous years, as several key markets entered a phase of consolidation following the exceptional surge in 2023 and, to a lesser extent, 2024. This slowdown largely reflects developments in the largest markets. The Americas experienced a notable contraction driven by declines in both the United States and Brazil, while growth in Europe stabilised at much lower levels. At the same time, China's continued dominance remains a defining feature of the global market.

More broadly, the dynamics observed in 2025 point to a structural transition in many mature solar markets. Rapid capacity growth is increasingly exposing system-level constraints, including grid congestion, curtailment, and insufficient flexibility, which are now emerging as the main limitations to further acceleration. These challenges are becoming more central than traditional permitting and cost barriers, particularly as module prices remain low following the sustained expansion of global manufacturing capacity.

At the same time, growth is becoming more geographically diversified. While leading markets continue to dominate global volumes, faster expansion in regions such as MEA highlights the increasing role of emerging markets in sustaining overall growth. However, these new growth centres remain smaller in absolute terms and more dependent on policy frameworks, tender pipelines, and financial conditions.

For more details about regional solar trends, please use SolarPower Europe's [Market and Policy Navigator](#).



4.1 MWh / 4MW, Corsica, France

From 1 TW to nearly 3 TW in just four years; solar's rapid expansion continues

Cumulative market

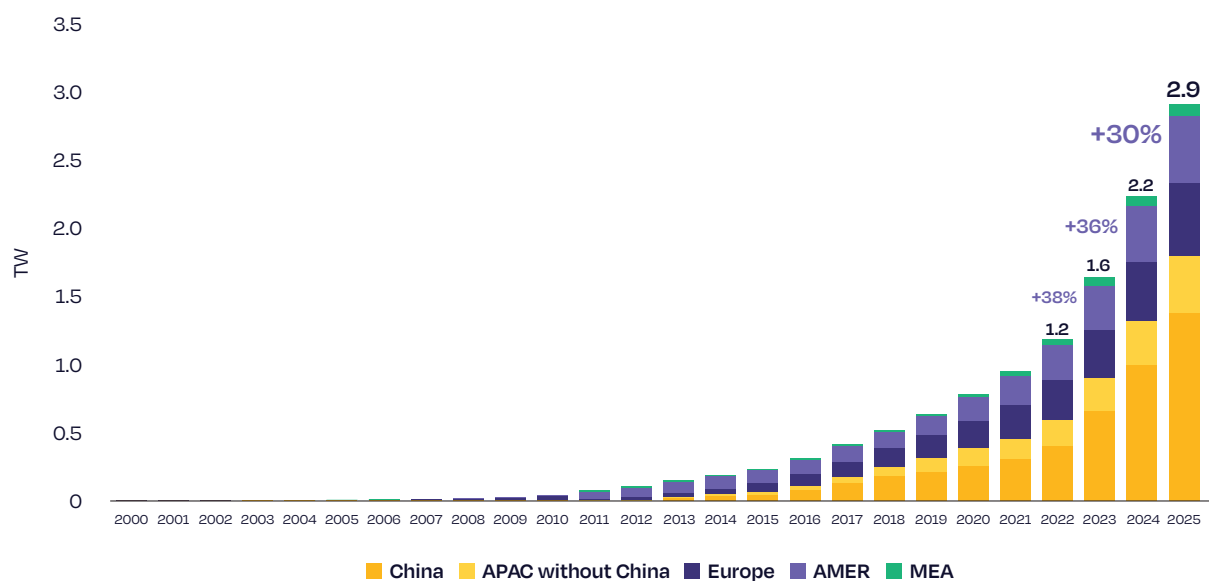
The global cumulative installed capacity of solar PV systems reached 2.9 TW by the end of 2025, up from 2.2 TW in 2024, increasing by 30% annually (see Fig. 19). This confirms that solar remains by far the fastest growing renewable technology, continuing to expand at an exceptional pace even at very large volumes.

This rapid expansion means that the global solar fleet has effectively tripled in just four years, moving from around 1 TW in 2021 to 2.9 TW in 2025 – with the 3 TW mark in the meantime also passed in Q1 2026. The pace of deployment remains unprecedented, and solar capacity is now almost 100 times higher than in 2009, illustrating the scale of growth over the past 15 years.

Figure 19

Global solar capacity tripled in four years, reaching 2.9 TW by end of 2025

Cumulative solar PV installed capacity 2000-2025



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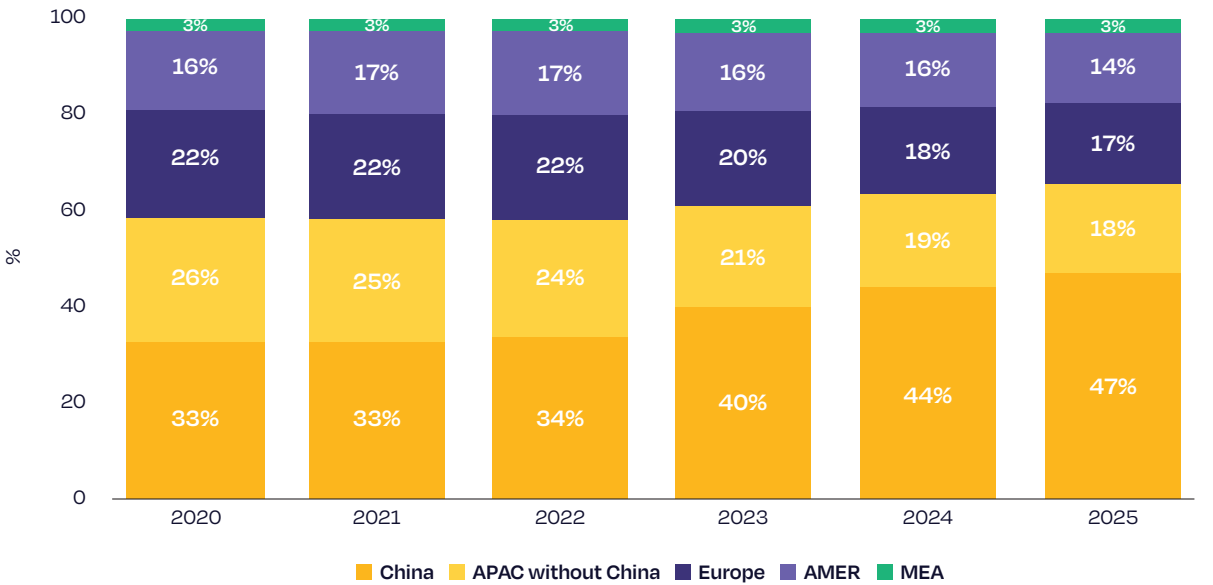
At the same time, developments in 2025 further reshaped the global distribution of solar capacity. China strengthened its dominant position, increasing its share of the global fleet from 44% in 2024 to 47% in 2025, driven by another year of very high installations. As a result, the APAC region enlarged its share from 63% to 66%, reaching around 1.9 TW in 2025.

These shifts highlight that, despite the large cumulative base, annual installation dynamics remain strong enough to significantly reshape global market shares. China's continued rapid expansion more than offsets slower growth in other regions, reinforcing its central role in shaping global solar deployment.

Figure 20

Two thirds of the global solar fleet is installed in APAC, and nearly half in China alone

Cumulative solar PV installed capacity shares 2019-2025



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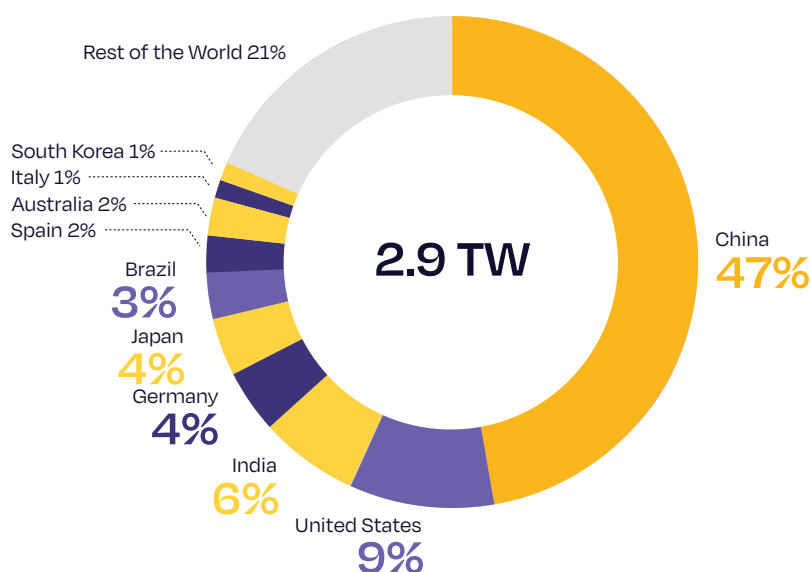
Other regions saw less pronounced developments in 2025, with their global shares continuing to gradually erode despite sustained capacity additions. Europe's share of the global solar fleet declined from 18% in 2024 to 17% in 2025, despite cumulative capacity increasing from 411 GW to 493 GW. The EU-27 continues to represent the majority of Europe's solar deployment, accounting for over 400 GW of the region's total capacity. While Europe remains the second-largest regional market globally, the gap with APAC continues to widen. A similar pattern can be seen in the Americas, which despite rising cumulative solar capacity from 348 GW to 420 GW, decreased its global share from 16% to 14% in 2025, reflecting the lacklustre performance in its main markets.

In the Middle East and Africa, cumulative capacity increased by 38% from 63 GW in 2024 to 87 GW in 2025, continuing the rapid expansion observed in recent years. However, despite this high growth, the region's global share remained broadly stable at around 3%, as faster expansion elsewhere, particularly in APAC, limited its relative gains.

Figure 21

China surpasses 1 TW of solar installed capacity, pushing all other countries below 10%

Top 10 cumulative solar PV capacity shares 2025



Note: Colours represent world regions.
© SolarPower Europe

The global top 10 ranking by operating solar capacity (Fig. 21) saw further consolidation in 2025. China remained firmly in the lead, with cumulative capacity rising from 985 GW in 2024 to 1.4 TW in 2025, increasing its already dominant position to a 47% share. The United States retained second place, with capacity growing from 223 GW to 266 GW, although its share of the global total continued to decline from 10% to 9%.

India strengthened its position in third place, rising from 121 GW to 159 GW, with a 6% global share, a 1 percentage point increase. Germany also continued its steady expansion, moving from 101 GW to 124 GW, maintaining fourth place, while Japan remained fifth, with capacity increasing more modestly from 96.6 GW to 103 GW, further reducing its relative position globally.

Collectively, the top 5 markets increased their dominance, with cumulative capacity rising from 1.5 TW in 2024 to over 2.0 TW in 2025. Their combined share grew from 68% in 2024 to 70% in 2025.

Changes in the second half of the top 10 were limited, although gaps between markets continued to widen. Brazil remained sixth with 81.2 GW, followed by Spain, which continued to expand steadily, reaching 57.6 GW. Australia and Italy maintained their positions, both above the 40 GW mark, while South Korea remained tenth with 37.6 GW.

1 kW of installed solar capacity per person is the new standard for leading markets, while APAC makes strong progress and Europe remains in the lead

Solar watt per capita

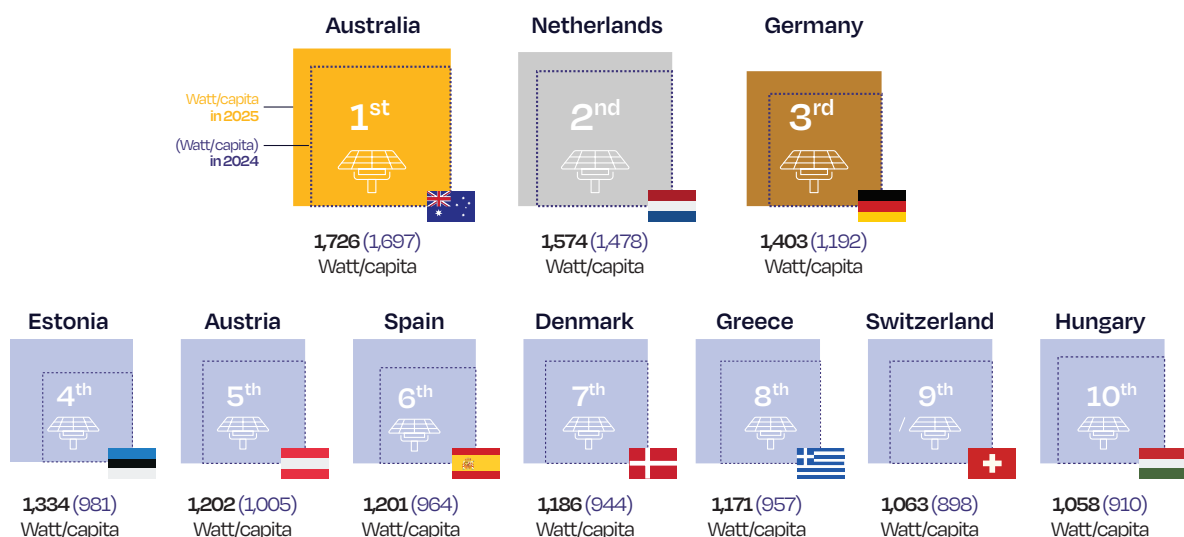
Looking at solar capacity on a per capita basis provides a different perspective on market maturity, highlighting where solar has become deeply embedded in the energy system rather than simply reflecting overall market size.

A key development in 2025 is that all countries in the global top 10 have now surpassed 1 kW of installed solar capacity per capita (Fig. 22). What used to be a distinguishing feature of only a handful of front-runners is now becoming the new benchmark for leading solar markets. This shift has occurred rapidly. Australia, long the global leader in this metric, first exceeded the 1 kW threshold only in 2021, and just by a narrow margin. By 2024, only four countries had crossed that level. One year later, in 2025, all top 10 markets reached it, illustrating the speed at which solar deployment is deepening across advanced markets.

Figure 22

All top 10 countries have over 1 kW of installed solar capacity per person in 2025, compared to only four in 2024

World top 10 countries cumulative solar PV capacity per capita



© SolarPower Europe

Australia remains by far the global leader, further strengthening its position with 1.7 kW per capita in 2025. The Netherlands follows, now above the 1.5 kW mark, while Germany firmly closes the top 3, having moved well beyond the 1 kW milestone over the past two years. These three countries continue to stand out, although the gap between the top positions and the rest of the top 10 is gradually narrowing. Countries such as Austria and Estonia, which experienced very rapid expansion in recent years, remain among the strongest performers, contributing to a clear convergence at the top. Except for Australia, all leading markets are located in Europe, with Switzerland the only non-EU country in the group.

Historically, the Watt per capita metric highlighted a strong divide between countries installing large volumes of solar in absolute terms and those leading in relative deployment. This gap is now starting to narrow. Some of the largest markets are gradually catching up: China, for instance, rose four places to rank 13th, reaching around 964 W per capita, now just outside the top 10 and ahead of several previously higher-ranked countries such as Belgium and Luxembourg. It has also overtaken Japan, a long-established solar market. The United States remains below the 1 kW threshold at around 769 W per capita, but continues to progress, rising to 19th position.

By contrast, India, despite strong growth in absolute installations, still has a relatively low level of solar capacity per capita. With its 1.4 billion inhabitants, the country ranks 71st with around 114 W per person. This highlights the significant untapped potential for solar expansion in large, high-population markets.

A comparison between annual Watt per capita and cumulative Watt per capita rankings highlights which markets are accelerating most rapidly and are likely to move up the global ranking in the coming years (see Fig. 23). In 2025, the leading countries in annual Watt per capita were once again predominantly smaller European markets, with a few notable additions.

Figure 23

Top 10 annual vs cumulative solar capacity, absolute and per capita rankings 2025

2025 country ranking

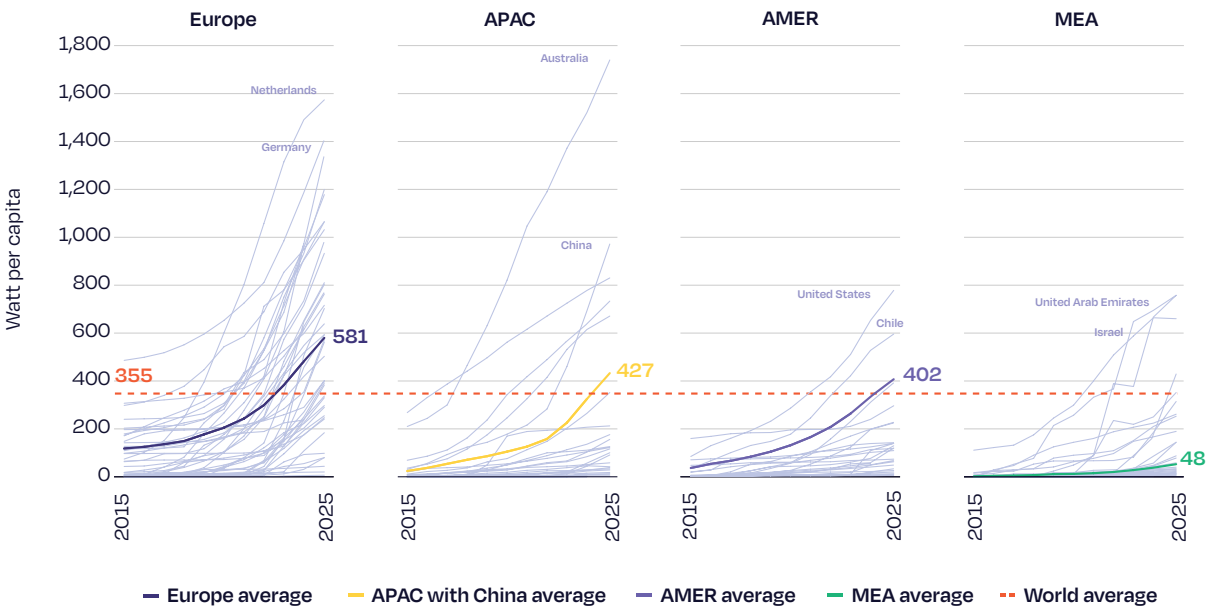
Ranking	Annual addition		Cumulative capacity		Annual watt per capita		Cumulative watt per capita	
1.		China		China		Estonia		Australia
2.		India		United States		Ireland		Netherlands
3.		United States		India		China		Germany
4.		Germany		Germany		Luxembourg		Estonia
5.		Brazil		Japan		Bulgaria		Austria
6.		Spain		Brazil		Denmark		Spain
7.		Saudi Arabia		Spain		Saudi Arabia		Denmark
8.		France		Australia		Lithuania		Greece
9.		Italy		Italy		Spain		Switzerland
10.		Australia		South Korea		Latvia		Hungary

Estonia remained at the top of the ranking, even though its annual additions per capita slightly decreased compared to 2024, confirming its position as one of the most dynamic solar markets relative to its size. Ireland came second, displaying very strong growth for its population, while China climbed to third position with nearly 270 W per capita added in 2025 – a remarkable performance considering its population size, underlining once again the exceptional scale of its solar deployment. Other countries in the top 10 include Luxembourg, Bulgaria, Denmark and Spain, as well as Saudi Arabia, which stands out as the only Middle Eastern market in the ranking and reflects the growing role of large-scale project commissioning in the region.

Figure 24

Europe keeps the lead in solar capacity per person, while APAC surpasses the Americas

Solar PV cumulative watt per capita across regions 2015-2025



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Looking at the total deployed solar per capita across regions (see Fig. 24), Europe maintained its lead in 2025, increasing its solar penetration to 581 W per capita, confirming its position as the most mature solar region. A key shift in 2025 is that APAC (427 W per capita) overtook the Americas (402 W per capita), driven by the continued rapid expansion of solar in China. The Americas’ performance remains driven primarily by the United States, with additional contributions from a handful of dynamic markets, but overall penetration remains more uneven across countries, particularly in Latin America, which weighs on the regional average. The MEA region, although still lagging in absolute terms, followed a positive trajectory, reaching 48 W per capita in 2025.

The global average rose from 276 to 355 W per capita, continuing its steady upward trend. While this progress highlights the increasing reach of solar energy, it also underscores the persistent gap between leading and emerging regions, and the significant untapped potential for further solar deployment worldwide.

DRIVING
THE ENERGY
TRANSITION

27

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China's slowdown in 2026 is expected to drive a decline in global solar installations, the first since tracking began in 2000

Global Forecast 2026

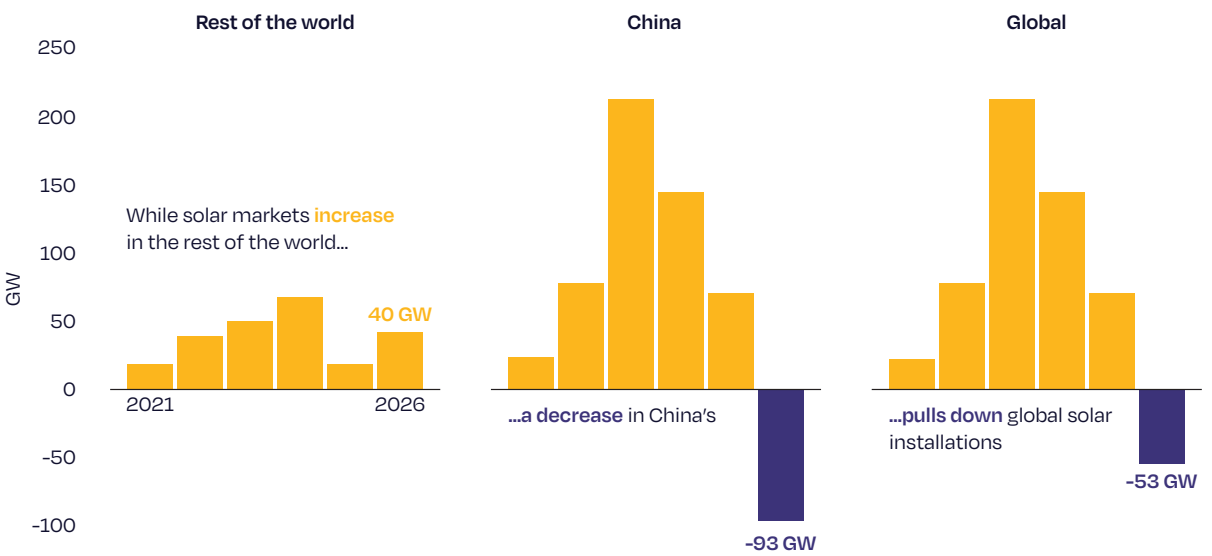
After slowing in 2024 and 2025, the global solar PV market is expected to decline for the first time in 2026 under our most likely Medium Scenario. Following a 12% growth to 664 GW in 2025, annual installations are projected to fall back to 612 GW in 2026, representing an 8% decrease.

The main cause of the anticipated 2026 market contraction is the slowdown of China's solar market following an exceptional 2025 (see Fig. 25). Given China's dominant position, accounting 57% of global installations in 2025, this decrease alone is sufficient to pull global installations into negative territory.

Figure 25

Due to its dominant share, a decrease in the Chinese solar market is expected to cause a decline in total annual installations in 2026

Net changes in annual solar additions, 2021-2026



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The slowdown in China reflects a combination of structural and cyclical factors. The transition from feed-in tariffs to a fully market-based pricing system reduces revenue certainty, as new projects are increasingly exposed to wholesale electricity markets and competitive bidding. At the same time, the exceptionally high 2025 level was partly driven by policy frontloading, as developers rushed to commission projects ahead of the market reform, inflating the comparison base. In parallel, grid integration constraints are becoming more visible, as rapid capacity additions have outpaced transmission and flexibility improvements in some regions, increasing curtailment costs and limiting deployment.

In addition to the above, China had already reached its 2030 target of 1.2 TW of installed solar and wind capacity in 2024, six years ahead of schedule. While the new energy and climate objectives for 2026-2030 under the 15th Five-Year Plan were approved in March 2026, the transition has caused a temporary hiatus with lower solar activity as the market adapts to evolving policy signals.

However, this global contraction masks a different reality outside China. Installations in the rest of the world are expected to continue growing, supported by strong underlying demand, ongoing electrification and renewed energy security concerns.

This turning point in China occurs in a complex global environment shaped by opposing forces. On the one hand, solar deployment is increasingly constrained by structural challenges, including grid saturation, rising curtailment rates, and more frequent periods of negative electricity prices. These challenges come on top of a more uncertain macroeconomic and geopolitical environment. Trade tensions remain elevated, with countries introducing tariffs and protectionist measures that risk disrupting supply chains and increasing costs. At the same time, conflict in the Middle East continues to contribute to higher fossil fuel prices, increased market volatility, inflationary pressures and tighter financial conditions, which can weigh on economic growth, investment returns, and project delivery.

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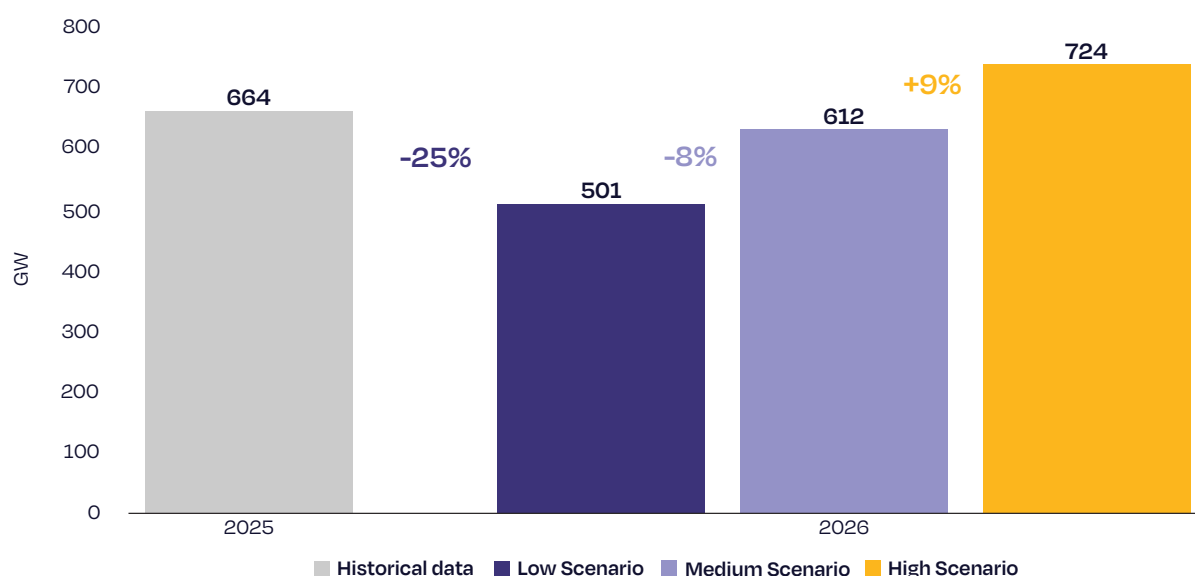
On the other hand, these same geopolitical developments can also accelerate solar deployment. Higher fossil fuel prices and energy security concerns are reinforcing the attractiveness of solar PV as a homegrown, low-cost and clean energy source. This dynamic was already observed following the war in Ukraine, when the energy price crisis triggered a surge in solar installations across several regions. A similar trend could emerge in 2026, particularly in countries that are highly exposed to fossil fuel imports, where solar can reduce dependence on volatile global fuel markets. As a result, 2026 cannot be described simply as a year of growth or decline, but rather as a period in which the global market is pulled in opposite directions, with a China driven slowdown offsetting continued expansion elsewhere.

If last year marked the first time we anticipated a potential decline in the Low Scenario, this year's most pessimistic outlook points to a much sharper contraction of 25%, bringing the market down to 501 GW (see Fig. 26). This downside scenario reflects simultaneous project delays or cancellations across multiple markets, in addition to a sharper contraction in China. The challenges stem primarily from system constraints, including rising curtailment and more frequent negative electricity prices, worsened financing conditions linked to a broader deterioration of the global economic environment, and less favourable policy conditions. In contrast, the High Scenario reaches 724 GW (+9%), indicating that another record year remains within reach. This upside assumes a more moderate decline in China and accelerated electrification efforts in several countries, supported by geopolitical responses to the Middle East conflict.

Figure 26

The global solar market is expected to decline by 8% in 2026, marking the first contraction in two decades

Annual solar PV market scenarios 2025-2026



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In summary, 2026 could become one of the most defining years for solar PV in recent history. While growth continues to be driven by solar's competitiveness and versatility, several markets are now reaching the limits of their power systems and are struggling to integrate rising volumes of solar capacity. At the same time, the world is facing a second fossil fuel crisis in less than five years, which could accelerate efforts to expand electrification and flexibility. In this context, solar is increasingly positioned as a key technology for energy security and independence, delivering affordable and domestic clean electricity.

Regional solar ranking to remain unchanged in 2026, despite uneven growth

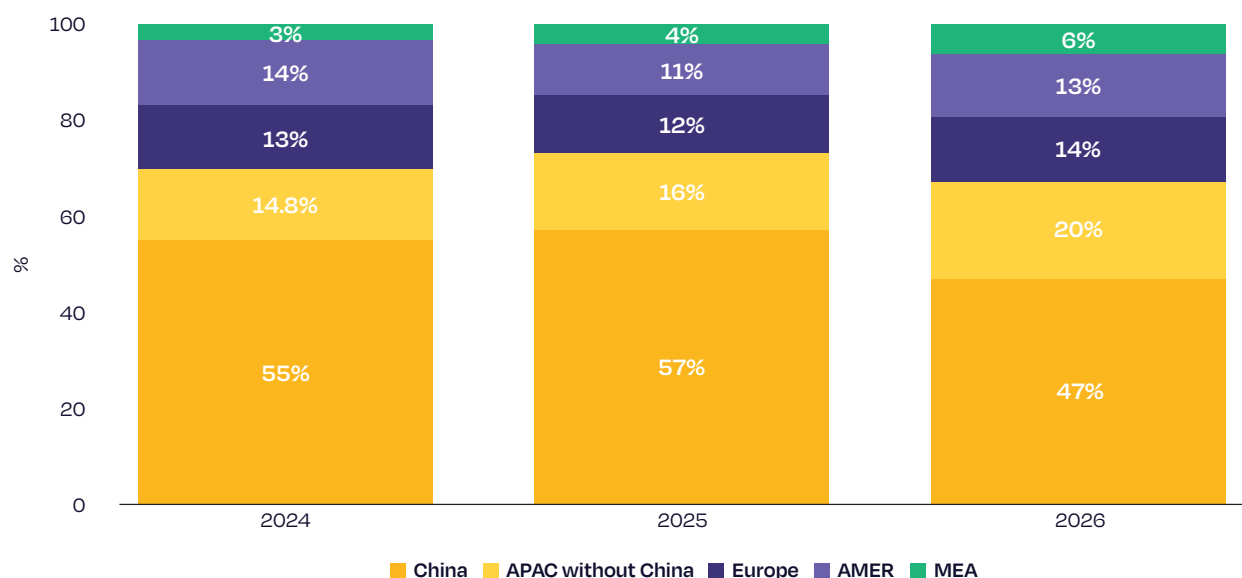
Regional forecast 2026

Following an exceptionally strong 2025, the solar PV market across the Asia-Pacific region is expected to lose global market share, largely shaped by developments in China (Fig. 27). The region as a whole is expected to decline from 73% in 2025 to 67% in 2026.

Figure 27

With China poised to decline, all other regions are projected to gain global solar market shares in 2026

Regional shares of global solar market 2024-2026



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Within APAC, contrasting dynamics are at play. China is projected to see a significant decline in annual installations, falling from 382 GW in 2025 to 289 GW in 2026, representing a 24% contraction. As a result, China's share of global installations is expected to drop by 10 percentage points, falling back below the 50% mark. The drivers behind this adjustment are discussed in the previous section and in the dedicated country article on page 95 of this report.

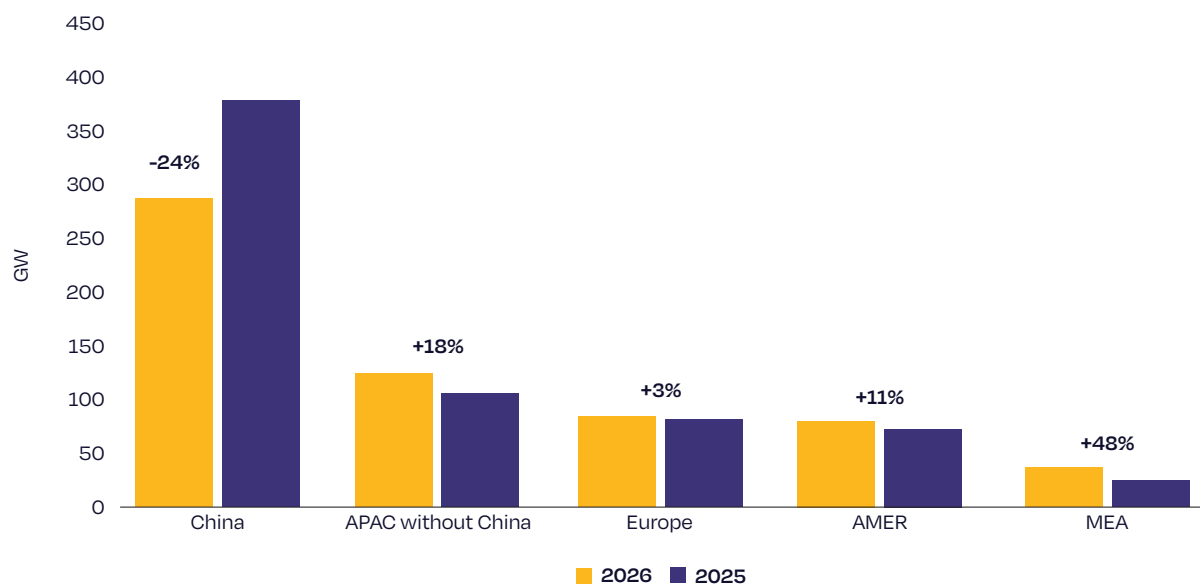
India, APAC's second solar powerhouse, is moving in the opposite direction, with installations expected to rise from 45.7 GW in 2025 to 57.2 GW in 2026. This confirms India as the main global solar growth engine outside China, supported by a sustained pipeline of utility-scale projects awarded through competitive auctions, alongside expanding activity in the commercial and industrial segment. Strong policy backing, including ambitious capacity targets and central government support, continues to underpin investor confidence. At the same time, the rapid expansion of domestic manufacturing capacity is strengthening the local supply chain, while improvements in project execution and grid integration are enabling the existing pipeline to materialise. As a result, India's relative weight within the APAC region is expected to increase significantly, from 9% to 14%, in 2026.

Elsewhere in APAC, trends are more mixed but generally stable or mildly positive under the Medium Scenario. Japan stabilises after several years of gradual decline, growing slightly from 5.8 GW to 5.9 GW. Australia continues its upward trajectory more clearly, with installations rising from 5.1 GW to 5.8 GW, supported by both distributed generation and utility-scale projects. In April 2026, the country recorded 442 MW of rooftop solar installed in a single month, the highest ever recorded by small-scale technology certificates (STC). The spike is closely linked to changes in the federal battery subsidy scheme which is amplifying demand for larger solar systems paired with storage. South Korea also sees moderate growth, increasing by 3% from 4.4 GW to 4.5 GW, although structural constraints such as grid limitations and permitting complexity continue to limit faster expansion. Many Southeast Asian countries are also expected to see the beginning of a growth curve following the energy crisis, directly impacting the region in gas and oil imports.

Figure 28

Solar is expected to grow in all regions but China in 2026

Regional annual solar PV developments 2025-2026



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In **Europe**, the 2026 Medium Scenario outlook confirms that the region is entering a period of adjustment rather than growth, with an expected growth of just 3% (see Fig. 28). Several of the largest markets contract following strong 2025 results. Germany declines 5% to 16.5 GW, maintaining a high but plateauing level. Spain drops 15% to 9.7 GW, reflecting increasing challenges related to declining capture prices, curtailment, and grid congestion, due to insufficient system flexibility. France also falls 18% to 5.6 GW following weaker political ambition towards renewables and a reduced solar target in the country's national energy plan.

Italy stands out as one of the few large European markets still growing, albeit modestly, increasing by 5% to 6.7 GW, supported by improving utility-scale pipelines. The United Kingdom is the strongest growth market in Europe, rising by 45% from 3.5 GW in 2025 to 5.1 GW in 2026, reflecting accelerating deployment and the early impact of policy initiatives such as the Solar Roadmap and reforms to planning and grid connections.

Across mid-sized European markets, a broad cooling trend emerges. Poland, the Netherlands and Greece all show declines, reflecting weaker residential demand and increasing system integration challenges. Romania remains a relative exception, continuing to grow as large-scale project pipelines advance, although the pace moderates compared to the previous year.

The solar PV market across **the Americas** presents a more balanced picture in 2026, with moderate growth in the United States offsetting declines in several Latin American markets. The United States is expected to recover slightly, growing by 7% from 43.2 GW in 2025 to 46.1 GW in 2026, supported by a strong utility scale pipeline and record levels of connection requests. However, this remains a limited expansion rather than a strong rebound. The market continues to face the effects of policy and trade measures that have constrained deployment, including tariffs on Southeast Asian imports, which have disrupted supply chains and increased costs. In addition, evolving domestic content requirements and regulatory complexity have raised development risks and slowed project execution. As a result, despite strong underlying demand, the current policy environment is acting as a structural brake on faster solar deployment.

Brazil, by contrast, is expected to decline to 13.3 GW from 14.5 GW in 2025 (around 9%). This reflects a maturing distributed generation market facing the gradual phase-out of favourable net-metering conditions, alongside persistent grid connection constraints. Other Latin American markets show mixed trajectories. Chile and Colombia continue to fluctuate at lower levels, largely reflecting project pipeline timing and structural market limitations. Mexico, meanwhile, is expected to regain pace in 2026, although recent energy reforms favouring the state-owned utility are constraining large-scale development and keeping the market below its full potential.

The **Middle East and Africa** region is expected to maintain strong growth in 2026. While the utility-driven Saudi Arabian market is anticipated to decline due to the timing of large project completions, this will be more than offset by rapid expansion in other markets. The United Arab Emirates and Egypt stand out with particularly strong growth, reflecting the commissioning of large-scale projects, while Israel and Nigeria will also accelerate significantly. South Africa continues its upward trajectory, supported by sustained demand for distributed generation amid ongoing power supply challenges. Overall, the region's growth profile remains highly project-driven, but 2026 marks a clear step-up in deployment, driven by a broader set of markets beyond the traditional leaders.



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A field of solar panels, Mexico

With solar PV demand resuming from 2027 onwards, global capacity additions are expected to reach 864 GW by 2030

Global 2027-2030

Global solar PV demand between 2027–2030 is expected to resume its positive trajectory after the 2026 hiccup. The increasing structural constraints on some of the more mature solar markets, however, pose a growing concern regarding deployment volumes.

On the one hand, the fundamentals of solar PV remain strong. The technology continues to be a versatile and cost-competitive source of electricity, with short development timelines that allow countries to use it as a resource to respond quickly to fuel supply shortages or energy price volatility. This has been illustrated in recent cases such as Pakistan and Cuba, and remains particularly relevant in the context of renewed geopolitical tensions in the Middle East, which highlight once again the economic and security risks associated with fossil fuel dependence.

However, the main challenge for the coming years is no longer primarily linked to technology cost or availability, but rather to the ability of power systems to integrate additional solar capacity. In several mature PV markets, such as Spain and Germany, increasing volumes of negative electricity prices, declining capture rates, and grid congestion are already limiting the value of new installations. Similar dynamics are now emerging in China, with decreasing project returns following the mandatory participation of solar assets on wholesale markets. The country's curtailment rates have sharply increased in early 2026, almost reaching the threshold allowed by national authorities, which was already raised only two years ago. These developments suggest that, without significant progress in storage deployment, grid expansion, and system flexibility, the pace of solar PV growth will increasingly be capped by integration constraints rather than driven by demand alone. In addition, the global solar supply chain dynamics remain uncertain. Countries are raising tariffs to protect their local industries, increasing costs for local renewable developers.

At the same time, the conflict in the Middle East and the closure of the Strait of Hormuz resulted in a second fossil fuel energy crisis in less than five years. This further reinforces the case for accelerating renewables to improve energy security. As a consequence, stronger solar expansion could be expected in less mature solar markets that are heavily impacted by the fossil fuel energy crisis. It remains to be seen whether growth in these regions can offset the slower growth in mature markets, where solar integration is currently limited by system constraints.

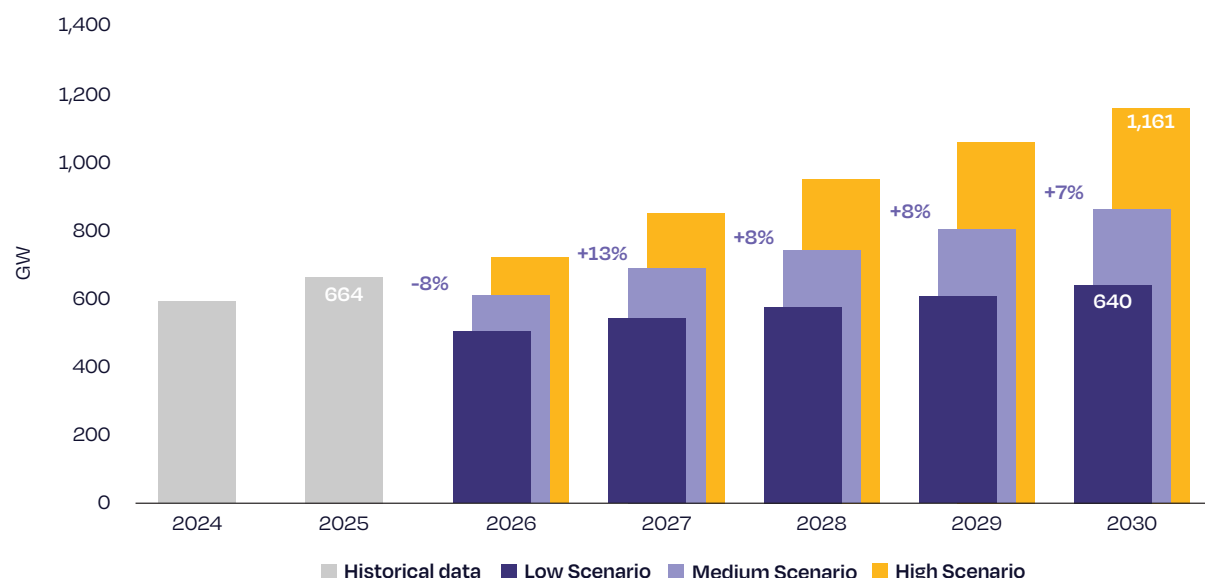
Overall, global demand for solar PV is expected to increase throughout 2030. The key question is not whether the market will grow, but how much of the underlying demand can be met given system integration limits and policy execution in emerging markets. This is the reason why the solar market outlook for the rest of the decade has been further tempered compared to our previous forecast (see more details in [Box 2 on p. 60](#)).

Naturally, China continues to play a central role in this outlook. Given its dominant position, any change in its market trajectory has a direct impact on global deployment. Following the expected slowdown in 2026, our projections assume a partial recovery in China from 288 GW in 2026 to 312 GW in 2027, supporting the global solar market rebound. However, this remains subject to uncertainty, as integration constraints and market design adjustments may weigh on investment decisions.

Figure 29

After a temporary slowdown in 2026, global solar growth is expected to resume, reaching 864 GW by 2030

World annual solar PV market scenarios 2026-2030



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Overall, our **Medium Scenario** projects the global PV market to recover from 611 GW in 2026 to 689 GW in 2027, before reaching 742 GW in 2028, 804 GW in 2029, and 864 GW in 2030 (see Fig. 29). The trajectory reflects continued global expansion, but at a slower and more constrained pace than anticipated in previous outlooks.

In the **Low Scenario**, global growth is expected to remain limited by insufficient system flexibility, a lack of recovery in China, and a more challenging macroeconomic environment. Under these conditions, annual installations increase only gradually after 2026 and remain below 2025 levels for the rest of the decade, with persistent constraints on the ability of power systems to absorb additional solar capacity.

By contrast, the **High Scenario** assumes that integration challenges are progressively addressed through faster deployment of storage, grid upgrades and additional flexibility measures, while geopolitical tensions accelerate renewable energy policies in a broader range of markets. In this case, global installations rise to 851 GW in 2027 and over 1.1 TW by 2030, with the market surpassing the 1 TW annual threshold in 2029.

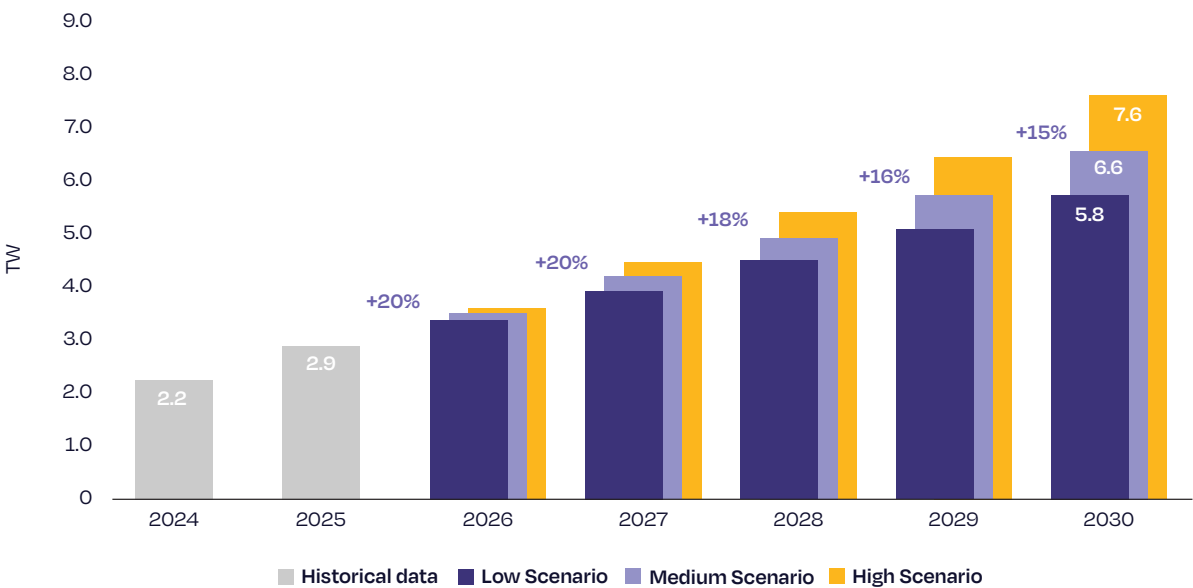
From a cumulative perspective, the global solar PV fleet is set to maintain strong growth. After crossing the 3 TW milestone in early 2026, our Medium Scenario expects capacity to rise further to approximately 3.5 TW in 2026, 4.2 TW in 2027, 4.9 TW in 2028, 5.7 TW in 2029, and 6.6 TW by 2030 (see Fig 30). This outlook corresponds to a 13% compound annual growth rate (CAGR) for the global solar fleet for the period 2026-2030.

Under the High Scenario, stronger policy support, accelerated infrastructure development, and faster deployment across less mature solar markets could push global capacity to 7.6 TW by 2030. In contrast, the Low Scenario foresees slower progress, with total installed capacity reaching 5.8 TW in 2030, still well over double the global capacity operating in 2024.

Figure 30

Double-digit growth rates expected for the global solar fleet, with 6 TW crossed in 2030

World cumulative solar PV market scenarios 2026-2030



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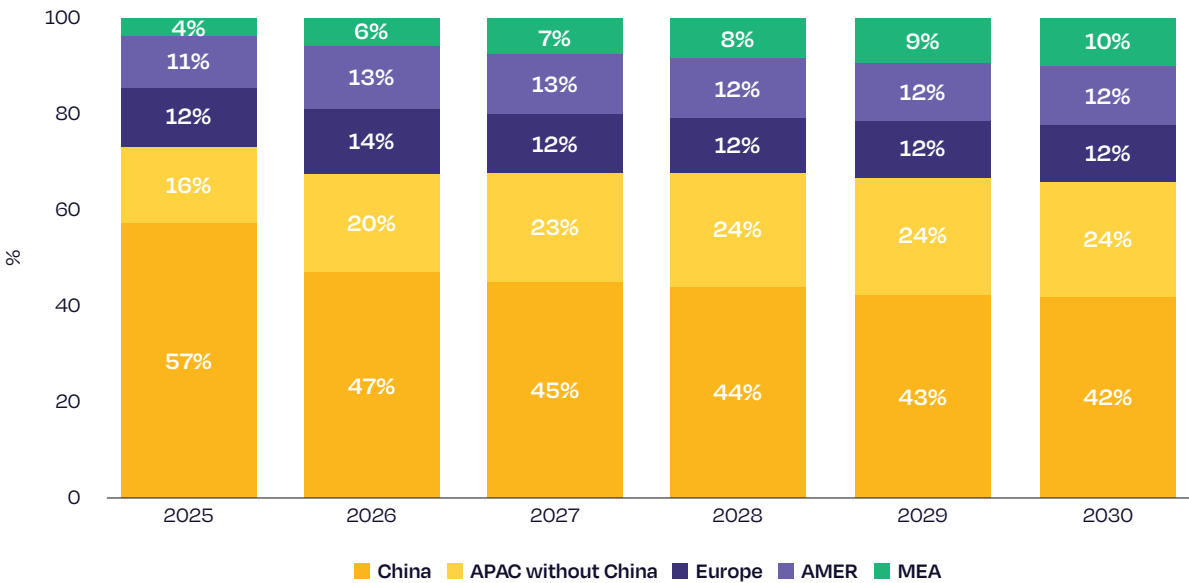
Amance, France

Compared to our previous analysis, the most striking shift in this year’s outlook is the more pronounced decline in China’s share of global solar PV installations after its peak in 2025. Climbing to around 57% of annual additions in 2025, China’s share is now projected to decline steadily, into the low-40% range by 2030 (see Fig 31). In last year’s outlook, China was still expected to retain around half of the global market through the end of the forecast period.

Figure 31

China’s solar share is expected to decrease towards 40% by 2030, to the benefit of the rest of Asia-Pacific and MEA

Evolution of global annual solar PV market shares until 2030 under Medium Scenario



© SolarPower Europe

This decline creates space for other regions to expand their role. In particular, Asia-Pacific excluding China strengthens its position as a key growth engine, with its share rising from 16% in 2024 to 24% by 2030, driven by sustained expansion in markets such as India, Southeast Asia, and Australia.

Taken together, the broader APAC region including China continues to dominate global solar deployment, although its combined share gradually declines from 73% in 2025 to 66% by 2030 as growth accelerates elsewhere.

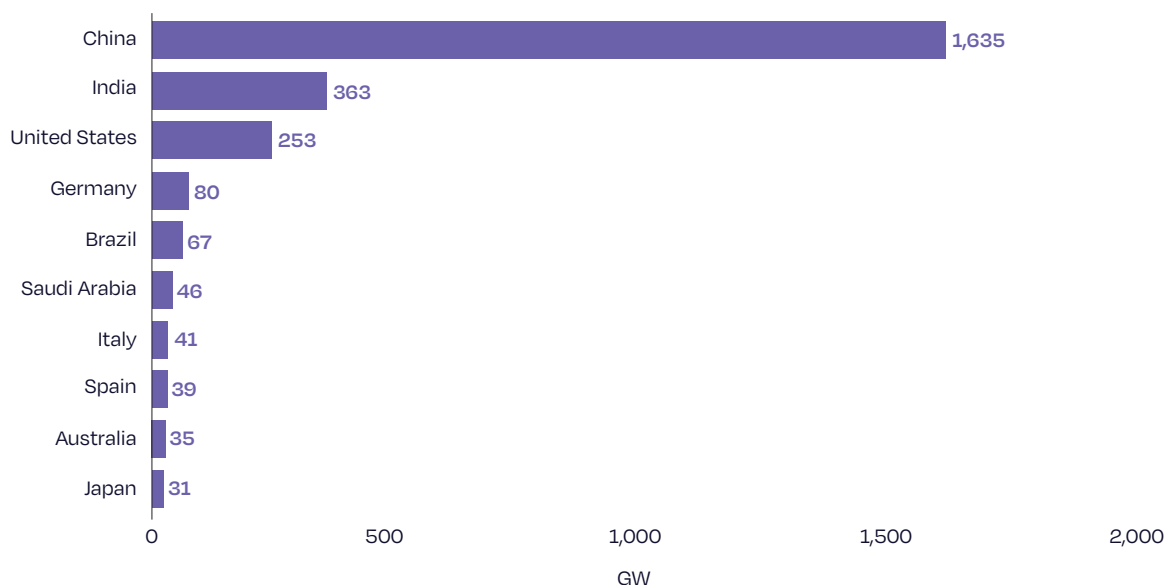
At the same time, Europe’s share remains broadly stable, holding at around 12% throughout the outlook period, while the Americas see a slight increase, rising from 11% in 2025 to 12% by 2030. This trajectory reflects a more resilient outlook for the United States than in last year’s projections, where a sharper contraction was expected.

Finally, while still smaller in absolute terms, the Middle East and Africa region continues to gain importance. Its share increases from around 4% in 2025 to 10% by 2030, driven primarily by large-scale developments in the Middle East, while Sub-Saharan Africa’s expansion remains more gradual.

Figure 32

China's solar dominance remains unchallenged despite deceleration, while India solidifies its second position

Top 10 markets solar PV additions 2026-2030



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The ranking of the top 10 markets with the highest five-year solar installation reveals several notable shifts (see Fig. 32). While China remains by far the largest market, its outlook has been significantly revised downward compared to last year, with 1.6 TW expected to be installed between 2026 and 2030 under the Medium Scenario, 17% lower than our previous forecast. This reflects the projected slowdown in 2026 and a more constrained growth trajectory thereafter, despite a recovery in the following years.

On the contrary, India consolidates its position as the second largest market, with 363 GW expected over the next five years. This represents a 53% or 126 GW upward revision compared to last year's outlook, driven by sustained utility-scale deployment and policy support.

The United States remains in third position, with 253 GW to be installed through 2030. This represents a 16% improvement compared to our previous expectations, as the uncertainties that weighed on the market last year are now expected to have a more limited impact on the medium-term outlook.

Germany and Brazil maintain their positions, with 80 GW and 67 GW respectively expected to be installed over the next five years, showing relatively stable trajectories, although growth prospects have been slightly reduced. Among the most notable changes, Saudi Arabia emerges as a major player, climbing into the top tier with 46 GW projected, reflecting the increasing importance of large-scale project pipelines in the Middle East. The remaining countries in the top 10 show stable development compared to the previous outlook.

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Looking back and forth

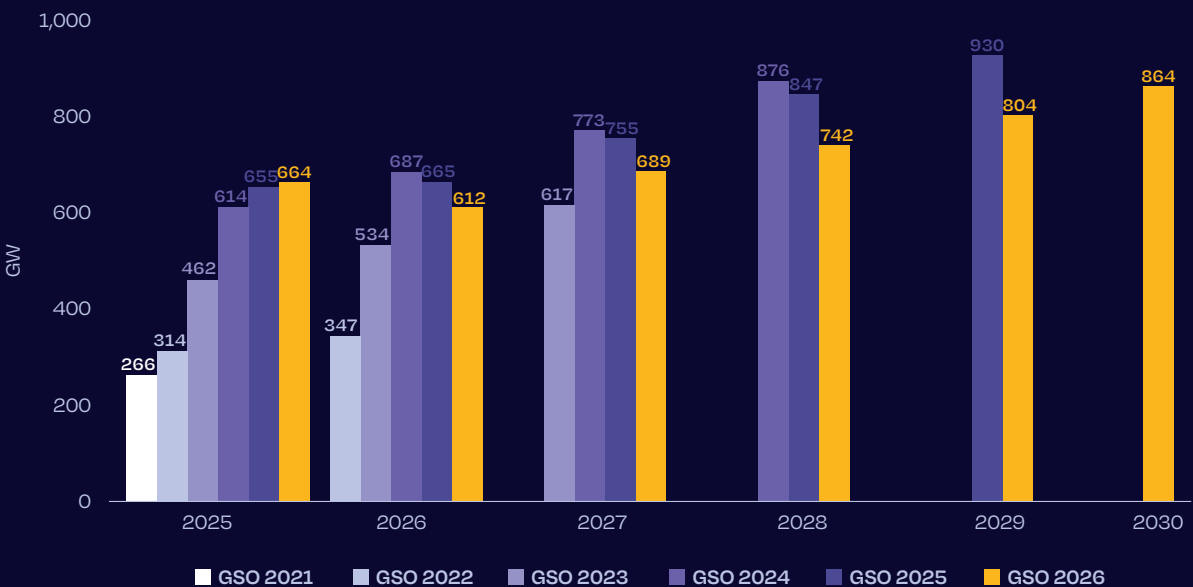
In last year's Global Solar Market Outlook (GSO 2025) , published in May 2025, we projected global solar PV installations to reach 655 GW in 2025. The market ultimately exceeded expectations once again, totalling 664 GW or 1% higher than anticipated.

Nevertheless, after several years of consistently underestimating solar market growth and regularly revising forecasts upward, last year's GSO 2025 marked the first downward revision of our five-year outlook, and this year's edition further extends that trend. The primary driver is China, where an exceptional expansion in 2025 is followed by a projected slowdown as the market transitions away from feed-in tariffs toward more market-based remuneration. Given China's dominant weight, this adjustment alone has a material impact on global deployment. In parallel, a more cautious outlook and signs of stagnation in parts of the European market further contribute to the downward revision.

Figure 33

Booth rooftop and utility-scale set to decline in 2026, with the latter expected to recover faster afterwards

Solar PV rooftop and utility-scale annual scenarios 2026-2030



© SolarPower Europe

Looking back and forth - continued

As a result, our global installation forecasts have been revised down across the entire medium-term horizon. Compared to GSO 2025, annual additions in the current outlook are lower by 53 GW (-8%) in 2026, 66 GW (-9%) in 2027, 105 GW (-12%) in 2028, and 126 GW (-14%) in 2029. These reductions reflect structural constraints rather than weaker demand fundamentals. In more advanced solar markets, much of the low-hanging fruit in the rooftop segment has already been captured, while the growing share of variable renewables has not yet been matched by sufficient deployment of grids, storage and other flexibility solutions. Unlocking further growth will therefore require a step-up in these enabling measures to preserve project economics.

From a cumulative perspective, total solar installations under our most recent Medium Scenario are reaching 5.7 TW in 2029 and 6.6 TW in 2030. This trajectory marks a slight deceleration compared to our previous forecast. In last year's outlook, global capacity was expected to reach 6.1 TW by 2029 and 7.1 TW in 2030. This year's outlook corresponds to a 7% lower volume both in 2029 and 2030.

Annual and cumulative forecasts for EU-27 markets and the top 10 global solar markets, together with regional data, can be found in SolarPower Europe's member-exclusive [Market and Policy Navigator](#).



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Rooftop and utility-scale solar segments follow similar paths towards 2030, although utility-scale is more affected by market fluctuations

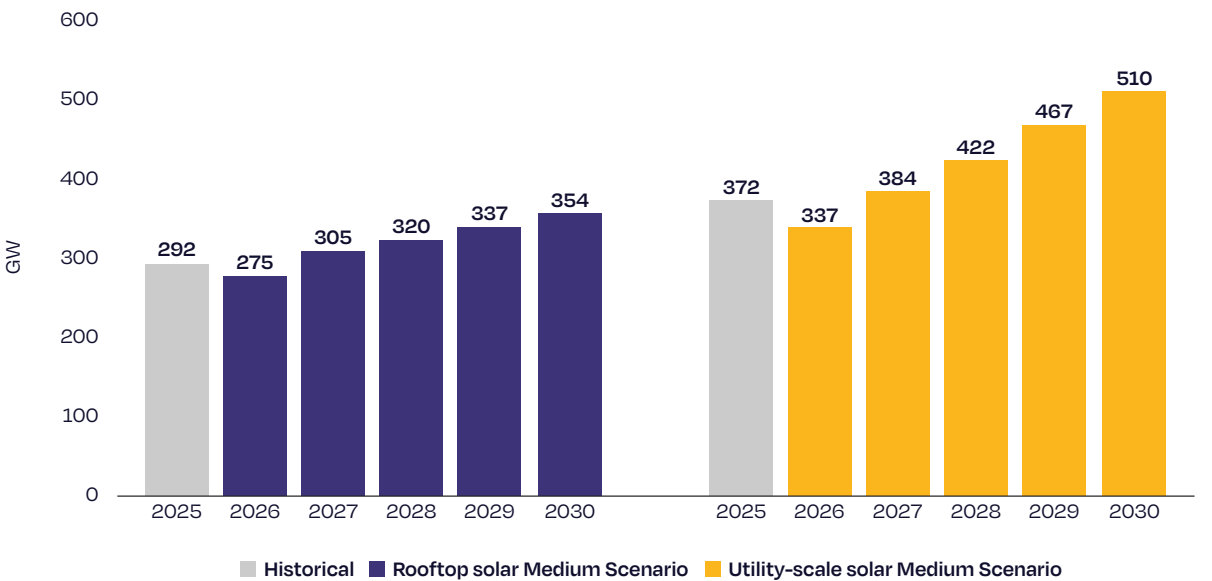
Rooftop and utility-scale installations both expanded in 2025, but at different rates. With 372 GW added a 7% growth from 2024, utility-scale remained the largest segment, compared to 292 GW and a 17% growth rate from 2024 for rooftop solar capacity. This results in a market share of 56% for utility-scale and 44% for rooftop PV.

Looking ahead, both segments are expected to decline in 2026 (Fig. 34). Utility-scale will see the sharper contraction, decreasing by 10% to 337 GW, mainly due to a reduction in large-scale projects in China. Rooftop installations are also projected to fall, though more moderately, declining by 6% to 275 GW. This softer decline reflects an accelerated demand from households and small businesses facing higher electricity prices in regions affected by the Middle East conflict.

Figure 34

Booth rooftop and utility-scale set to decline in 2026, with the latter expected to recover faster afterwards

Solar PV rooftop and utility-scale annual scenarios 2026-2030



Beyond 2026, utility-scale is expected to resume growth. Under the Medium Scenario, annual additions rise from 337 GW in 2026 to 510 GW by 2030, corresponding to a 9% CAGR, with market shares increasing from 55% to 59% during this period. This reflects the continued competitiveness of large-scale projects and their central role in many countries' electrification strategies.

The rooftop segment is also projected to grow, albeit at a slower pace and with a corresponding declining share of total capacity additions. After installing 275 GW in 2026, rooftop additions are expected to increase to 354 GW by 2030, equal to a 5% CAGR. Over the same period, the segment's market share gradually declines from 44% in 2025 to 41% in 2030. This trend reflects reduced financial incentives in several key markets, including the scaling back of feed-in tariffs and net-metering schemes in the United States and parts of Europe. As a result, the rooftop segment increasingly needs to shift towards business models focused on maximising self-consumption, integrating storage, and participating in flexibility markets. At the same time, policy support is evolving, with rooftop mandates and building regulations emerging in multiple regions from Asia to Europe, which should support longer-term deployment.



Zerbst Hybrid Solar-Battery Park, Zerbst, Saxony-Anhalt, Germany — 46.4 MW solar PV with 16 MW/57 MWh battery

Tripling Renewables by 2030

At COP28 in December 2023, governments and leaders from more than 130 countries committed to tripling global renewable energy capacity by 2030. Concretely, the pledge aims to increase installed renewable capacity from approximately 3.6 TW at the end of 2022 to 11 TW by the end of 2030. While no technology-specific targets were included, solar's contribution to achieving this goal can be estimated through our Medium Scenario forecast for cumulative solar PV capacity in 2030.

By the end of 2025, solar PV reached a major milestone, reaching for more than half of all renewable energy capacity operating worldwide. With 2.9 TW of installed capacity, this represented 51% of the global total (see Fig. 35). This is a 5 percentage point increase from 46% at the end of 2024, reflecting the faster pace of solar deployment compared to other renewable technologies.

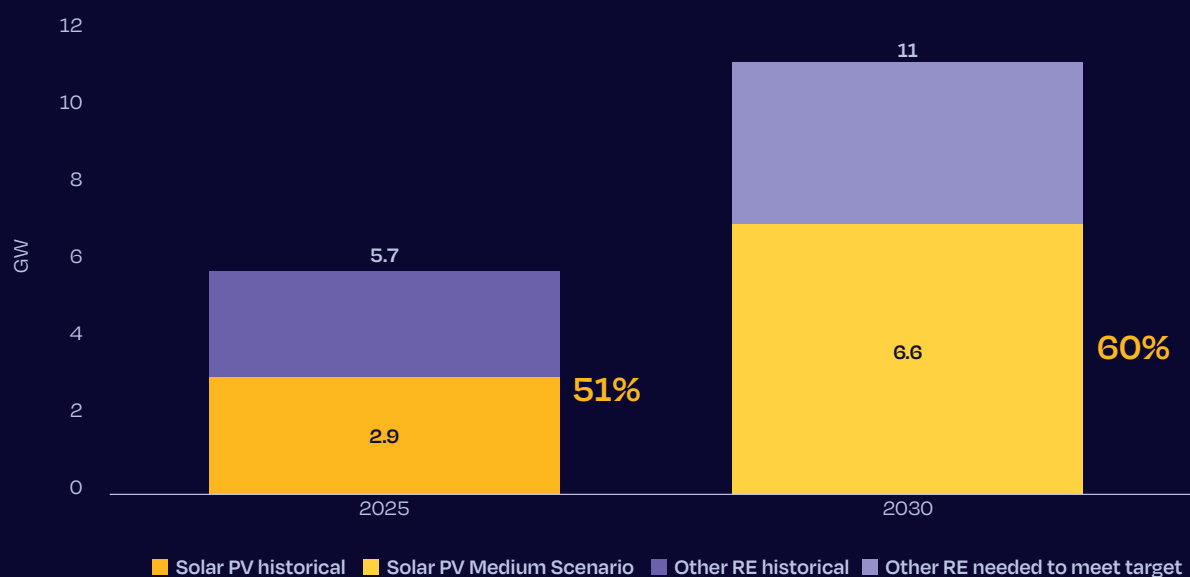
Looking ahead, we expect an additional 3.7 TW of solar PV capacity to be installed between 2026 and 2030, bringing cumulative global capacity to 6.6 TW by the end of the decade. Under this scenario, solar will account for 60% of the 11 TW renewable energy target. Although this represents a further increase of 9 percentage points from 2025 levels, it is lower than the 65% share projected in last year's report, since our cumulative outlook for 2030 has been decreased by about 0.5 TW. As a result, other renewable technologies will need to accelerate deployment substantially in the coming years to keep the tripling target within reach.

Under our High Scenario, cumulative solar PV capacity reaches 7.6 TW by 2030. In this case, solar alone would represent 69% of the 11 TW target, highlighting the central role that accelerated solar deployment could play in delivering the COP28 commitment.

Figure 35

Under the current trajectory, solar will account for 60% of the tripling renewable capacity pledge by 2030

Global installed renewable electricity generation capacity in 2025 and target for 2030



Solar PV and Global Energy Security

By Global Solar Council

This chapter examines how solar PV has become a central pillar of modern energy security, moving beyond its role as a climate technology to become a tool for reducing fossil-fuel dependence, protecting consumers from price shocks, and strengthening resilience during crises. It shows how solar and storage can support energy availability, affordability, reliability, and independence by replacing imported fuels with domestic electricity generation. Through examples from the EU, Pakistan, Lebanon, Ukraine, MENA and other regions, the chapter illustrates how solar is being used as import-substitution, price-shock protection, decentralised backup power, and critical infrastructure for households, businesses, public services and governments. It concludes that countries which combine rapid solar deployment with storage, grid modernisation, fair finance, strong standards and resilient supply chains will be better positioned to withstand future energy shocks.

2.1 Energy security in the PV context

Energy security has returned to the centre of global policymaking. Recent years have shown that fossil-fuel dependence can expose countries to sudden and severe shocks. The Russian invasion of Ukraine caused disruptions to gas supply in Europe, oil-market volatility, economic crises in import-dependent countries, electricity blackouts, extreme weather events. And most recently, in April and May 2026, the US-Israel-Iran war and Strait of Hormuz disruptions have resulted in the second severe oil and gas energy crisis in this decade. Market responses showed that recent crises have pushed countries and consumers to reduce exposure to volatile oil and gas markets, with solar PV plus storage now being seen as a fast alternative to the shock (see Table 1, p. 79).

These events have changed the way governments think about energy security. Traditional energy security policy focused heavily on securing fossil-fuel supply with strategic petroleum reserves, gas storage, LNG contracts, pipeline diversification and protection of shipping routes. These tools remain relevant, but they are no longer sufficient. Modern energy security is about resilience on every level, national down to building level – and reduce the need for imported fuels in the first place. European leaders have already started to rethink the fiscal and social risks of poorly targeted energy aid as the war has pushed up oil and gas prices.

Energy security policy is now shifting to become more about reducing exposure to volatile fossil-fuel markets, protecting consumers from price shocks, maintaining electricity supply during crises through domestic sources, and strengthening communities' resilience against conflicts, extreme weather and single points of failure. Renewable energy more generally, and solar PV plus storage in particular, have become the most important technologies in this new energy-security landscape.



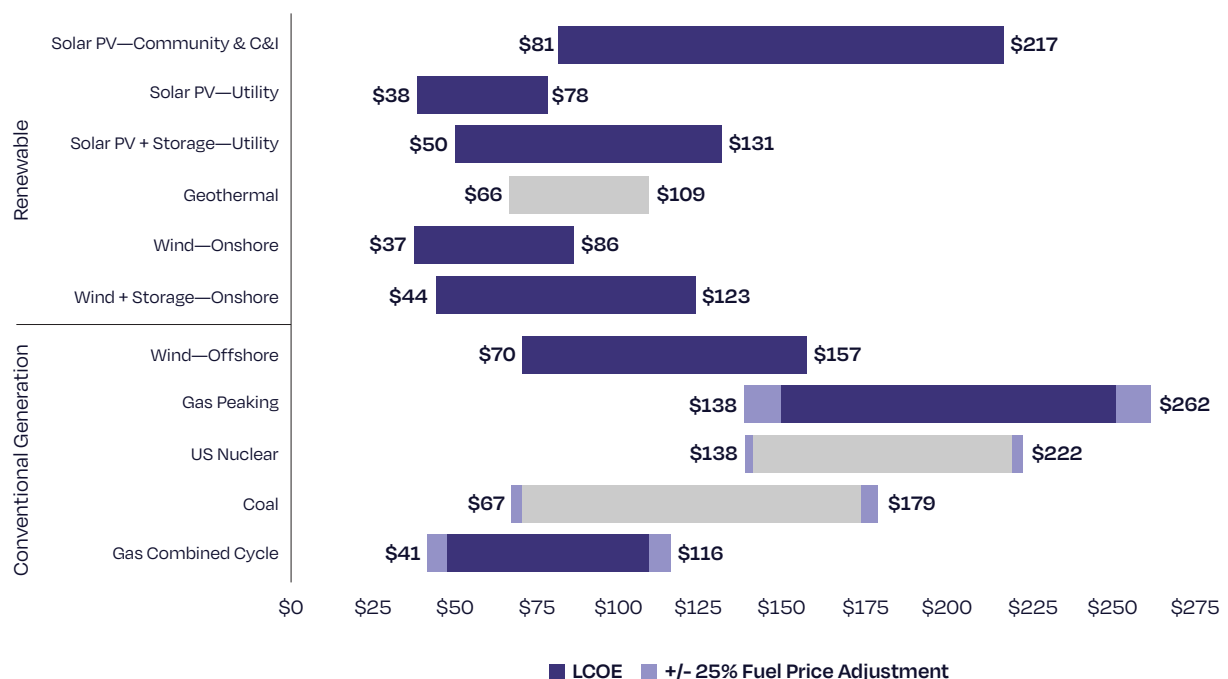
Zerst, Germany

Solar PV is particularly relevant for countries facing energy security challenges that are related to availability, affordability, reliability, and independence. It improves the availability of national electricity through the use of a widely accessible domestic resource (sunlight), which is available in every country in the world. Unlike fossil fuels, which often depend on imports, shipping routes, pipelines, foreign exchange availability, and international market conditions, solar PV can be deployed wherever there is adequate solar irradiation, which is available in most regions globally. Its characteristics make solar power particularly valuable for countries with limited domestic fossil fuel resources, isolated grids, rural communities, islands, and regions exposed to supply disruption. Its modular nature also means that capacity can be added gradually and quickly, from small rooftop systems to large utility-scale plants, allowing countries to respond faster to growing electricity demand or sudden supply pressures.

Solar PV also supports affordability by reducing exposure to volatile fossil fuel prices. Once installed, solar PV has no fuel cost, which means that its much lower electricity generation cost is also more predictable over time than gas, coal, oil, or diesel, and its LCOE is not affected by increases in fossil fuel prices (see Fig. 36). This can help governments reduce fuel import bills, limit the fiscal pressure of energy subsidies, and protect consumers from sudden tariff increases during international price shocks. For businesses and households, commercial and residential rooftop solar systems can reduce electricity bills and provide a hedge against rising grid electricity prices, especially in countries where imported fuels are a major driver of power-sector costs.

Figure 36

Sensitivity of LCOE of different technologies to fuel prices



© SolarPower Europe. Source: Lazard



Suburban solar farm at sunset in Adelaide, South Australia

In terms of reliability, solar PV contributes by diversifying the electricity mix and reducing overdependence on a single fuel, supplier, or generation source. When combined with battery storage, smart grids, demand response, and stronger transmission and distribution networks, solar PV can improve system resilience and provide backup power during outages. Distributed solar systems can be especially important for hospitals, schools, telecom towers, farms, water pumping systems, and small businesses, helping them maintain essential services even when the central grid is under stress. Solar PV alone is variable, but integrated properly into a flexible power system, it becomes a major contributor to reliability rather than a risk to it.

Additionally, solar PV advances energy independence by allowing countries to produce more of their electricity domestically. This reduces vulnerability to geopolitical tensions, fuel embargoes, currency fluctuations, shipping chokepoint risks, and external suppliers. For fuel-importing countries, every unit of solar electricity generated at home can reduce the need to purchase imported gas, diesel, coal, or heavy fuel oil. Over time, this strengthens national sovereignty over energy planning and gives governments more control over their economic and security choices, building more secure, self-reliant, and resilient energy systems.

2.1 Solar PV energy security in practice

Solar PV as an import-substitution tool: Lessons learnt from EU dependence on Russian fuels

After Russia invaded Ukraine in February 2022, solar PV became an import-substitution tool for the EU by directly reducing the need for imported fossil fuels in the power sector, especially gas. Before the crisis, Europe's energy security model relied heavily on external fuel supply, with Russian gas accounting for around 45% of EU gas imports in 2021 and almost 40% of its total gas consumption.

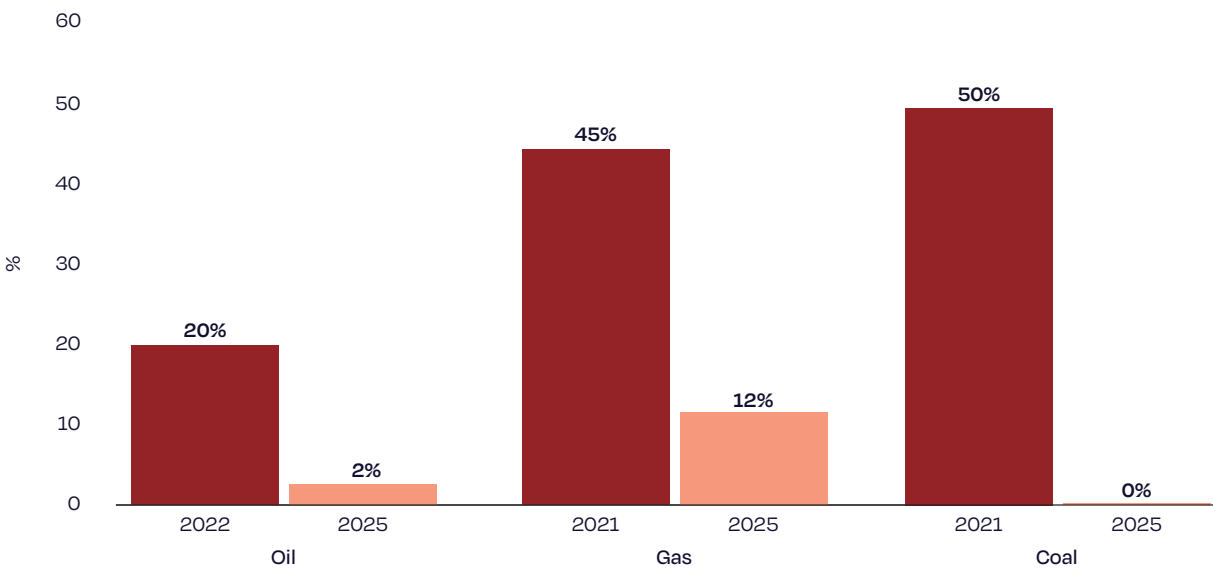
In response, the EU launched the REPowerEU Plan, in May 2022, which framed renewable energy expansion as a core route to reduce Europe's dependence on Russian fossil fuels, accelerate the green transition and lower energy prices over time. To support this, the European Commission proposed raising the EU's 2030 renewable energy target from 40% to 45%, proposed a dedicated Solar Strategy to double solar PV capacity by 2025 and reach 600 GW_{AC} (750 GW_{DC}) by 2030. The plan also included a Solar Rooftop Initiative requiring PV systems on new public, commercial and residential buildings, faster heat pump deployment, greater use of geothermal and solar thermal energy, and reforms to simplify permitting by recognising renewables as an overriding public interest and creating low-risk "go-to" areas for faster project approval.

Solar's import-substitution value was especially visible in 2022, when the EU added 41.4 GW of new solar PV capacity, a 47% increase over the 28.1 GW installed in 2021. SolarPower Europe estimated that this new 2022 solar capacity was equivalent to around 4.45 billion cubic meters (bcm) of gas, or 102 LNG tankers. In practical terms, every additional kilowatt-hour generated by solar reduced the need to burn gas, coal, or oil for electricity, thereby lowering Europe's exposure to international fuel markets, Russian supply dependence, and competition for LNG cargoes. This mattered because the crisis was not only about physical supply, it was also about price. Gas-fired power plants often set marginal electricity prices in European markets, so replacing gas generation with zero-fuel-cost solar helped reduce the structural role of imported gas in the electricity system.

The effect deepened in 2023 and 2024. EU fossil generation fell by a record 19% in 2023, reaching less than one-third of electricity generation, while renewables reached a record 44% share. Solar continued expanding, with 56 GW of additional capacity in 2023, up from 41 GW in 2022, and wind and solar together produced a record 27% of EU electricity, according to Ember data. In 2024, solar went further and overtook coal in the EU electricity mix for the first time, supplying 11% of EU electricity, solar generation reaching 304 TWh compared with coal at 269 TWh.

Figure 37

Share of EU fossil fuels imports from Russia, 2021 vs 2025



© SolarPower Europe. Source: European Commission

By 2025, imports of Russian coal were fully eliminated from the EU's energy mix. As a result of EU sanctions, Russian crude oil accounted for 2% of the EU's crude oil imports in 2025 versus 20% in 2022. Imports of Russian LNG and pipeline gas dropped from a 45% share of overall EU gas imports in 2021, to 12% in 2025, a decrease from 152 bcm in 2021 to 36 bcm in 2025 (see Fig. 37).

At the same time, from 2021 to end of 2025, the EU has installed 260 GW of renewable capacity, of which over 80% is solar. This has led to 5.6 billion EUR in savings of gas that would have otherwise been used for generation in 2025, according to the EU Commission. In addition, wind and solar generation have increased by more than 50% in the last 5 years, bringing their total contribution to 30% of the EU electricity supply, overtaking fossil fuels.²

This shift was not delivered by solar alone, but solar PV was the fastest-deploying substitute because it could be installed on rooftops, commercial buildings, brownfield sites, and utility-scale projects without requiring continuous imported fuel. This marked a structural shift: solar expanded its scope from a 'climate technology' to a key 'energy security tool' displacing imported fossil fuels and thereby significantly reducing European gas dependency from Russia. Solar PV also supported import substitution at the consumer and industrial level. High gas and electricity prices after the start of the war created strong incentives for households, municipalities, and companies to install rooftop and commercial solar systems to reduce exposure to volatile grid prices. For governments, this decentralised deployment helped diversify the response to the crisis: instead of relying only on emergency LNG procurement, subsidies, or fuel switching, Europe could expand domestic electricity production across millions of sites. This made solar a security tool with both macroeconomic and distributed benefits: it reduced fossil fuel import bills, lowered demand for scarce gas, improved resilience for consumers, and supported Europe's broader objective of producing more clean energy at home.



Hybrid project in Euskirchen, Germany

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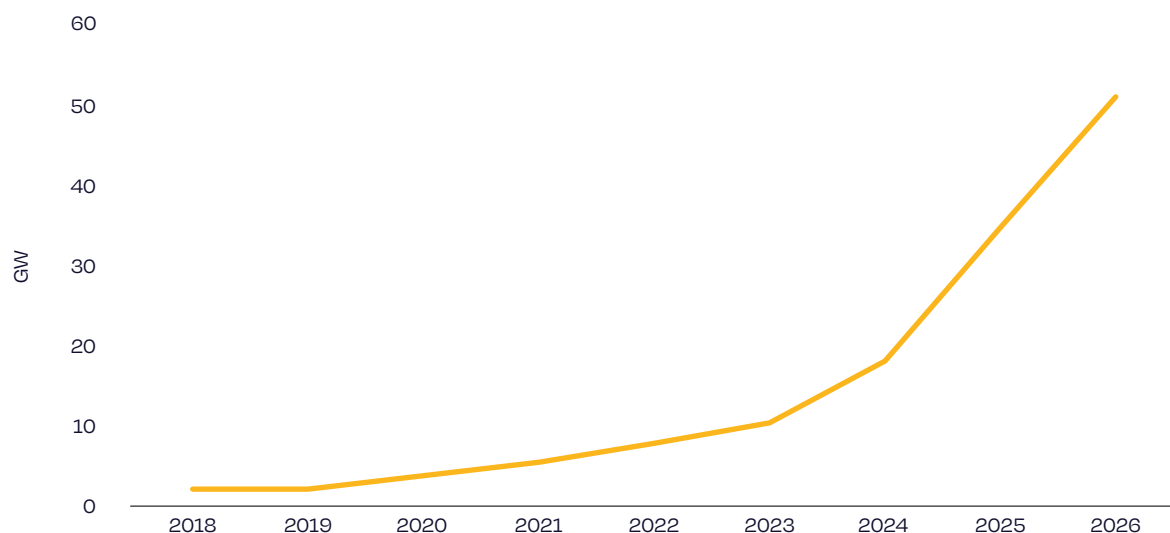
Solar as a price-shock absorber: Pakistan's solar boom

Pakistan has become one of the clearest examples of consumer-led solar adoption as a response to high electricity prices and fossil-fuel import pressure. Pakistan's rapid solar uptake has been driven by a combination of demand-side pressure and supply-side opportunity. On the demand side, electricity tariffs rose sharply, fossil-fuel costs remained high, subsidies were reduced, and the fixed costs of underused thermal power plants continued to push up grid electricity prices. On the supply side, global PV module prices fell significantly, while Pakistan's tax exemptions on PV imports made rooftop systems even more attractive. As a result, solar shifted from being an optional clean-energy investment to an infrastructure of necessity for households, businesses and farmers seeking cheaper, more reliable power. Supportive policies, including net metering, rural off-grid solar programmes and utility-scale renewable energy frameworks helped accelerate this shift, making distributed solar a practical response to Pakistan's affordability, reliability and fuel-price challenges.³

This solar boom can be seen from how Pakistan's solar PV imports rose dramatically, increasing from below 1 GW in 2018 to more than 50 GW by early 2026 (Fig. 38). While installed on-grid capacities are much lower than imported, only a small share of the recent growth came from utility-scale solar, at around 0.7 GW. Expansion has been driven mainly by distributed rooftop solar PV systems, often off-grid, marking one of the fastest consumer-driven energy shifts. This kind of solar deployment can reduce the sensitivity of the power system to fossil-fuel shocks by cutting daytime demand for grid electricity and reducing the need to dispatch imported-fuel generation. It also eases pressure on the balance of payments by lowering demand for imported LNG, diesel and other fuels.

Figure 38

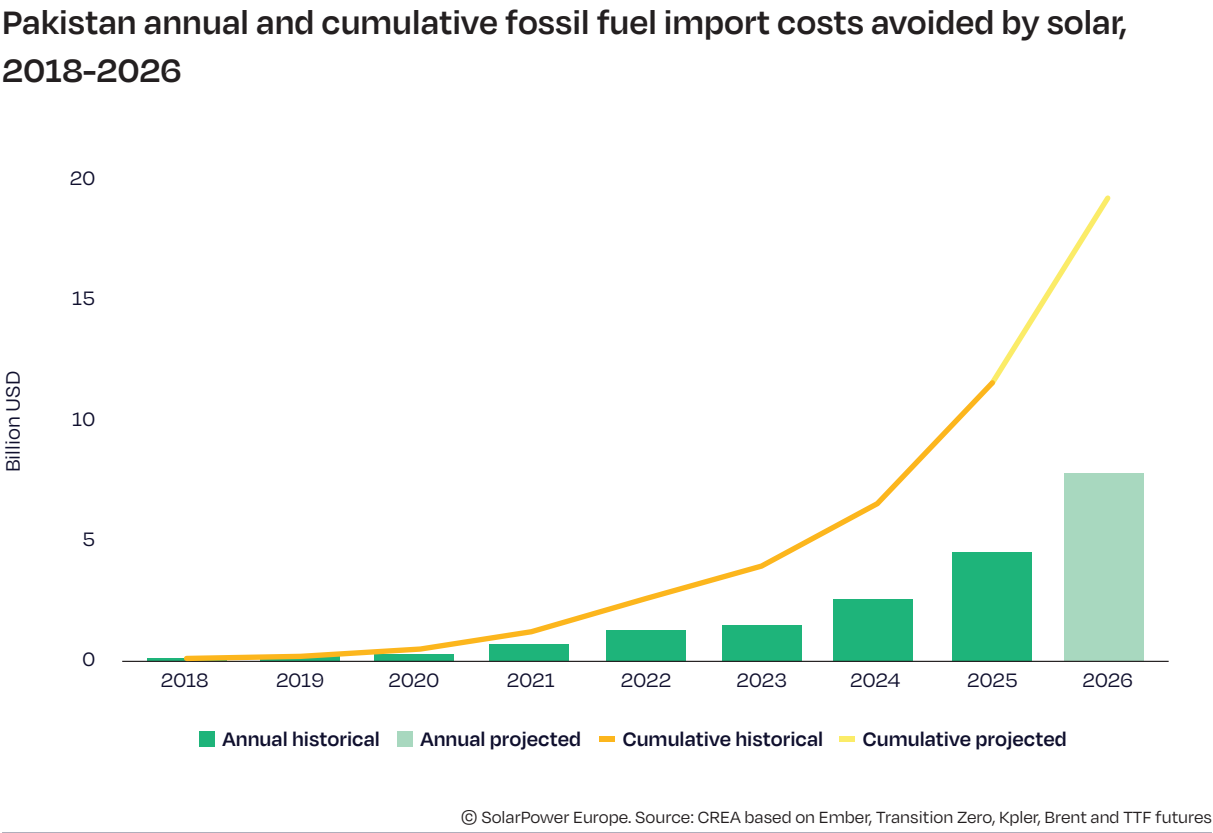
Pakistan cumulative solar PV module imports, 2018-2026



© SolarPower Europe. Source: Renewables First

This rapid expansion helped reduce the country's oil and gas imports by 40% between 2022 and 2024 alone. Pakistan's think tank Renewables First estimated that Pakistan avoided over 12 billion USD (10.4 billion EUR) in LNG import costs between 2021 and February 2026 and could save an additional 6.3 billion USD (5.5 billion EUR) by the end of 2026 if prices remain high due to the US-Israel-Iran war.⁴

Figure 39



6.7 MW installation, Dusseldorf, Germany

4 Renewables First (2025): The hedge that paid off: How Pakistan's solar boom is shielding it from the Hormuz crisis

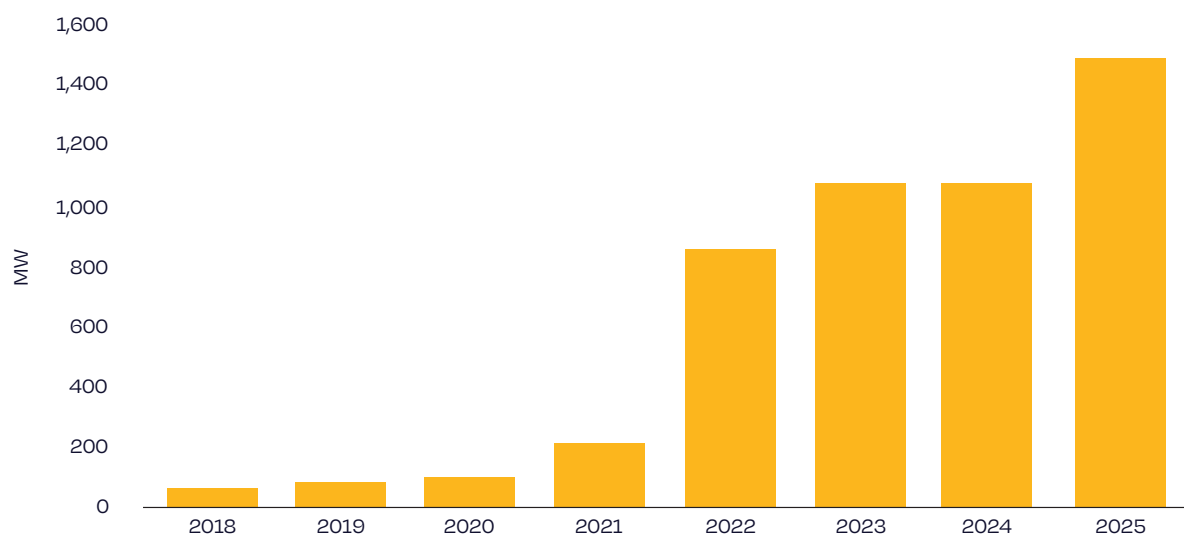
Solar plus storage as a decentralised crisis response: Lebanon's fuel and electricity crisis

Lebanon's solar case is best understood as a decentralised crisis response rather than a conventional renewable energy transition. The country's electricity system collapsed under the combined weight of decades of mismanagement, fuel import dependence, currency devaluation and the wider economic crisis. By 2021–2022, the state utility Électricité du Liban was providing only one to three hours of electricity per day on average, leaving households and businesses dependent on expensive private diesel generators. Human Rights Watch found that generator bills consumed around 44% of average household income among surveyed households, and much more for poorer households, making electricity both unreliable and socially unequal.

In this context, solar PV has become a practical survival tool. Families, businesses, universities, hospitals and other institutions turned to rooftop and behind-the-meter solar systems paired with batteries, to secure a minimum level of electricity without relying entirely on the collapsing grid or diesel generator market. This was not mainly driven by a state-led auction, feed-in tariff or large utility-scale programme – it was largely a bottom-up response by consumers seeking cheaper, cleaner and more reliable power during a fuel and electricity emergency. This is demonstrated in the increase in Lebanon's solar capacity from around 56 MW in 2018 to 1,505 MW by the end of 2025 (Fig. 40). This rapid expansion shows how solar has become a substitute infrastructure, instead of waiting for central power-sector reform, consumers built their own electricity resilience on rooftops, farms, campuses and commercial premises.

Figure 40

Lebanon cumulative solar PV capacity, 2018-2025

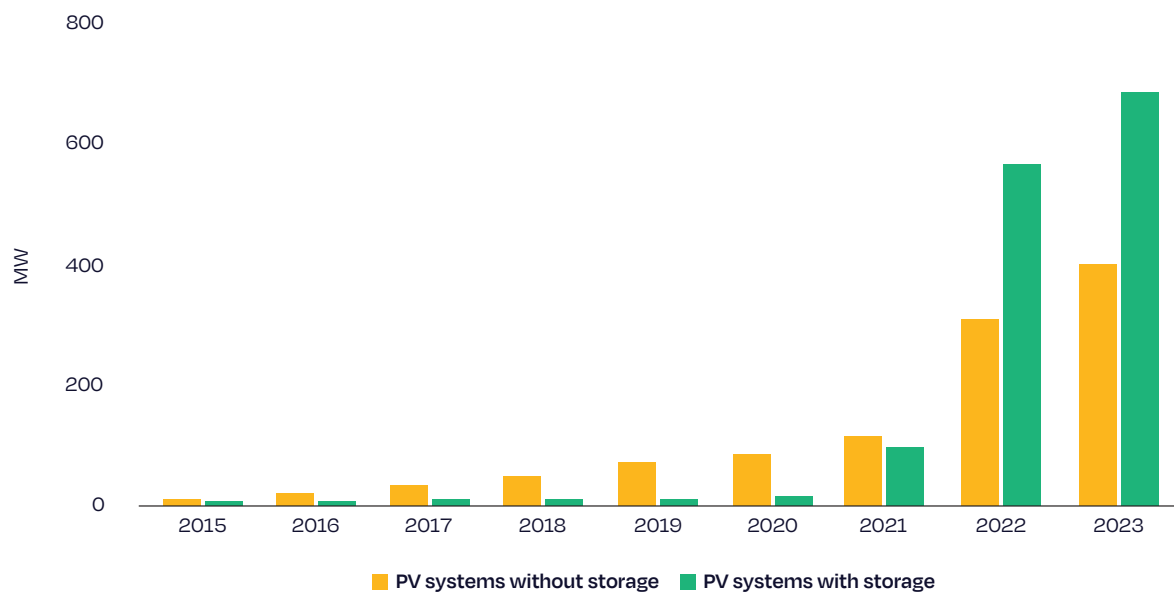


© SolarPower Europe. Source: Lebanese Center for Energy Conservation

Solar's crisis-response value lies in three main functions. First, it reduces exposure to diesel and fuel price shocks by replacing part of generator consumption with fuel-free electricity. Second, it improves resilience by allowing users to maintain lighting, refrigeration, communications, water pumping, business operations and basic services during grid outages. Third, it reduces the economic burden of the electricity crisis for those able to invest in systems, especially when solar plus storage systems displace recurring generator bills. In fact, storage in this case becomes an essential part of the solar system solution. In 2022, the capacity of solar systems paired with storage surpassed those without it. By 2023, they accounted for 63% of the systems in the market and 96% of the systems installed in the residential sector between 2021 and 2023 (Fig. 41).

Figure 41

Lebanon cumulative solar PV capacity with and without storage, 2015-2023



© SolarPower Europe. Source: Lebanese Center for Energy Conservation

In a country where the state could not guarantee reliable public electricity, solar allowed energy security to become partially decentralised at the household, institutional and business level. However, Lebanon's solar response also exposes the limits of consumer-led resilience. Solar has helped those with rooftops, capital, access to hard currency or institutional financing, but poorer households, renters and dense urban residents often remain dependent on costly generators or very limited grid supply. The private solar boom also does not replace the need for national electricity reform, grid investment, transparent regulation and public support for low-income access. Without these measures, solar can reduce the crisis for individual users while leaving the wider electricity system fragmented and unequal. The policy lesson from Lebanon is therefore clear: distributed solar can be a powerful emergency response to fuel and electricity crises, but it must be supported by financing, standards, storage, grid integration and equity measures if it is to become a durable national resilience strategy rather than a private coping mechanism.

Solar and storage powering energy security amid the Middle East crisis in the MENA region

By Middle East Solar Industry Association

In early 2026, the spark of the Middle East war caused tanker movements through the Strait of Hormuz to collapse from about 20 million barrels per day of crude and products to just over 2 million barrels per day by mid-March, pushing Brent crude as high as 126 USD per barrel and prompting the IEA to label it the largest oil supply disruption in history. Iranian strikes on Qatar's Ras Laffan complex damaged key LNG and gas-to-liquids assets, sidelining 12.8 million tons per year of LNG capacity – around 17% of Qatar's exports – and leading QatarEnergy to declare force majeure on all LNG output, with repairs expected to take three to five years. At the editorial deadline of this report, flows through Hormuz remain well below pre-conflict levels, turning what had long been a strategic scenario into a lived reality and forcing governments across the MENA region to rethink energy security.

Across the region, a debate that framed solar as a climate or cost complement to fossil fuels has been effectively closed in a single quarter. Solar is now treated as the only large-scale domestic resource that is not constrained by a 50-km maritime chokepoint, turning renewables – especially solar plus storage – from an environmental category into hard national security infrastructure. Countries in the MENA region approach solar differently according to their needs.

Crisis-driven distributed markets

Lebanon, Iraq, and Syria entered the crisis already functioning as distributed, survival-driven energy markets, where households and small businesses had begun replacing the failing grid with their own systems. In Lebanon, years of grid degradation created a parallel system of rooftop solar, hybrid inverters, and batteries; the recent destruction of PV systems in Debel, southern Lebanon in military attacks, showed that these installations now support essential civilian resilience, powering both homes and local water infrastructure.

Iraq experienced a near-total blackout on 11 August 2025, when two 400 kV lines failed during an Arabian heatwave that hit 50°C, dropping more than 6,000 MW and exposing a system where peak demand is roughly 55 GW but available capacity is much lower. In response, Iraq has set a 12 GW solar target by 2030 while distributed rooftop PV and storage grow organically. This mirrors Syria's approach, where roughly two hours of electricity are followed by four hours of outage and more than half the grid is incapacitated, making rooftop solar literal survival infrastructure alongside updated 2030 targets of 2,500 MW solar and 1,500 MW wind.

Import-dependent markets restructuring for resilience

Import-dependent markets such as **Jordan, Egypt, Morocco, Kuwait, and Bahrain** have reframed solar and storage as tools of sovereignty and operational continuity rather than environmental branding. Jordan has activated strategic fuel reserves and is building on a decade of renewable investment, with solar and batteries now treated as national security assets and policies expected to favour industrial wheeling and C&I storage.

Egypt's focus has shifted from sustainability to keeping industry running under load-management pressures, driving demand for rooftop C&I solar, hybrid backup systems, and batteries while continuing also large, central utility-scale projects, though now backed with energy storage. Morocco's earlier push for solar-wind expansion, storage, and clean power exports to Europe is being validated by regional stress, reinforcing its position as North Africa's most investable utility-scale market.

Solar and storage powering energy security amid the Middle East crisis in the MENA region – continued

The case of Kuwait showed that hydrocarbon wealth does not guarantee energy security: after 2024-25 summer shortages forced LNG and electricity imports, it signed about 3.5 GW of solar in March 2025 and revived the 1.1 GW Shagaya tender, with this solar pipeline now seen as the most credible near-term capacity addition and tender timelines likely to tighten further. Bahrain, facing domestic gas decline, began commercial LNG imports via the Hidd terminal in April 2025, while national energy company Bapco committed to 2 GW of wind and the first utility-scale solar project at Sakhir. In Bahrain, Kuwait, and Qatar, where desalination provides roughly 90-99% of drinking water, the most powerful commercial signal is now solar-plus-storage dedicated to desalination, hospitals, telecom, and defence.

Producer states: from strategy to direct exposure

For MENA's producer states, the crisis converted renewables from a strategic, export-competitiveness argument into a shield against direct physical and commercial exposure. In **Qatar**, the operational 800 MW Al Kharsaah plant, a further 875 MW at Mesaieed and Ras Laffan, and the 1.6 GW Dukhan project form a path toward 5 GW of solar by 2035, and after the Ras Laffan strike removed 17% of LNG capacity for years, accelerating this domestic solar build-out is now the fastest way to secure reliable new generation.

Saudi Arabia and the **UAE** hold the only meaningful Hormuz-bypass pipelines, the East-West and Habshan–Fujairah/ADCOP routes, but even these were targetable and together could move only 6.4 million barrels per day, less than a third than the volume normally transiting Hormuz, highlighting their limits. Large programmes such as NEOM and PIF/ACWA Power tenders in Saudi Arabia, the Mohammed bin Rashid Al Maktoum Solar Park and Al Dhafra in the UAE, and **Algeria's** push, where every megawatt of domestic solar preserves a Megawatt of exportable hydrocarbons, are now seen as resilience infrastructure, with growing emphasis on batteries and grid-forming inverters.

The Hormuz crisis has effectively done in one quarter what a decade of climate diplomacy and policy struggled to achieve: it has repositioned solar and storage across MENA from environmental add-ons to non-negotiable components of national security. The IEA's description of Hormuz as “the greatest threat to global energy security in history” doubles as the clearest commercial signal of the decade for the solar and storage value chain, indicating that fuel-based systems alone can no longer meet governments' security requirements.

For EPCs and developers, the shift will manifest in compressed tender cycles, streamlined permitting, more robust sovereign-backed offtake, and explicit resilience and critical-infrastructure requirements written into requests for proposals. Inverter and BESS suppliers can expect rising demand for hybrid systems, microgrids, grid-forming architectures, and storage sized for evening peaks and partial grid independence, particularly to secure hospitals, telecom sites, water and wastewater plants, desalination facilities, and defence installations. We will also see more 24/7 projects, like the planned 1.95 GW solar and 3.9 GWh BESS system in Egypt, for which the Egyptian Electricity Transmission Company (EETC) signed a PPA in early 2026.

Module manufacturers and distributors stand to benefit from a more diversified regional demand profile that spreads beyond a small number of Gulf mega-projects into sustained pipelines in distributed, C&I, and utility-scale segments across multiple countries. The core lesson for policymakers and industry alike is stark: imported fuel can be delayed, gas flows can be blockaded, and pipelines can be targeted—but sunlight has no chokepoint, making solar-plus-storage the anchor of any credible energy-security strategy in the post-Hormuz landscape.

Solar PV across the world: Energy security in crisis, access and resilience contexts

Beyond the cases of the EU, Pakistan and Lebanon, solar PV is increasingly being used as a practical energy-security tool across very different crisis contexts. In disaster-prone regions such as **Puerto Rico**, solar-plus-storage has become resilience infrastructure: after Hurricane Maria exposed the fragility of a centralised grid, the U.S. Department of Energy launched the Puerto Rico Energy Resilience Fund and the Programa Acceso Solar to provide subsidised residential solar and battery systems for low-income households. In **Cuba**, a country deprived of supply of oil from Venezuela, and experiencing major blackouts, we have seen potentially the fastest switch to solar plus storage on a par with Pakistan.

In wartime **Ukraine**, distributed solar and batteries are being treated as part of civil resilience, the available dispatchable generation capacity fell from about 38 GW after the Russian invasion to 19 GW, and later to 12 GW after severe attacks in spring 2024, making decentralised generation vital for hospitals, municipal services, water systems and emergency communications. The IEA argues that distributed energy resources – including rooftop solar, batteries, and local generation – can not only improve energy security, reduce dependence on vulnerable centralised plants but also increase recovery speed after attacks while still supporting long-term decarbonisation and EU integration goals. The agency's roadmap emphasizes distributed solar PV as a key component of rebuilding Ukraine's electricity sector.

Syria has seen a similar response to conflict, with the city of Aleppo now covered in rooftop solar. In **Bangladesh**, solar home systems showed how PV can strengthen household-level energy security by replacing kerosene and weak-grid dependence with basic electricity access. In 2021, Bangladesh had the largest off-grid solar power programme in the world that brought electricity to around 20 million people. There are many other examples in African countries such as Nigeria, Uganda, Kenya, Rwanda, Ethiopia and Tanzania, where solar home systems and mini-grids are helping households, clinics, schools and small businesses secure basic electricity where national grids are unreliable or absent.

These examples and many others around the world show that solar PV's energy-security value is functioning as emergency power, fossil fuels displacement, household energy access, critical-service protection and decentralised resilience infrastructure in countries facing disasters, war, weak grids and fuel-price volatility.

The 2026 Hormuz Strait oil and gas shock: why solar matters now

The US–Israel war against Iran has reinforced the energy security case for solar PV by exposing how quickly geopolitical conflicts can translate into global fuel-price shocks and supply risks. The Strait of Hormuz remains one of the world's most critical energy chokepoints, with around 20 million barrels per day of crude oil and oil products passed through it in 2025, equal to roughly 25% of global seaborne oil trade, while LNG exports from Qatar and the UAE through the Strait represented around 20% of global LNG trade, according to the IEA. Any disruption therefore raises energy costs far beyond the immediate conflict zone, especially for fuel-importing countries and price-sensitive economies.

The war and closure of the strait boosted demand for solar systems, batteries, electric vehicles and other clean-energy products, with reported Chinese clean-tech exporters posting record monthly sales. Global leaders and international institutions increasingly framed this crisis as an accelerator of the clean-energy transition, arguing that governments were seeking energy sources, such as solar PV, which are less exposed to volatile fossil-fuel markets, narrow shipping routes and curbing geopolitical disruption. It incentivised countries to supercharge the global shift to deploy more solar, as they looked for safer, more affordable and more secure alternatives to oil and gas supplies vulnerable to chokepoints and conflict.

Table 1 provides a list of examples of how countries reacted on the second fossil fuel crisis this decade, and made decisions towards enhancing their energy security using solar or renewable energy in general.

Table 1

Market responses to tackle the Middle East war-led energy crisis

EU-27	- Announced AccelerateEU package aiming to accelerate the clean-energy transition, reduce dependence on oil and gas, expand homegrown clean energy, upgrade grids, protect consumers from price spikes and mobilise investment in the energy system; - Announced Citizens Energy Package that aims to lower household energy bills, protect vulnerable consumers, and encourage households, small businesses and local authorities to produce, consume and share their own renewable energy.
Germany	Demand for rooftop solar has increased strongly, with several leading stakeholders reporting that interest from private customers has often doubled following the war events. Interest in heat pumps and electric vehicle chargers has also risen sharply.
Indonesia	- Working to accelerate the transition from fossil fuels to renewables, particularly solar power, to mitigate the impacts of the energy crisis; - Plans to decommission diesel and oil-fired steam power plants, with shutdowns occurring in parallel with the deployment of new renewable infrastructure to avoid disruption to the national power grid.
Iraq	- Launched an emergency initiative to accelerate the deployment of solar infrastructure; - Directed port authorities to prioritise equipment and materials required for solar projects.
Philippines	- Suspended electricity trading on the wholesale electricity spot market until further notice due to fuel supply risks and price volatility, while the powersystem will operate under guidelines that aim to prioritise renewable energy and conserve critical fuel inventories; - Announced fast-tracking of 1,471 MW of renewable energy and storage projects by the end of April 2026.
South Korea	- Announced medium- and long-term measures to expand renewable energy supply, accelerate renewable-energy financing, speed up commissioning and streamline licensing and grid access; - Rolled out a supplementary budget including 365 million USD for solar, wind, storage and EV subsidies.
Spain	Approved emergency measures that include an expansion of income tax deductions for installing PV systems, heat pumps and electric vehicle charging points, as well as support for improving building efficiency and scaling up renewable energy deployment.
UK	- Demand for residential solar has increased significantly, with utilities reporting strong surges in installation enquiries since the start of the war; - The government has prioritised solar generation in its energy security strategy in response to price shocks, bringing forward the next renewables auction round and accelerating the approval of plug-in solar for the domestic market.

This crisis demonstrates that fossil-fuel import dependence remains a strategic vulnerability even for advanced economies. Countries that invested early in domestic renewable electricity, grids and storage are better positioned than countries that remain structurally dependent on imported fossil fuels. The next phase of energy-security policy should therefore treat solar PV not as an optional climate measure, but as strategic infrastructure. The countries that gain the most security benefits will be those that combine rapid solar deployment with storage, grid modernisation, fair finance, strong standards and resilient supply chains.

It also builds upon previous energy crises and further strengthens the argument for an energy system change that is not based on fossil fuels and could absorb more renewable energy. While there is an increase in the above-mentioned renewable energy policy measures, there is an anticipated commitment on electrification part of climate negotiations this year. On June 9th 2026, the COP31 Presidency announced a global target to increase the share of final energy demand met by electricity from just over 20% today to 35% by 2035. This signals a significant step in translating this momentum into a concrete international objective, positioning electrification as a key pathway for enhancing energy security, reducing exposure to fossil fuel market volatility, and potentially accelerating demand for solar energy.

Market Focus: Australia

By Smart Energy Council

Australia has reached a major milestone in its clean energy transition, with renewables and storage supplying more than half of demand in the National Electricity Market for the first time in Q4 2025. Solar PV remains at the centre of this shift, led by one of the world's most mature rooftop markets and supported by accelerating utility-scale deployment, falling storage costs, strong policy frameworks, and growing demand for consumer energy resources. Battery storage is rapidly becoming essential to the Australian power system, helping absorb daytime solar output, supply evening peaks, reduce reliance on coal and gas, and improve system affordability and resilience. Looking towards 2030, Australia's solar and storage growth will be driven by the Capacity Investment Scheme, the Cheaper Home Batteries Program, state-level targets, corporate PPAs, virtual power plants and solar-plus-storage projects, although transmission constraints, price cannibalisation, workforce shortages and supply-chain dependence remain key challenges to overcome.

Australia has passed the halfway point in its shift from fossil-fuelled power to renewables

In Q4 2025, renewables and storage supplied 51% of demand in the Eastern and Southern states' National Electricity Market (NEM) for the first time, with solar PV and batteries leading the change.

The transition is already delivering tangible system benefits. Record renewable output is improving affordability, cutting emissions and strengthening energy security by reducing reliance on coal and gas. In the NEM, wholesale prices almost halved in late 2025 and early 2026, with average quarterly prices falling by up to 44% to about 50 AUD/MWh (30.9 EUR/MWh), while in Q1 2026 the cost of generating electricity across Australia's east coast fell by 12%.

Coal and gas generation also dropped to record lows. Gas plants, which have traditionally supplied evening peak demand, recorded their lowest average quarterly share since 1999, as batteries increasingly absorbed daytime rooftop solar and wind output before discharging it during the evening peak. Batteries set the price of power in the grid almost one-third of the time during the first quarter of 2026, a new record that increased supply at peak times and helped drive the broader price decline.



Solar power plant near the town of Broken Hill, New South Wales, Australia

Solar PV and battery storage landscape until 2026

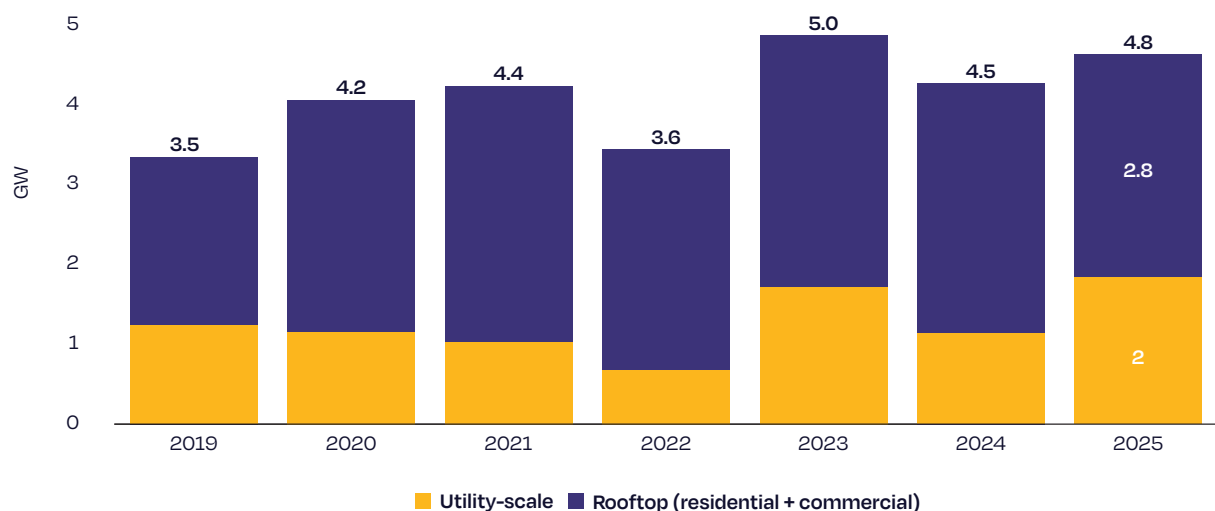
Australia's solar journey has been extraordinary. From a modest cumulative base of 5.1 GW at the end of 2015, over the following decade, the country added more solar capacity than many countries' total solar fleet. With around 4.8 GW added in 2025, Australia's total solar fleet surpassed 45 GW by the end of 2025.

The Australian market remains rooftop led. Of the 4.8 GW of solar added in 2025, around 2.8 GW came from rooftop residential, commercial, and industrial systems, while about 2 GW came from utility-scale projects of 5 MW or larger (see Fig. 42). This reflects the success of long-standing consumer incentives, but it also shows that utility-scale solar still needs to accelerate if Australia is to reach its 2030 objectives of 43% GHG emissions reduction compared to 2005 levels and 82% renewable share in the power mix by 2030.

This trajectory reflects a market that is simultaneously world-leading in per-capita rooftop penetration and accelerating rapidly in utility-scale deployment, which amounted to 2 GW of new capacity in 2025. Solar now supplies around 20% of Australia's total electricity demand across the regional wholesale markets NEM and South West Interconnected System (SWIS). Rooftop solar remains the dominant contributor within that figure: in the second half of 2025 it accounted for 14.2% of electricity generated in Australia, nearly doubling its contribution since 2020. Utility-scale solar contributed a further 9.3% of NEM generation output in the first half of 2025, with the two segments together surpassing wind as the largest single source of renewable electricity.

Figure 42

Annual solar PV installed capacity, 2019-2025



© SolarPower Europe. Source: Green Energy Markets, Clean Energy Council

Total operating systems have risen steadily. According to the Australian Photovoltaic Institute (APVI), by the end of 2025 Australia had more than 4.29 million PV system installations with a combined capacity of over 45.1 GW, of which rooftop solar accounted for 28 GW. This equates to nearly one in three free-standing homes and capacity has now surpassed Australia's coal-fired power fleet, which stands at 22.5 GW.

The rooftop solar market has remained relatively stable at roughly 2.6–3.2 GW per year over the past 4 years, while utility-scale installations rose from 0.85 GW in 2022 to around 2.0 GW in 2025 and is expected to strengthen further in the latter half of the decade. This matters because rooftop PV is already highly penetrated, whereas the wider energy transition will require far more utility-scale generation and firming capacity.

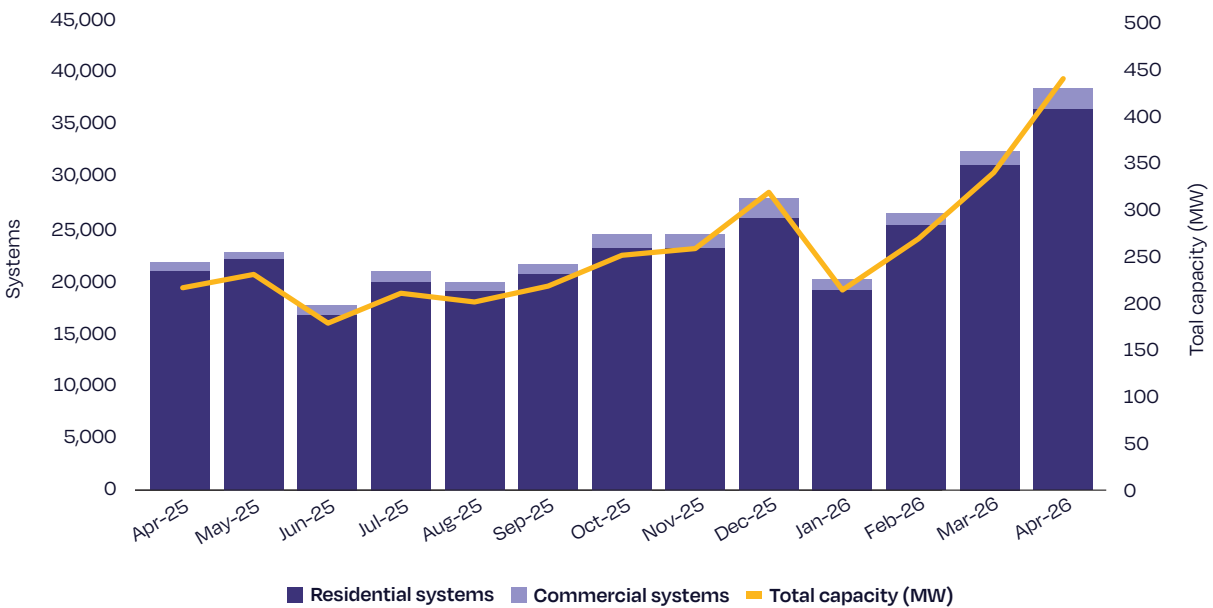
This pattern reflects the success of a decade-long suite of government incentives, particularly the Small-scale Renewable Energy Scheme (SRES), which uses tradeable Small-scale Technology Certificates (STCs) to reduce upfront costs for households and small businesses.

A second notable trend is system replacement, with some of the recent rooftop growth coming from upgrades rather than entirely new installations. As a result, gross additions are outpacing net fleet growth, although rooftop PV is still expected to exceed the capacity needed under the 2029/30 pathway by about 1 GW.

Australia's solar PV deployment continues to break national records, with rooftop solar leading the surge. In April 2026 alone, 437 MW of rooftop solar capacity was registered, the highest monthly figure ever recorded and well above the previous peak set during the COVID-era boom in March 2021 (see Fig. 43).

Figure 43

Monthly residential and commercial solar PV installed capacity, April 2025 – April 2026



© SolarPower Europe. Source: Green Energy Markets, based on STC registrations including those pending CER review

In terms of system numbers, almost 39,000 systems were installed in April 2026, the highest monthly count since the peaks of 2011–2012 driven by the solar STC multiplier and feed-in tariff surge. While system numbers were higher in that earlier period, today's installations are much larger, with average system size rising to around 10 kW by 2024 from roughly 2–3 kW in the early years.

This acceleration was driven by the Cheaper Home Batteries Program (CHBP), broader policy momentum following Labor's May 2025 re-election and continued declines in system costs. However, the Clean Energy Regulator's Carbon Market Quarterly data indicates that some of the recent growth reflects replacement of aging systems rather than entirely new rooftop coverage, so net fleet growth is lower than gross installation figures suggest.

Commercial and industrial solar adoption in Australia is accelerating as large corporate energy users increasingly pursue renewable PPAs and behind-the-meter solar to manage energy costs and achieve sustainability commitments. The Clean Energy Finance Corporation (CEFC) – the federal government owned 'green bank' – has been instrumental in enabling mid-market C&I solar transactions through innovative financial structures. Stepped pricing innovations in the PPA market are enabling mid-sized companies to enter the market for the first time, broadening the offtaker pool beyond conventional large energy buyers.

As commercial and industrial solar installations are not eligible for existing federal certificate schemes, some programmes such as the Victorian Energy Efficiency Certificates (VEECs) are being created at the state level which indicate the next growth segment for the solar industry in Australia.

Virtual power plants (VPPs), which aggregate rooftop solar and battery systems across many commercial sites, represent the next phase of the transition, transforming distributed C&I assets into dispatchable grid resources.

In April 2026, the record PV installations were coupled with about 69,000 battery systems registered in a single month, highlighting the extraordinary pace at which aggregable behind-the-meter assets are being added to the Australian grid. At this rate, Australia's distributed storage fleet could reach multi-GWh scale within months, creating the building blocks of a genuinely consumer-led energy system. Distributed storage capacity reached 11.2 GWh in May 2026.



Solar panels on suburban houses in Melbourne, Australia

Outlook to 2030

Australia's 2030 solar outlook should be viewed in the context of an 82% renewables target by 2030 and the expected retirement of much of the coal fleet by 2035. To stay on that path, the Australian Energy Market Operator (AEMO) and the Clean Energy Council (CEC) expect annual solar additions to rise to about 8-12 GW a year in the latter part of this decade. The federal Capacity Investment Scheme, expanded in July 2025 to a 40 GW target, is the main policy lever driving this scale-up. It is designed to underwrite 26 GW of new renewable generation and 14 GW of clean storage through competitive tenders running until 2027.

Rooftop solar is expected to remain a major contributor, with cumulative capacity forecast to reach 37.2 GW by June 2030, slightly above earlier forecasts as per CEC. If the April 2026 record were sustained even partly, annual rooftop additions would exceed 3 GW in 2026, building on the 3.2 GW peak set in 2024.

Utility-scale solar, however, will need to accelerate much faster to close the gap to target. Investor sentiment has improved following Labor's 2025 re-election and the approval of 54 renewable projects by November 2025, bringing total approvals since 2022 to 123, while around 7 GW of renewable capacity was added across all technologies in 2025 (equivalent to powering approximately 2.4 million homes).

The market is heavily shifting toward co-located solar-plus-storage projects as battery costs fall and market volatility makes hybrid projects more economical. At the same time, agrivoltaics, floating solar, and off-grid mining applications are emerging as important niche segments that could broaden the market and improve land-use and social-license outcomes. The overall solar market growth would highly depend on the following key drivers and by addressing the hurdles.

Drivers of solar & storage growth

The Australian **Government's policy framework** has been the foundation of solar market expansion. Key mechanisms include the aforementioned SRES scheme, which provides upfront capital cost reductions through STCs for residential and small commercial systems and runs until 2030; the Capacity Investment Scheme (CIS), a federal revenue floor/ceiling underwriting mechanism offering long-term contracts to incentivise dispatchable generation and storage projects; and the CHBP rebate, launched in July 2025, which subsidises home battery systems. The rebate was a proposal long sought by the Smart Energy Council (SEC), who worked with the Government to develop and deliver the programme.

Australians purchased 85,000 battery units in the first half of 2025 alone, a 191% increase over the same period in 2024. This was prior to any government incentives such as rebates. Since the introduction of the CHBP rebate, coupled with other incentives such as green finance loans, and some complimentary state subsidies, the market response has been exceptional. As of May 2026, a total of 400,000 batteries has been installed, with a combined storage capacity of 11.2 GWh.

State-level targets and tenders further amplify the federal policy framework. New South Wales has pledged 12 GW of storage by 2030; Queensland is targeting 4 GW of storage by 2035. Victoria, South Australia, and Western Australia maintain complementary renewable energy and storage targets that contribute to national energy infrastructure delivery. An overview of support programmes is provided in Table 2.

Table 2

Australia's State & Territory solar PV and battery storage funding Schemes

State/ Territory	Scheme	Technology	Funding/Value	Target & Deployment (Q1 2026)
NSW	Energy Security Corp - storage procurement	Grid-scale BESS	Revenue underwriting/ contracts	56 GWh storage required by 2030 (up 40% from 40 GWh). Only 12.5 GWh has reached FID — 75% still uncontracted.
	Peak Demand Reduction Scheme (PDRS) — VPP incentive	Home battery + Virtual Power Plant	Up to 1,500 AUD (925 EUR) state rebate	Residential VPP connection statewide. Stackable with federal CHBP, combined 6,000 AUD – 8,000 AUD (3,702 EUR – 4,936 EUR) possible. 40 projects under construction.
	Rooftop solar (SRES + state policy)	Rooftop solar PV	Federal STCs only (no separate state rebate)	321 MW new rooftop H1 2025 (2 nd nationally). Part of 26.8 GW national total.
VIC	Solar Homes Program	Rooftop solar PV	Up to 1,400 AUD (863 EUR) (panels); 2,800 AUD (1,727 EUR) (apartments); 1,400 AUD (863 EUR) (rentals / landlord)	Legislated 40% renewables by 2025; 65% by 2030; 95% by 2035. 230 MW new rooftop H1 2025.
	Solar Homes — interest-free battery loans	Residential battery storage	Up to 8,800 AUD (5,429 EUR) interest-free loan — closed Q1 2026. CHBP now the main battery subsidy	2.6 GW storage target by 2030; 6.3 GW by 2035. Victoria first state to exceed 1 GW simultaneous BESS. 28 projects under construction.
QLD	Supercharged Solar for Renters	Rooftop solar (rentals only)	Up to 3,500 AUD (2,160 EUR) (landlord rebate)	326 MW new rooftop H1 2025 — led all states nationally.
SA	Firm Energy Reliability Mechanism (FERM)	Grid-scale dispatchable storage	State government mechanism (not a grant)	Grid stability focus; SA is a global BESS leader per capita. CIS Tender 7 includes SA projects.
	Retailer Energy Productivity Scheme (REPS)	Home battery + VPP	Variable cash-back (retailer-set)	Residential battery uptake via VPP connection statewide.
WA	WA Residential Battery Scheme (Synergy/Horizon)	Home battery storage	Up to 1,300 AUD (802 EUR) (Synergy); up to 3,800 AUD (2,345 EUR) (Horizon remote customers)	Residential BESS uptake across SWIS. VPP connection required for Synergy rebate.
TAS	CIS Tender 9 allocation + interest-free battery loans	Utility-scale renewables + home batteries	300 MW CIS Tender 9 allocation; interest-free loans for home batteries	300 MW reserved in Tender 9. Battery loans available alongside federal CHBP.
ACT	Sustainable Household Scheme	Battery storage, solar PV, energy efficiency	Zero-interest loans 2,000 AUD – 15,000 AUD (1,243 EUR – 9,256 EUR) (3% fixed also available); Grants up to 7,500 AUD (4,628 EUR) (50% of shared solar/BESS install cost)	Target: 100% renewable electricity. Current assessment round closed Apr 2026. Covers shared solar PV, BESS, smart meters.
NT	Federal programs + NT Government grants (GrantsNT)	Solar PV + battery storage	Federal CHBP primary; GrantsNT for commercial-scale projects	Residential battery support mainly via CHBP. No dedicated NT solar residential rebate beyond SRES.

© SEC based on DCCEEW, Clean Energy Council, AEMO Draft 2026 ISP, Energy Storage Summit Australia 2026, Solar Choice, Gridly, Infrastructure Australia (as of Q1 2026).

An additional market boost will come from renewable hydrogen support frameworks. Despite a wave of cancellations, the projects closest to progressing in Australia are those pairing electrolysis directly with dedicated renewable generation and storage. The most advanced example is Copenhagen Infrastructure Partners' Murchison Green Hydrogen Project in Western Australia, which pairs up to 6 GW of solar and wind with a 600 MW / 1,200 MWh BESS to power 3 GW of electrolyzers. Detailed engineering studies are expected to begin in 2026, with a final investment decision targeted for 2027, after receiving 814 million AUD (493 million EUR) under Hydrogen Headstart Round 1.

Seven projects totalling 2,180 MW of electrolysis capacity have been shortlisted for Round 2, most structured around integrated renewables. However, with applications not due until September 2026 and funding decisions expected in 2027, the gap between Australia's hydrogen ambitions and projects under construction – or reaching financial commitment – remain stark.

The Hydrogen Headstart funding programme and the Hydrogen Production Tax Credit commencing 2027 extend the scope of the support into renewable hydrogen and low-carbon liquid fuel arenas.

Consumer energy is a key enabler of Australia's clean energy transition. While the shift to renewables is well underway, progress is being slowed by delayed approvals and local opposition to large-scale infrastructure such as transmission lines, wind farms and utility-scale solar projects. In this context, rooftop solar, home batteries, virtual power plants and vehicle-to-grid systems offer the fastest and most scalable route to new capacity. The Federal Budget of 12 May 2026 recognised this by allocating 71.8 million AUD (44.3 million EUR) for a new Consumer Energy Resources National Technical Regulator, which will be responsible for coordinating these distributed assets with the grid.

Solar deployment is also increasingly driven by **system economics** rather than subsidy alone in Australia. At utility-scale level, solar generation costs are now below wholesale electricity prices in most states, and large batteries are creating a meaningful revenue stream through intraday arbitrage in the NEM, which generated 165.4 million AUD (102 million EUR) in 2024. The sharp fall in stationary storage prices to around 70 AUD/kWh (43 EUR/kWh) in 2025, down 45% year on year, is strengthening the case for co-located solar-plus-storage projects across commercial and utility segments. Four-hour battery systems are now emerging as the standard design in government tenders, signalling that storage is becoming integral to market structure rather than an optional enhancement.

Residential solar also offers a highly attractive economic proposition, with payback periods of around three to four years, and roughly half that when paired with battery storage, while also reducing household energy bills by about 1,500 AUD (925 EUR) a year.

Last but not least, Australia's **power system** is entering a period of rapid structural change. With nearly 90% of the coal fleet expected to retire by 2035, the need for flexible, dispatchable capacity is rising, making hybrid solar and battery storage the most practical way to preserve reliability during the transition. According to system operator AEMO, electricity demand is projected to grow from about 178 TWh in 2024-25 to 229 TWh by 2034-35, driven by electrification across transport, industry and heating, as well as expanding datacentre load from AI.

Solar market challenges

The most significant structural constraint on Australia's solar build-out remains **transmission and related network augmentation**. Large-scale solar capacity is being added faster than grid infrastructure can absorb it, creating curtailment, connection delays, and cost overruns.

The development of Renewable Energy Zones (REZs), including the Central-West Orana REZ in NSW and the Western Renewables Link in Victoria, aim to aggregate projects around upgraded transmission corridors, but delivery timelines remain stretched.

Solar price cannibalisation, where high levels of solar generation flood electricity markets during sunny daytime hours causing wholesale prices to plunge, sometimes turning negative, is an emerging challenge across several states. When comparing Q1 wholesale prices from 2022 to 2025 across the NEM, negative price occurrence has risen from low levels up to 13–31%, depending on the state. South Australia saw negative power prices in 37% of all NEM trading intervals in Q4 2024, driven overwhelmingly by the scale of rooftop solar generation during daylight hours. While batteries can capture and monetise this surplus, the solar cannibalisation effect is beginning to erode revenue for utility-scale solar developers, particularly those operating without long-term power purchase agreements.

Australia's clean energy transition will require a major **workforce shift**. AEMO expects new energy investment to support more than 60,000 jobs over the next 20 years, but in the near term, labour shortages are already constraining solar and storage deployment.

Record installation volumes are adding to the pressure. The most urgent gaps are in C&I and utility-scale solar, electrical engineering, grid management, battery commissioning and hybrid project development, while regional areas remain particularly under-served by training capacity.

The **skills challenge** is becoming more acute as the sector adopts smarter inverters, grid-scale BESS, virtual power plants and more complex solar-plus-storage configurations. Without faster training and workforce development, project delivery risks becoming a binding constraint on market growth.

Australia's solar **supply chain** remains heavily dependent on China-manufactured components. China currently produces approximately 88% of the world's solar cells and over 95% of polysilicon, ingots, and wafers. This concentration creates geopolitical and logistical risk, a vulnerability highlighted by the 2026 Middle East energy crisis, which has disrupted global shipping routes and introduced upward cost pressure on panel logistics from Asia.

Australia has no domestic solar manufacturing capacity at scale, making supply chain diversification and strategic stockpiling of critical components a genuine policy priority. The US-Australia Critical Minerals Production Tax Credit Agreement of October 2025 represents a useful template for bilateral arrangements that bolster supply chain resilience across both solar and battery supply chains.

Solar supply chain development and trade ties

Australia's solar supply chain remains overwhelmingly import-dependent, with most hardware sourced from China, exposing the sector to external shocks. Recent disruptions, including the 2026 Middle East energy crisis, highlighted these vulnerabilities as shipping cost volatility quickly spilled across global routes. While Australia's proximity to Asian manufacturing hubs offers some logistical geographic advantage, it remains exposed to trade policy shifts, route volatility, and wider geopolitical tensions.

Australia's Middle East energy crisis response

The escalation of conflict in the Middle East in 2026 has pushed up global oil and gas prices, underscoring the vulnerability of fossil-fuel-dependent economies to geopolitical disruption. Although Australia's electricity sector is now more insulated from direct gas-price shocks thanks to the renewable transition, the crisis still has clear consequences for power prices, gas peaking costs, and solar supply chains.

Higher gas prices have increased the cost of peaking plants that support the grid during low-solar and low-wind periods, reinforcing the case for faster battery storage deployment. At the same time, shipping disruption has raised logistics costs for solar hardware on key routes, with increases of up to 18% reported. The broader policy message is that each additional gigawatt of solar reduces reliance on gas peaking and improves resilience against imported fossil-fuel price shocks.

The main response priorities identified globally are accelerated permitting, grid upgrades, clean-energy financing, end-use electrification and more secure supply chains. For Australia, these are not abstract principles but immediate policy requirements if solar deployment is to remain on track through 2030. The challenge is not only to add more generation, but to ensure the system can absorb, firm and deliver it reliably.

Australia's comparative advantage lies not in the limited solar manufacturing, but in critical minerals and clean-energy generation exports. It holds world-leading or near-world-leading reserves of lithium, cobalt, nickel, and manganese, as well as strong reserves of silicon precursors used in solar manufacturing.

The October 2025 US-Australia Critical Minerals Production Tax Credit Agreement strengthened bilateral trade links by opening access for Australian mineral processors to US IRA-equivalent incentives for hydrogen and critical minerals. That gives Australia a pathway to develop upstream battery materials processing capacity rather than competing mainly in finished-panel assembly.

China remains the most important trade partner in the solar and BESS supply chain, so Australia's trade relationship must be managed with diplomatic sophistication. The goal should be to preserve access to competitively priced Chinese-made PV modules and batteries while gradually reducing concentration risk through diversification.

It is important that Australia work on a solar supply chain diversification pathway. And a resilient supply-chain strategy for Australia's solar and BESS sector could combine several measures:

- Strategic stockpiling of modules, inverters, and batteries to maintain and provide a government-supported buffer against short-term disruptions, similar to oil reserves;
- Expand procurement relationship with Southeast Asian partners Vietnam, Malaysia, India, and Indonesia, where solar and battery component manufacturing is growing and can provide geographic and political diversification;

- Strengthen the **Australian Energy Sector Cyber Security Framework** through special mandates tailored to solar PV;
- Greater domestic value-add through investing in critical minerals, especially lithium hydroxide processing, nickel sulphate refining, and manganese purification;
- Continued investment in next-generation solar technologies such as perovskite and tandem cells, including research at University New South Wales (UNSW) and the Australian National University (ANU), to position Australia as a technology contributor as well as a deployment leader.

BESS integration

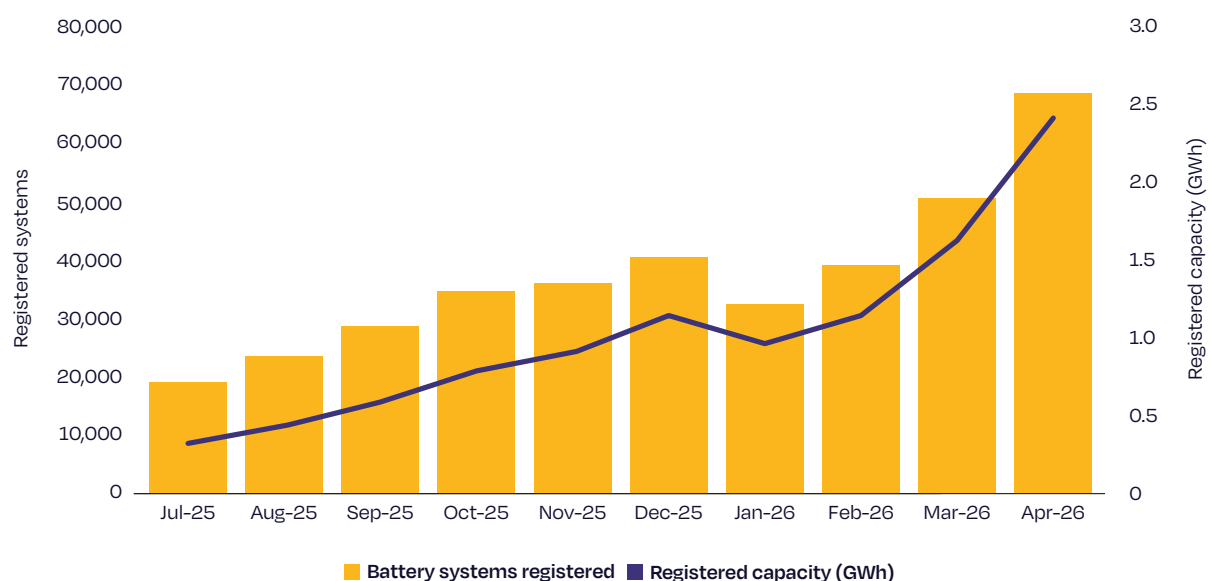
Australia has emerged as a global leader in BESS, marking one of the standout clean energy successes of the mid-2020s. It is deploying small, medium and large BESS at record speed and scale, fundamentally reshaping energy grids and markets in the process. By 2025, it had become the third-largest market for utility-scale BESS in the world, behind only China and the United States. As of August 2025, around 14 GW / 37 GWh of battery capacity was at or nearing financial close, and the project pipeline expanded rapidly from 109 GW in August 2024 to 154 GW a year later.

Australia has also become the first country to exceed 1 kWh of utility-scale battery capacity per capita, well ahead of China and the United States, both of which remain below 400 Wh per capita. Investment momentum has been strong as well, with Q1 2025 alone attracting 2.4 billion AUD (1.5 billion EUR) in large-scale BESS funding, 83% above recent annual averages.

At the residential level, driven by the Cheaper Home Batteries Program, the market has shifted into a completely new gear in 2026, with monthly registrations accelerating rapidly since February (see Fig. 44). Overall, between 1 July 2025 and 1 May 2026, over 370,000 batteries were installed in Australian homes. Enabled by a 7.2 billion AUD (4.4 billion EUR) federal government rebate which discounted purchase costs by 30%, over 10 GWh of storage connected to solar PV was installed in Australian homes in 10 months.

Figure 44

Monthly residential BESS installed capacity, July 2025 – April 2026



© SolarPower Europe. Source: Green Energy Markets

The pairing of solar PV with battery storage has rapidly become the dominant model for new large-scale project development in Australia. The confluence of falling battery prices, growing solar price cannibalisation during daylight hours, and high overnight arbitrage revenues, is making solar-plus-storage configurations inherently more attractive than standalone solar investments.

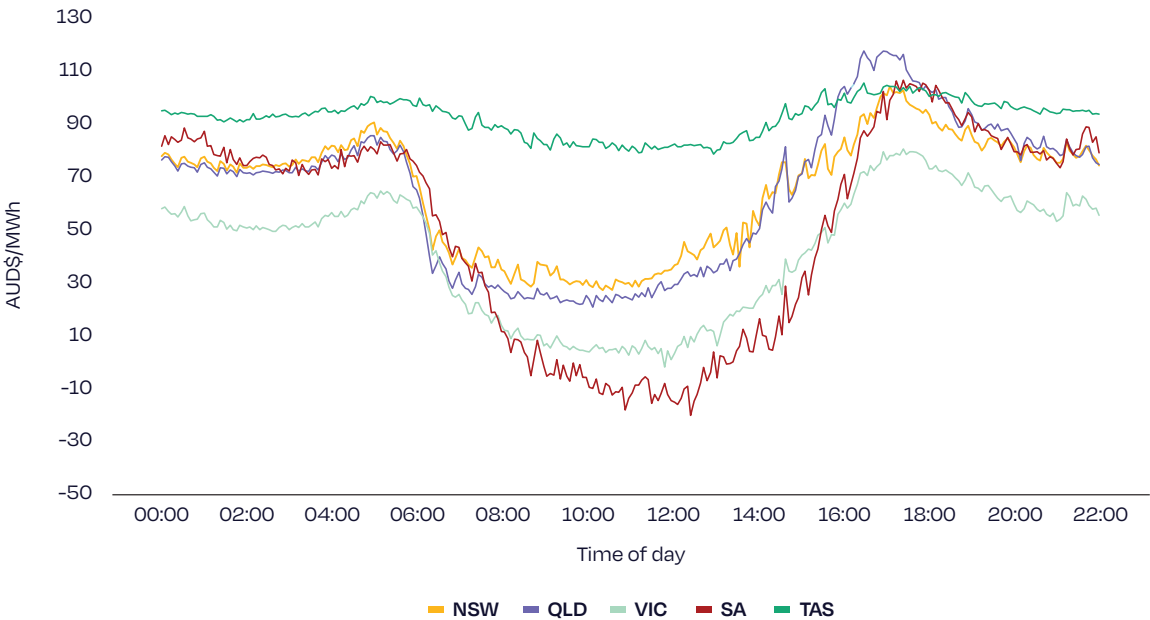
Some sizeable examples include the Waratah Super Battery (700 MW / 1.4 GWh) in New South Wales, capable of supplying 970,000 homes for one hour or 80,000 homes for a full day. Origin Energy's Eraring Battery is currently expanding its capacity and will reach 700 MW / 3.2 GWh once fully operational. Green Gold Energy's 108 MW solar farm with 91.7 MWh battery storage in South Australia, approved in July 2024, is also exploring on-site green hydrogen production, signalling the next phase of integrated energy hub development.

BloombergNEF forecasts that utility-scale BESS in Australia could expand eightfold to 18 GW by 2035 from 2.3 GW in 2024. In parallel, Australia's national science agency CSIRO has assessed that the country will need an additional 11-14 GW of energy storage capacity by 2030 to achieve its renewable energy targets, while investments in new storage capacity by 2030 are expected to surpass 21 billion AUD (13 billion EUR) through the CIS alone.

In Q1 2026, wholesale electricity prices showed a much wider gap between low daytime prices and higher evening peaks across the National Electricity Market (Fig. 45). This reflects the growing impact of solar generation in pushing down midday prices, while increasing the value of storage and other flexible capacity to meet demand later in the day.

Figure 45

Average regional energy price by time of day, Q1 2026



© AEMO Quarterly Energy Dynamics Q1 2026

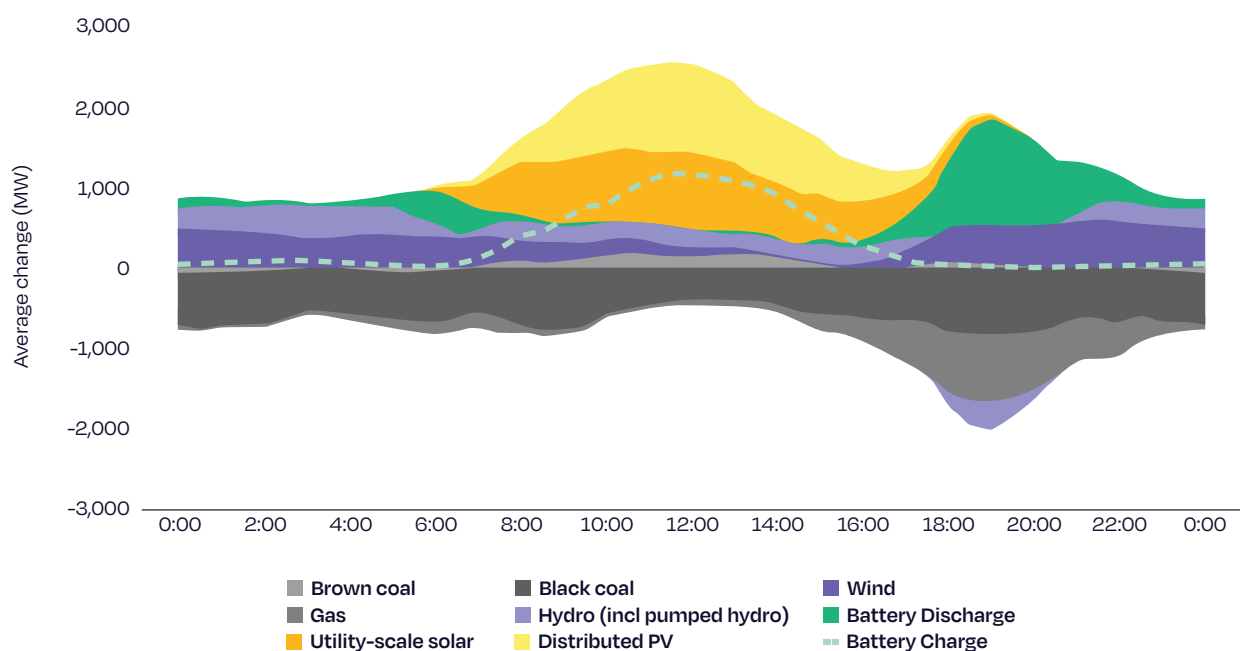
According to analysis from AEMO, battery discharge across the NEM in Q1 2026 was more than three times the Q1 2025 level. Battery flexibility is shifting how households use and store energy, as daytime charging increased by 872 MW (+300%) and evening peak discharge rose by 818 MW (+275%), shifting energy from daylight hours into periods of higher demand.

The increase in battery capacity was evident in price-setting outcomes as evening peak prices fell as battery discharge reduced reliance on gas and hydro generation. This effect was slightly moderated by an increase in daytime prices as battery charge set prices more frequently, reducing the frequency of negative prices in the northern regions.

Figure 46

Renewables and storage reshaped supply across the day, displacing thermal generation

Change in NEM generation and storage by time of day - Q1 2026 vs Q1 2025



© SolarPower Europe. Source: AEMO Quarterly Energy Dynamics Q1 2026

Emerging frontiers

Agrisolar is a significant but still underdeveloped opportunity in Australia. It can support a wide range of uses, from shade-tolerant horticulture and livestock grazing beneath elevated PV modules to improved water-efficiency solutions for viticulture.

Its appeal lies in the co-benefits it creates: lower evaporation from crops and irrigation channels, passive cooling of panels from surrounding vegetation, extra income for farmers from land that remains productive, and stronger social license for solar projects in agricultural areas.

Early pilots in South Australia, Victoria and Queensland are already showing that the model can work across different cropping and livestock systems. With Australia's Renewable Energy Agency ARENA treating Agrisolar as a priority area and planning frameworks gradually improving, the segment could eventually unlock several additional gigawatts of solar capacity as the competition for land intensifies.

Australia's natural resource deposits, world-class wind and solar generation, combined with established export infrastructure, create a plausible and potentially transformative pathway to becoming a global green hydrogen exporter. That ambition is supported by the Powering Australia plan, including a 3 billion AUD (1.8 billion EUR) Hydrogen Headstart program and a 6.7 billion AUD (4.1 billion EUR) Hydrogen Production Tax Credit granting 2 AUD per kilo of green hydrogen (1.2 EUR) starting from 2027-28.

The six shortlisted Hydrogen Headstart projects collectively represent over 3.5 GW of electrolyser capacity. Projects include the aforementioned Murchison Green Hydrogen project in Western Australia, combining solar and wind generation with electrolysis for domestic use and ammonia export. Current green hydrogen production costs of 5-8 AUD (3.1-4.9 EUR) per kg must decline to 2-3 AUD (1.2-1.9 EUR) per kg for competitive parity, a threshold that modelling suggests could be reached in Australia by the early 2030s given the country's solar and wind resource advantage.

The October 2025 US-Australia Critical Minerals Production Tax Credit Agreement also creates a pathway to access US IRA-equivalent hydrogen incentives, materially improving the economics of Australian green hydrogen projects targeting North American markets. Green hydrogen represents the ultimate power-to-X opportunity - transforming Australia's abundant renewable energy resource into exportable molecules that displace fossil fuels in hard-to-electrify industries including steel, iron, maritime, agricultural and aviation sectors.

Floating photovoltaic (FPV) systems are in small numbers in Australia, with around six sizeable installations now in operation, ranging in size from 50-500 kW. The two latest and largest systems of 350 kW and 500 kW have been deployed by regional Victorian water utility operators, which have set net-zero emission targets by 2035. Both the mining and agricultural sectors are seen as the next frontier for FPV, where evaporative loss from irrigation storage in NSW and Queensland alone drains 1,320 gigalitres of water annually. Saving just 10% of that through FPV shading represents a 41 million AUD (25.3 million EUR) economic boon for crops. Deployment in heavy industries and mining on industrial ponds would enable significant offsets in diesel use and emissions.



Waratah Super Battery at Colongra, NSW, Australia. Completed in 2025, 850 MWh battery energy storage system

PV module reuse and recycling is approaching an industry step change in Australia, with a 24.7 million AUD (15.2 million EUR) national PV module recycling pilot with up to 100 sites due to commence in 2026. The pilot builds on one of the world's largest recycling and reuse testing pilots in Queensland, undertaken by the Smart Energy Council in conjunction with the state government over 2024/25. 25,000 PV modules were collected during the Queensland pilot, up to 250,000 are expected to be collected under the national pilot, which is designed to inform a national solar recycling scheme. The SEC's formal policy position is that a national collection scheme must be mandatory.

Vehicle-to-grid (V2G) technology is advancing from pilot to early commercial deployment in Australia. The first CEC-certified bidirectional EV charger received network approval in late 2025, while ARENA's National Vehicle-Grid Network has been launched in December 2025 with 2.4 million AUD (1.5 million EUR) in funding to coordinate the standards, regulatory frameworks and commercial models needed to bring V2G to scale by 2030. ARENA projects Australia could have 300,000 V2G-capable EVs on the road by that date, effectively creating a distributed mobile storage fleet that, when charged by rooftop solar, can export surplus energy back to the grid during peak demand periods.

On the regulatory front, new standards taking effect from 1 July 2026 will require all newly installed V2G-capable chargers to meet demand response requirements, positioning smart EV chargers as active participants in network orchestration rather than passive loads. This is complemented by the 2026-27 Federal Budget's commitment of 40 million AUD (24.7 million EUR) over four years to expand kerbside and regional public charging infrastructure.

While this funding is focused on broadening access rather than grid services directly, it will meaningfully expand the base of charging assets that future V2G and demand-response frameworks can draw upon.

Conclusions

Australia enters the second half of the decade with a strong foundation in solar deployment, but the next phase will hinge on how quickly policy can translate momentum into a more resilient and flexible system. The direction is right, yet there is still a need to reduce execution risk and give investors clearer signals. Measures such as strengthening supply chains, embedding solar- and battery-ready standards in new buildings, and refining schemes like the CIS can help unlock a more stable pipeline of projects. At the same time, closer alignment with international partners on critical minerals and clean technology offers a practical way to support both security of supply and long-term competitiveness.

Looking ahead, the real test will be whether the system can fully value and use the growing base of distributed energy assets. Rooftop solar and behind-the-meter batteries are being installed at pace, but without more responsive price signals and scalable VPP frameworks, much of that potential will remain underused. Enabling households and businesses to participate more actively in the market would turn this fragmented capacity into a meaningful source of flexibility for the grid. If supported by consistent and coordinated policy, this could provide a more cost-effective path to 2030 while strengthening energy security and sustaining growth across both solar PV and battery storage.

Authors: Rhiannon Evans, Senior Policy and Advocacy Officer; Sohaib Mohammed, Policy and Advocacy Officer; Tim Lamacraft, Media Relations Manager; Smart Energy Council

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GW-scale solar markets

In 2025, 35 countries installed over 1 GW of new solar capacity, down from 36 in 2024. Despite record global annual installations, this slight decline in the number of GW markets reflects more uneven growth across regions. We expect 47 GW markets in 2026, driven by increasing solar PV demand outside China, including across several emerging markets in the MEA region.

In this chapter, national solar associations from countries that installed over 1.5 GW in the past year share their expert insights on local market dynamics. Smaller GW markets that installed between 1 GW and 1.5 GW are also highlighted in the last section of this report.

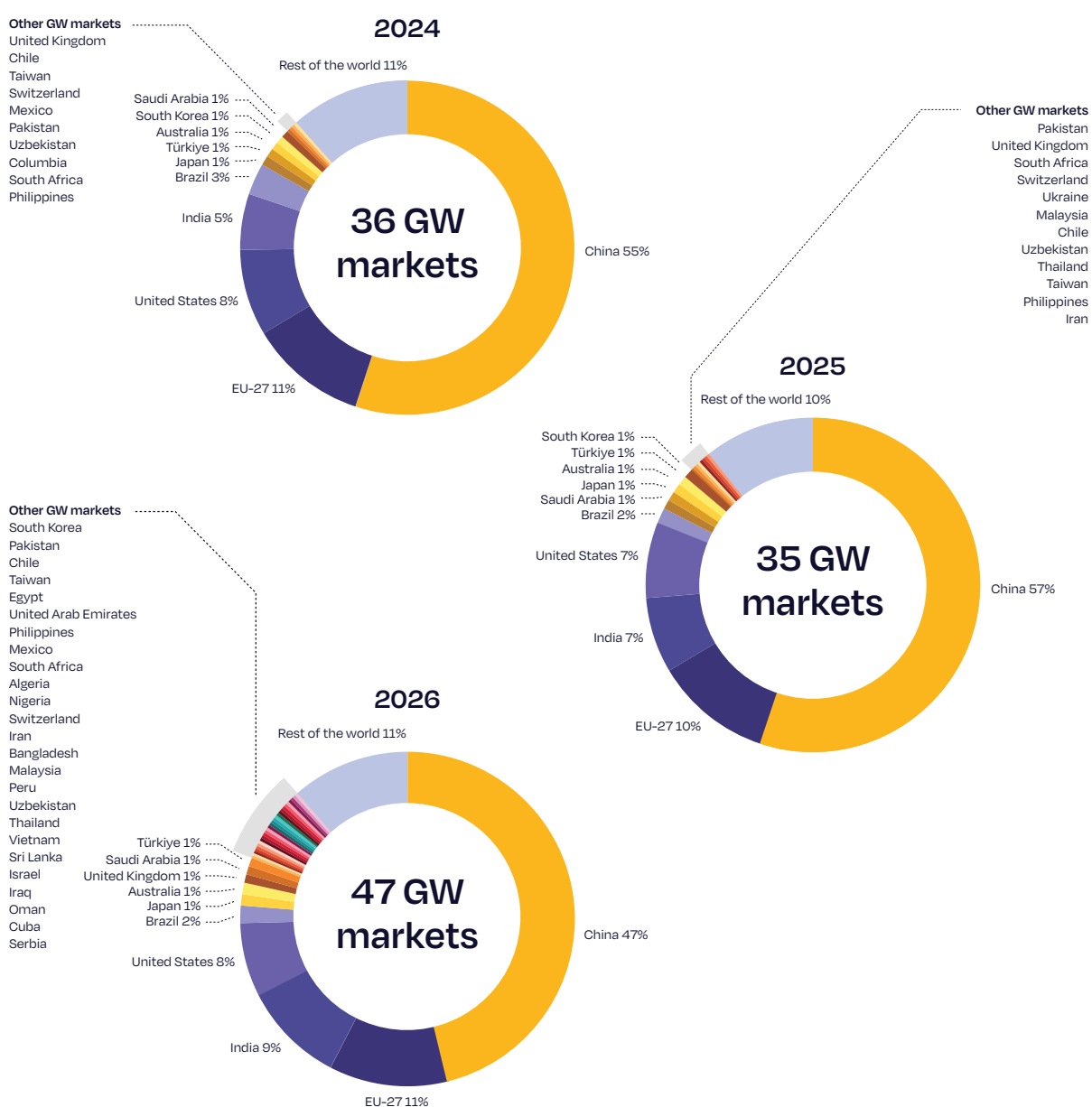
4.0 GW-scale solar markets

One GW of solar PV capacity is enough to power around 300,000 homes in the EU. In 2025, 35 countries across the world installed more than 1 GW of new solar capacity. While this is one fewer than in 2024, when 36 countries reached this level (see Fig. 47), it remains above the 31 recorded in 2023.

Despite record global installations in 2025, this slight dip in the number of GW markets reflects the general trend in 2025 of slower and more uneven growth across regions. Countries that re-joined the GW group in 2025 are Thailand, Ukraine and Denmark, while Malaysia and Iran reached the GW scale for the first time in 2025. Meanwhile, Mexico, Belgium, Colombia, Sweden, the Czech Republic and Lithuania, which had reached the GW scale in 2024, did not make it back in 2025.

Figure 47

GW-scale solar markets 2024-2026



According to our Medium Scenario, GW-scale markets will continue to diversify in 2026, with 12 more countries expected to join the group, bringing the total to 47. Although total annual global PV capacity installations are expected to decrease in 2026, due to dynamics specific to the Chinese PV market, installations in the rest of the world are expected to keep growing, supported by strong underlying demand, ongoing electrification and renewed energy security concerns. Most new GW markets are expected to emerge in the MEA region. Algeria, Egypt, Iraq, Israel, Nigeria, Oman, and UAE all estimated to reach the GW scale in 2026, while Bangladesh, Sri Lanka and Vietnam from APAC, and Peru and Cuba from AMER are also expected to join the GW-group next year.

We've invited national solar associations from countries that installed over 1.5 GW in the past year to share their expert insights on local market dynamics⁵ – perspectives that occasionally differ from our own consolidated estimates, which are based on several sources. Many of these associations, like SolarPower Europe, are active members of the Global Solar Council (GSC), a longstanding partner of the Global Solar Market Outlook. This year we received contributions from all GW markets above 1.5 GW, except South Korea, which we wrote ourselves. Australia is featured in detail in the focus chapter of this report (page 74). Overviews of the PV market in countries that installed between 1 GW and 1.5 GW – Chile, Iran, Malaysia, Philippines, Taiwan, Thailand and Uzbekistan – are also featured in this section.

The number of GW markets in the European Union is stagnating at 14 since 2023. The EU-27 bloc is featured below as a whole, ranking again #2 in terms of combined annual installed capacity – only European countries outside the EU are featured individually. A detailed analysis of each EU GW market according to our national association members is available in our latest EU Solar Market Outlook 2025-2030 (ESO 2025), published in December 2025.

More detailed information on country-specific trends and segments across the EU and in the top 10 global markets is available in SolarPower Europe's member-exclusive [Market and Policy Navigator](#).



1.6 MW Nobeyama agrisolar plant, Nagano, Japan

⁵ In previous years, all markets that had installed more than 1 GW were featured through a dedicated article. In this edition, we've increased the threshold to 1.5 GW of annual installed capacity, while still providing a brief overview of GW markets installing between 1 GW and 1.5 GW.

Table 3

GW-scale solar markets

No.	Country and national industry associations
1.	China – China Photovoltaic Industry Association (CPIA)
2.	EU-27 – SolarPower Europe
3.	India – National Solar Energy Federation of India (NSEFI)
4.	United States – Solar Energy Industries Association (SEIA)
5.	Brazil – Brazilian Photovoltaic Solar Energy Association (ABSOLAR)
6.	Saudi Arabia – Middle East Solar Industry Association (MESIA)
7.	Japan – Japan Photovoltaic Energy Association (JPEA)
8.	Australia – Smart Energy Council (SEC)
9.	Türkiye – Turkish Solar Energy Association (GÜNDER)
10.	South Korea – SolarPower Europe (SPE)
11.	Pakistan – Pakistan Solar Association (PSA)
12.	United Kingdom – Solar Energy UK (SEUK)
13.	South Africa – South African PV Industry Association (SAPVIA)
14.	Switzerland – Swissolar
15.	Ukraine – Solar Energy Association of Ukraine (SEAU)
16.	Smaller GW markets – SolarPower Europe (SPE)



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4.1 China

New record: 317 GW_{AC} annual solar PV capacity in 2025, with market contraction expected in 2026

Author: China Photovoltaic Industry Association (CPIA)

Overview of PV developments

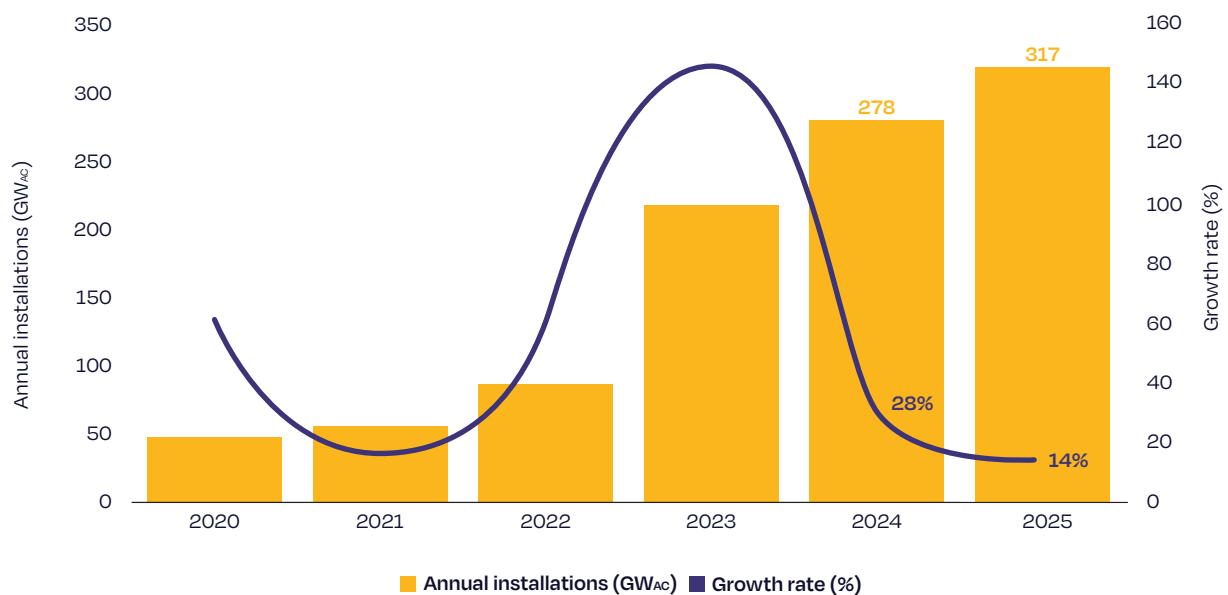
In 2025, China's solar PV industry maintained strong growth, with newly installed PV capacity reaching a record high of 317 GW_{AC}, a year-on-year increase of 14%. By the end of 2025, China's cumulative installed PV capacity had reached 1.2 TW_{AC}, maintaining its position as the country's second-largest power source after coal in terms of installed capacity, and playing a significant role in China's energy mix.

Driven by the global consensus around the green energy transition, many countries around the world have increased their support for renewable energy development, leading to a rise in global demand for PV products. China's PV manufacturing industry continued to serve the global market in 2025. By the end of the year, China's polysilicon production was approximately 1.34 million tons, down 27% year-on-year; silicon wafer production was about 680 GW, down 12%; cell production was about 660 GW, down 5%; and module production was about 620 GW, down 1.2%. Compared with 2024, production in all four segments declined.

GW Figure 1.1

China

Annual solar PV installed capacity, 2020-2025



© SolarPower Europe, Source: National Energy Administration (NEA)

National targets for solar PV

In the next five years, the share of solar PV in newly installed renewable energy capacity will exceed 50%, making it the mainstay of power generation capacity. By 2030, the share of renewable power generation is expected to reach around 30%, advancing in tandem with the goal of raising the share of non-fossil energy consumption to 25%. Furthermore, national targets aim to achieve a total installed capacity of 3,600 GW_{AC} for wind and solar power nationwide by 2035. Over the next decade, solar PV will continue to expand at an average rate of more than 200 GW_{AC} annually in new installations, thereby laying a solid foundation for achieving the country's goals of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060.

Key drivers for solar growth

Although China's newly installed PV capacity reached a record high in 2025, it is expected to experience a year-on-year decline in 2026. This short-term adjustment is primarily driven by two factors: first, the policy-driven demand in 2025, particularly its concentrated release in the first half of the year, created a high comparison base; second, the market-oriented reform of grid parity for new energy prompted some projects to accelerate installation ahead of schedule, thereby pulling forward some subsequent demand.

However, this short-term fluctuation does not alter the industry's long-term development logic. Firmly guided by the "carbon peak and carbon neutrality" objectives, solar PV remains the backbone of clean energy growth in China, and market demand will maintain a stable growth trajectory in the future.

Utility-scale vs. distributed solar PV

In 2025, China added 164 GW_{AC} of new utility-scale PV capacity, a year-on-year increase of 2.6%, while 153 GW_{AC} of distributed PV were added, up 30% year-on-year. Among distributed PV projects, residential PV added 46 GW_{AC}, a year-on-year increase of 56%, and commercial and industrial (C&I) PV added 107 GW_{AC}, up 21% year-on-year.



Gobi desert solar power plant, Delingha, Qinghai, China

Market challenges

In 2025, the Chinese solar PV industry entered the era of market-based pricing. This transformation has fundamentally restructured the revenue model for power plants, forcing investment logic to shift toward refined calculations and placing extremely high demands on project absorption capacity and electricity price forecasting. At the same time, policies eliminating mandatory energy storage requirements, coupled with widening peak-to-valley price differentials, are driving energy storage to evolve from a mere compliance cost into a profitable asset, thereby generating significant demand for flexible regulation.

Outlook for 2026-2030

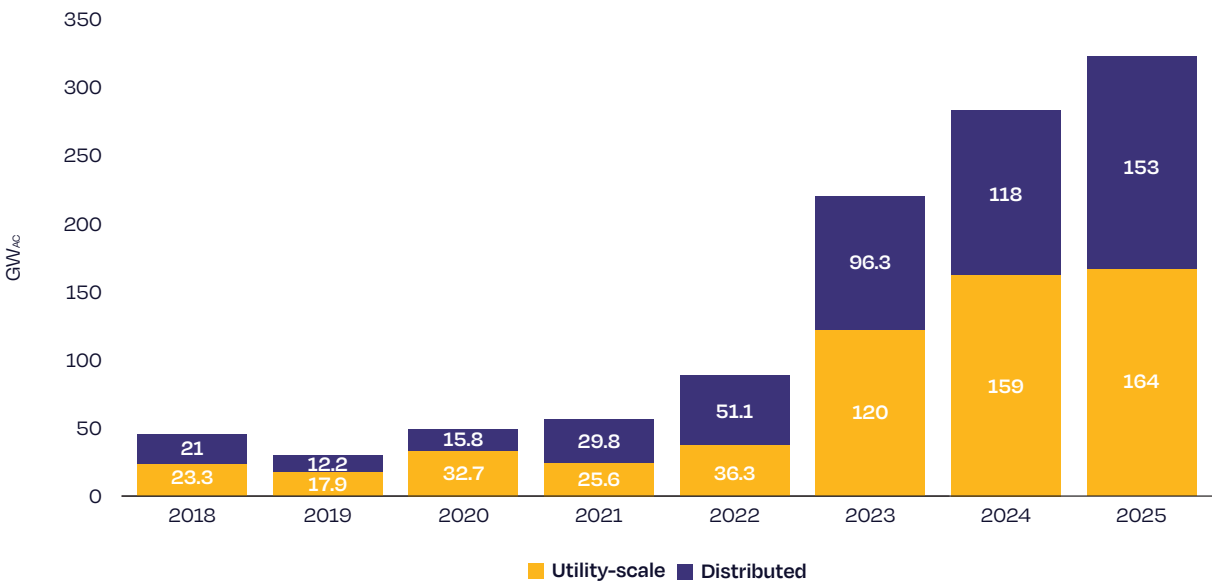
With strong policy support, China's solar PV applications and deployment scenarios are expected to further expand. Initiatives such as the construction of large-scale wind and solar power plants in the Gobi desert and in wasteland areas, as well as encouraging the retrofitting of existing buildings' rooftops with PV systems, to achieve energy conservation and emissions reduction, are likely to bring new growth opportunities to the market. In addition, the acceleration of integration of new energy storage and new power systems is easing PV grid pressure, expanding PV applications, and driving new demand growth in the industry.

The China Photovoltaic Industry Association expects that between 2026 and 2030, China's average annual new PV capacity additions are expected to remain above 200 GW_{AC}, with annual new capacity in 2026 projected to reach between 180 GW_{AC} and 240 GW_{AC}.

GW Figure 1.2

China

Annual solar PV installed utility-scale and distributed capacity, 2018-2025



© SolarPower Europe, Source: National Energy Administration (NEA)

4.2 EU-27

Growth stalls in 2025 as utility-scale PV drives a shifting market

Author: SolarPower Europe

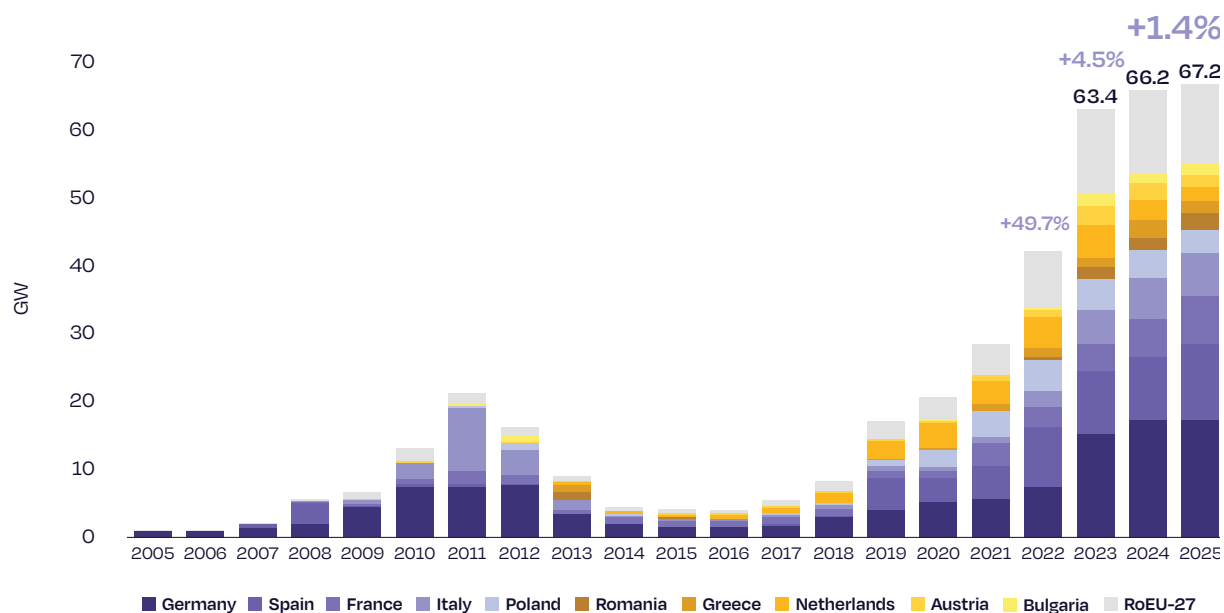
Overview of solar developments in 2025

In 2025, the European Union added 67.2 GW of new solar PV capacity, marking a 1.4% year-on-year increase compared to the 66.2 GW installed in 2024 (GW Fig. 2.1). This revised figure represents an upward adjustment from the 0.7% market contraction anticipated at the time of the European Solar Market Outlook 2025-2030, published in December 2025. This increase was primarily driven by late registrations in the final months of the year, with higher-than-expected utility-scale grid connections in Spain and Italy during Q4.

GW Figure 2.1

EU-27

Annual solar PV installed capacity, 2005-2025



© SolarPower Europe

Despite this marginal growth, the overall market picture remains one of structural deceleration. Annual installations in 2025 stayed broadly flat compared to 2024 and well below the exceptional growth rates observed during the energy crisis period ignited in 2022. This slowdown is also reflected in increasing market concentration: the top 10 EU solar markets accounted for 81% of total EU-27 installations in 2024, rising further to over 82% in 2025. The contribution of the remaining 17 EU markets together decreased in 2025 compared to the previous year, showing an increasing reliance on a few main markets.

At the same time, the breadth of market growth across leading countries has narrowed sharply. In 2023, all top 10 EU solar markets recorded year-on-year growth, reflecting the still broad-based momentum of the post-crisis expansion. By 2024, however, this number had fallen to 5 out of 10 markets, with several major countries already entering decline. In 2025, again only 5 of the top 10 markets expanded, while the remainder stagnated or contracted.

Today's market drivers & challenges

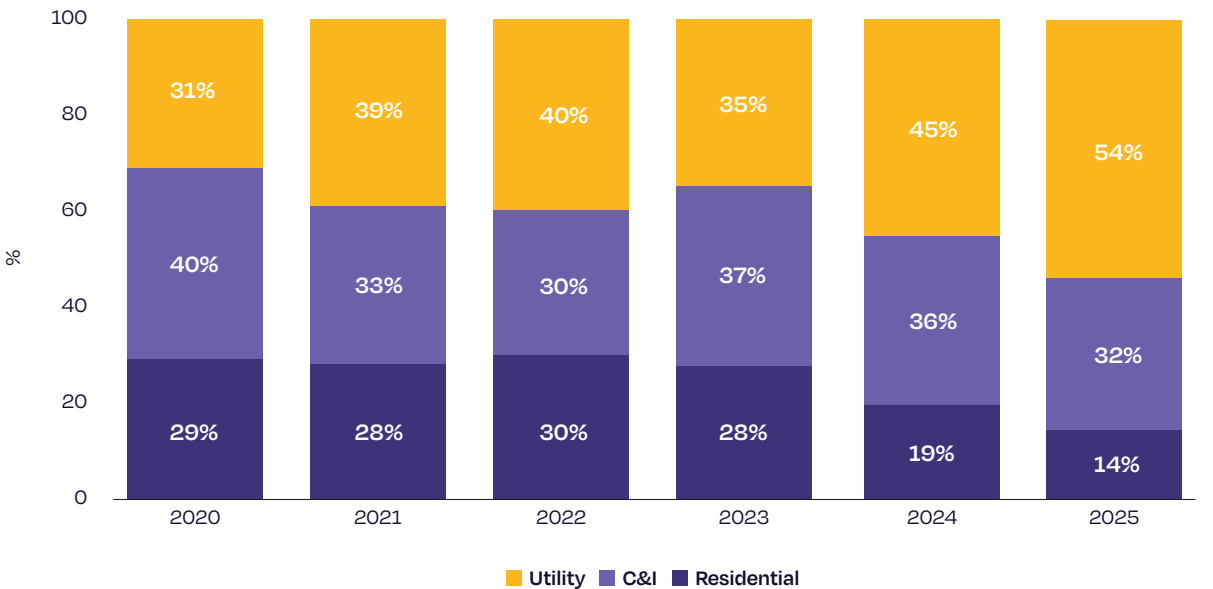
The EU rooftop solar market experienced a pronounced slowdown in 2024 and 2025, marking a clear break from the rapid expansion seen during the energy price crisis following the Russian invasion of Ukraine.

Most notably, **residential installations** fell 28% from a peak of 17.7 GW in 2023 to 12.7 GW in 2024, before declining 25% further to 9.6 GW in 2025. This represents a contraction of 46% over two years, a strong fallback from the crisis-driven surge. As a result, the residential segment's share of the EU solar market dropped from 28% in 2023 to 19% in 2024, and further to just 14% in 2025 (GW Fig. 2.2).

GW Figure 2.2

EU-27

Annual solar PV segmentation, 2020-2025



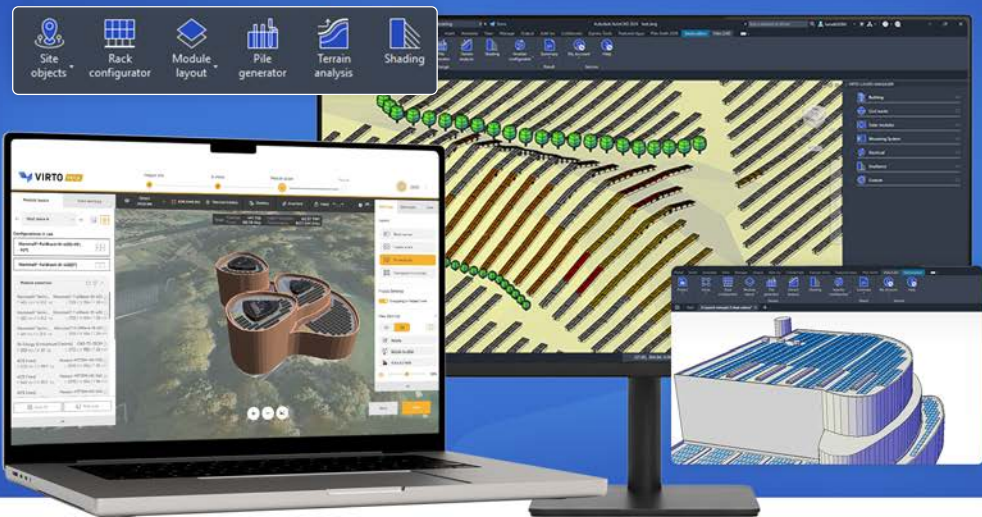
The slowdown stems from both structural and cyclical factors. Many mature markets have reduced or changed support schemes like net-metering and feed-in tariffs, weakening the business case for traditional residential PV. Today, the business case for solar remains especially strong in mature markets, when combined with battery storage systems and/or other sources of demand-side flexibility. This leads to higher upfront costs, which many Member States still fail to alleviate with policy support. In more advanced solar markets, early adopters already own a PV system, leaving a more price-sensitive mass market that is harder to mobilise without supportive policies. At the same time, retail electricity prices somewhat normalised from their 2022 peaks, reducing the sense of urgency for households to invest in solar. Retail prices for households in the EU, without taxes and levies, are 12% lower in the first half of 2025, compared to the second half of 2022.⁷ On top of this, grid constraints and slow rollout of enabling technologies like smart meters and flexible tariffs further hinder rooftop deployment.

The **C&I** segment proved more resilient but also showed signs of weakening momentum in 2025. After growing strongly to 23.5 GW in 2023 and stabilising at 23.6 GW in 2024, C&I installations declined to 21.3 GW in 2025. Consequently, the segment's market share edged down from 36-37% in 2023-2024 to 32% in 2025. Many businesses choose solar to hedge against future fossil fuel price fluctuations, reducing reliance on expensive fossil-generated electricity through self-consumption and electrification. In various EU countries, the rising cost and waiting time for a sufficiently sized grid connection made adopting PV and battery solutions behind the meter an attractive alternative. However, longer investment cycles and increasing grid-related complexity have started to slow decision-making. Looking ahead, the electrification of industry is expected to become the major driver for this segment in the second half of the decade.

As rooftop demand weakened, **utility-scale** solar increasingly became the backbone of EU solar deployment, absorbing the downward shock and contributing to a stable EU solar market in 2025. Utility-scale installations reached 36.2 GW, accounting for 54% of total EU solar additions, up from 45% in 2024 and 35% in 2023 (GW Fig.2.2). However, the growing dominance of utility-scale solar also exposes the market more directly to system-level constraints, which are now weighing heavily on project economics.



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⁷ Eurostat (2026): Electricity price statistics

The core challenge facing utility-scale solar today is not deployment potential, but declining market value. The rapid expansion of variable renewable generation, combined with insufficient system flexibility, has led to a sharp increase in negative electricity price periods across Europe. While until 2022 the share of hours with negative power prices remained below 0.5%, this percentage rose to almost 2% in 2023, around 3% in 2024, and reached a new high of 3.4% in 2025 – equivalent to roughly 310 hours, or nearly two consecutive weeks, of below-zero prices. These conditions translate directly into lower revenues for solar producers and are reflected in plummeting solar capture rates, which dropped to as low as 31% in Germany in June and 18% in Spain in May. In response, developers and investors have increasingly turned to de-risked routes to market, notably auctions and corporate power purchase agreements (PPAs). Auction volumes expanded strongly in 2025, reinforcing their role as the primary stabilising mechanism for utility-scale solar deployment in many Member States. At the same time, the PPA market slowed markedly, as buyers showed greater reluctance to lock in long-term prices in an environment characterised by low and negative spot prices.

This is the market context entering 2026: an EU solar sector increasingly constrained by system inflexibility at utility scale, alongside persistent difficulties in re-engaging the mass market for rooftop solar. At the same time, electrification across industry, buildings and transport is advancing too slowly to absorb growing solar generation and stabilise market value. How these structural challenges are addressed will determine the pace and direction of EU solar growth in the years ahead.



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Agrivoltaic farm, Puy-de-Dôme, France

Outlook 2026–2030

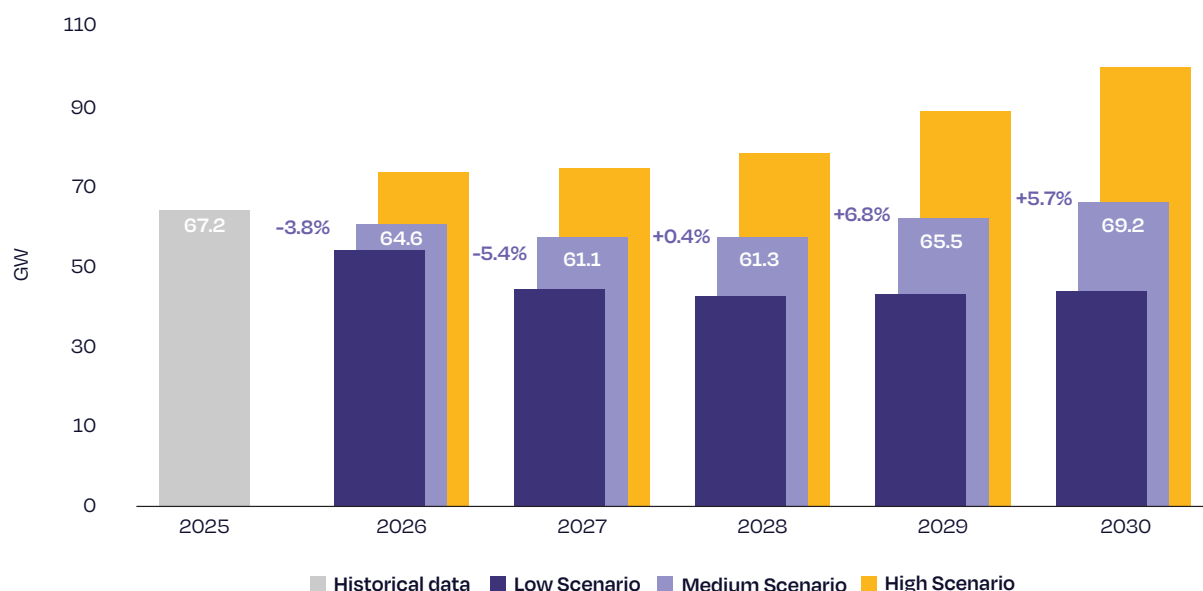
Compared to the European Solar Market Outlook 2025, the updated outlook starts from a slightly higher 2025 baseline, with final installations revised up to 67.2 GW (+2.1 GW compared to our previous estimate). However, this upward correction does not translate into a more optimistic long-term trajectory. The updated forecast still assumes similar dynamics – a decrease in annual additions in the next two years, reaching a low point in 2027, before gradual recovery to above-2025 levels only in 2030.

Under the Medium Scenario, the EU solar market therefore follows a U-shaped trajectory through the remainder of the decade. After the post-crisis peak, annual installations are expected to decline to 64.6 GW in 2026 and 61.1 GW in 2027, before stabilising in 2028 and partially recovering to 69.2 GW by 2030 (GW Fig. 2.3).

GW Figure 2.3

EU-27

Annual solar PV market scenarios, 2025–2030



© SolarPower Europe

The Medium Scenario assumes a prolonged but moderate impact of the Iran war on fossil fuel prices, with differentiated effects across EU solar markets. As in previous crises, rooftop solar – particularly residential installations – responds first, reflecting shorter decision and installation timelines. While some renewed interest in rooftop PV can already be observed, the magnitude of this effect remains well below the 2022 surge following Russia's invasion of Ukraine. This mainly due to Europe's stronger structural resilience, with a higher share of renewables in the power mix, as well as the timing of the shock outside the winter heating season. For analytical clarity, EU solar markets can be grouped into four broad regions: Western, Northern, Southern and Eastern Europe – each showing, on a group level, a distinct response to the current price environment.

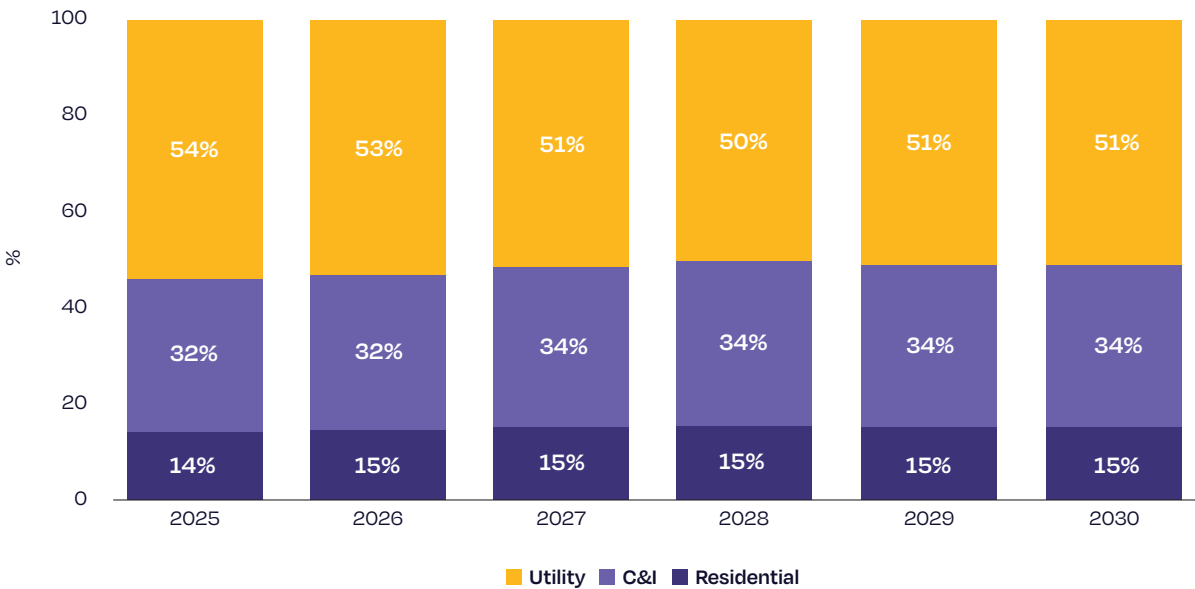
In **Western Europe**, notably the Netherlands, Germany and Belgium, higher fossil fuel prices are more directly translated into electricity prices due to gas-based price setting, leading to a visible uptick in residential rooftop interest. This trend is reinforced by renewed public debate around energy affordability and security, increasing awareness of the financial risks associated with fossil fuel dependence, and discussions on policy adjustments that could improve the investment environment for renewables. By contrast, **Nordic markets**, with high renewable penetration and limited exposure to fossil price volatility, show little reaction in rooftop demand today. Most of **Southern European** markets remain somewhat insulated, as strong solar output continues to suppress wholesale prices during spring and summer. **Eastern Europe** presents a mixed picture: high solar penetration in countries like Hungary pushes prices down, while parts of the region still hold on to retail price caps, which dampen incentives for new installations. At the same time, many Eastern Member States are only beginning to electrify buildings, industry and transport, making rising electricity demand a faster, first reaction. While this does not yet translate into a strong short-term boost for solar installations, it is expected to support future capacity growth.

These regional patterns translate into a segmentation outlook that confirms a structurally rebalanced EU solar market over the second half of the decade. In the Medium Scenario, utility-scale solar remains dominant, accounting for 50–53% of annual additions through 2030, despite short-term volume fluctuations (GW Fig. 2.4). Residential rooftop installations stabilise at around 15%, pointing to a slow recovery rather than a renewed boom. Commercial and industrial installations combined gradually gain importance, rising from around 32% in 2025 to 34% by 2030, supported by electrification and self-consumption strategies.

GW Figure 2.4

EU-27

Annual solar PV segmentation, 2025-2030

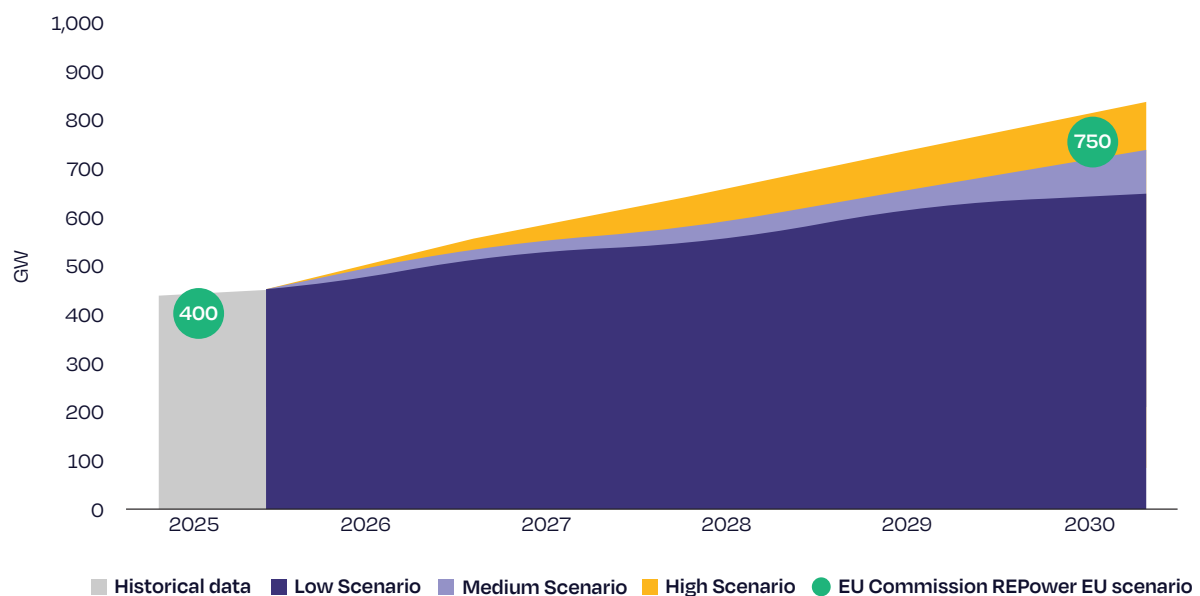


The cumulative outlook shows a widening gap between scenarios when set against EU policy ambitions (GW Fig. 2.5). Under the Medium Scenario, EU solar capacity reaches 730 GW by 2030, missing the EU solar target of 750 GW by 20 GW or 2.6% but exceeding the aggregated NECP target of 694 GW. Only the High Scenario, reaching 831 GW by 2030, comfortably surpasses both targets, reflecting a stronger policy response, accelerated electrification and faster deployment of system flexibility. By contrast, the Low Scenario, which sees capacity rise to just 659 GW by 2030, shows how persistent structural barriers can derail EU solar ambitions.

GW Figure 2.5

EU-27

Total solar PV market scenarios, 2026-2030



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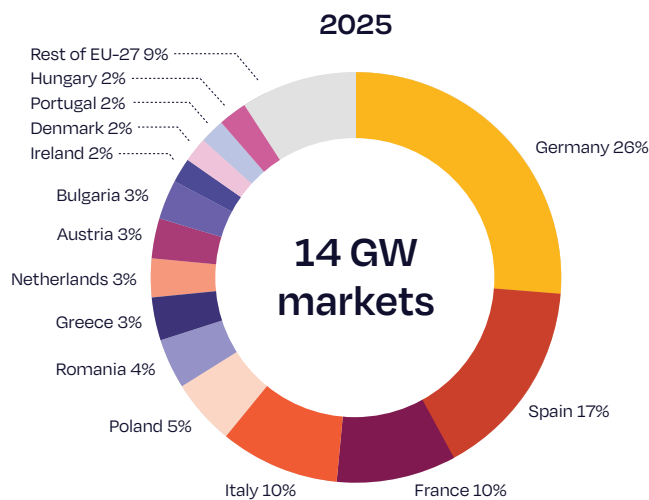
In the Low Scenario, rooftop demand remains subdued throughout the period, with residential installations failing to recover meaningfully as support frameworks remain weak and self-consumption enablers scale too slowly. More impactful, utility-scale deployment is increasingly constrained by an insufficient rollout of battery storage and other flexibility solutions, the single most impactful factor shaping the downside outcome. The contrast between scenarios makes clear that reaching EU solar targets by 2030 hinges less on technology availability than on the speed and effectiveness of deploying storage and flexibility across European power systems.

Looking at the EU through the lens of GW-scale solar markets further illustrates how leadership and concentration evolve over the decade. While the EU itself constitutes a solar market well beyond 1 GW, the number of individual Member States installing more than 1 GW per year is anticipated to remain relatively stable in the near term. In 2025, 14 out of 27 Member States crossed the GW level (GW Fig. 2.6). We expect that this will happen again in 2026, before expanding to 17 GW-scale markets by 2030, reflecting a more geographically diversified, though still uneven, growth pattern toward the end of the decade.

GW Figure 2.6

EU-27

GW-scale solar markets, 2025



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3.45 MW solar plant, Dorsten, Germany

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Battery Storage**
2025–2029

EU Solar Market Outlook
2025–2030

Technology & System Integration

Embracing the Benefits of Hybrid PV Systems
Combining technologies for greater performance

Solar Mounting Systems Explained
Supporting Europe's Flexible Solar Future

Flexible Buildings, Resilient Grids
Solar's role in smart, flexible infrastructure

Solutions for PV Cyber Risks to Grid Stability

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European Market Review 2025

Solar Investment Opportunities
Country insights: Morocco, Oman, Kazakhstan, Vietnam, Tunisia, Middle East, India, Mozambique

**Solar PV in a Strengthened EU
Single Market**
Unlocking cross-border potential

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Reshoring solar manufacturing to Europe
A cost gap analysis and a policy impact simulation

**Boosting EU Solar Manufacturing
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End-of-Life Management
Best Practice Guidelines

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Environmental, social, and governance actions along the value chain

Operations & Best Practices

EPC Best Practice Guidelines
Version 3.0

O&M Best Practice Guidelines
Version 6.0

Technical Due Diligence Best Practice Guidelines
for Hybrid Utility Solar PV & Battery Energy Storage Systems



All Publications



4.3 India

India adds record 40 GW in 2025 as solar momentum builds

Authors: Subrahmanyam Pulipaka, CEO; Shubhang Parekh, Assistant Director of Public Relations; Muskaan Sethi, International Relations Manager; Emil Roby, Policy and Research Associate

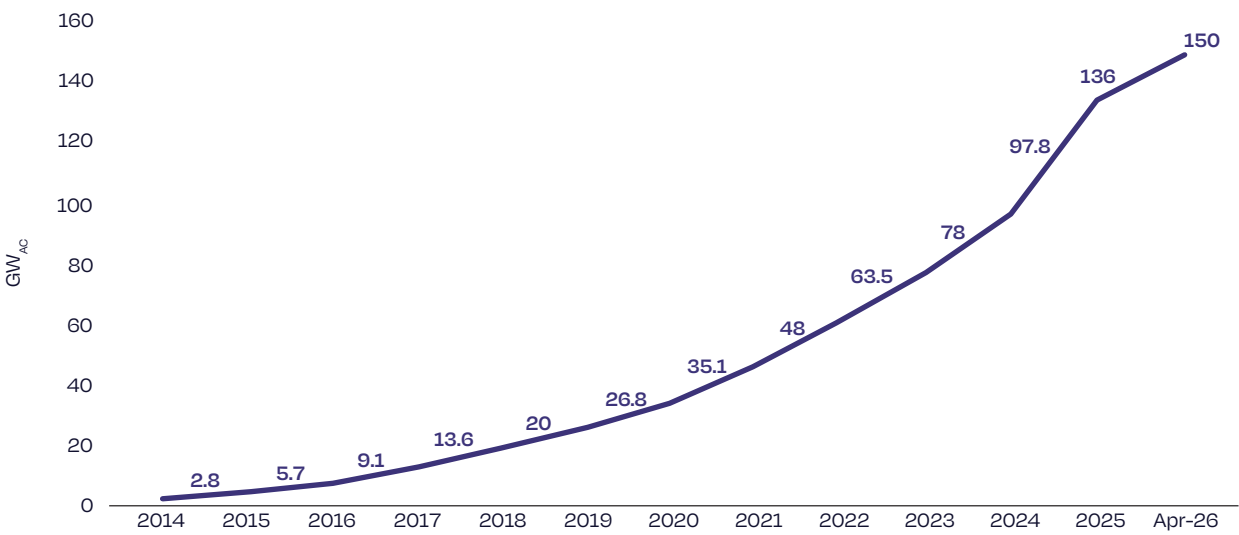
Overview of PV developments

India's solar PV sector has entered a phase of accelerated scale and structural transformation, driven by record capacity additions and expanding system integration. In 2025, the country added a record 39.6 GW_{AC} (close to 55 GW_{DC}) of solar capacity, nearly doubling the previous year's additions and marking the highest annual deployment to date. In 2026, India's cumulative solar installed capacity has kept increasing, from 136 GW_{AC} in December 2025 to 150 GW_{AC} by March 2026 (GW Fig. 3.1), with the C&I segment continuing to drive incremental demand growth. This reflects a more than 50-fold increase in solar installed capacity since 2014 (2.8 GW_{AC}), and firmly establishes solar as the largest contributor within India's renewable energy mix.⁶

GW Figure 3.1

India

Cumulative solar PV installed capacity, 2014-April 2026



© SolarPower Europe. Source: Ministry of New and Renewable Energy (MNRE)

6 Central Electricity Authority (2026), Transmission Plan for Integration of over 900 GW Non-Fossil Fuel Capacity by 2035-36

At the system level, India's total non-fossil fuel capacity stood at 283 GW_{AC} with renewable energy accounting for 275 GW_{AC}, enabling the country to achieve over 50% of installed capacity from non-fossil sources five years ahead of its 2030 target. Solar alone contributes over 54% of total renewable energy capacity, underscoring its central role in the energy transition. Renewables also contribute 25.9% in India's electricity generation.

Beyond capacity expansion, the sector is undergoing a structural shift toward deeper integration across the value chain. This includes rapid scaling of domestic manufacturing, with module production capacity reaching around 172 GW by March 2026, alongside increasing deployment of storage-linked and hybrid renewable systems. In parallel, solar generation reached 173.5 billion units (BU) (173.5 TWh) in FY 2025–26, accounting for over 20% growth year-on-year and forming a key component of India's total electricity generation mix.

Overall, India's solar PV sector is transitioning from a deployment-driven growth phase toward a more integrated ecosystem encompassing manufacturing, grid infrastructure, and energy storage, positioning it as one of the most dynamic solar markets globally.

Utility scale vs. distributed and rooftop developments

Commercial & industrial (C&I) solar

The C&I segment has emerged as a key driver of solar demand, supported by regulatory reforms and corporate decarbonisation initiatives. During FY 2025–26, the segment contributed approximately 15 GW_{AC} (34%) of total solar capacity additions, reflecting a significant increase from around 10 GW_{AC} in the previous year.



© Vikram Solar Pvt. Ltd., 2026

Vikram Solar's 5 GW PV module manufacturing facility, Vallam, Tamil Nadu, India

Growth in this segment has been enabled by the implementation of Green Energy Open Access (GEOA) regulations across states, facilitating direct renewable procurement. In addition, Virtual Power Purchase Agreements (VPPA) have emerged as a key instrument for compliance under the revised Renewable Consumption Obligation (RCO) framework.

The expansion of open-access solar and captive installations has also been supported by competitive procurement through bilateral and market-based mechanisms, including participation in short-term markets such as the Green Term Ahead Market (GTAM).

Utility-scale solar

Utility-scale solar remains the dominant segment, accounting for approximately 110 GW_{AC} (75%) of total installed capacity as of March 2026. Capacity additions remained strong during 2025, with around 35 GW_{AC} added, supported by a robust pipeline of 69.1 GW under implementation and 35.5 GW tendered, along with 70 GW of hybrid/Round the Clock (RTC) and Firm and Dispatchable Renewable Energy (FDRE) projects.

The segment is witnessing a structural transition toward firm and dispatchable renewable energy, with increasing integration of battery energy storage systems (BESS) and hybrid configurations. Government support through Viability Gap Funding (VGF) schemes for storage, including 3,760 crore INR (33.56 billion EUR) for 4,000 MWh and an expanded 5,400 crore INR (48.19 billion EUR) scheme for 30 GWh is accelerating storage-linked project deployment.

Competitive bidding mechanisms continue to evolve, with the introduction of Contract-for-Difference (CfD) pilot tenders and increased focus on hybrid and round-the-clock supply solutions.

Transmission infrastructure expansion remains a critical enabler for utility-scale growth. During FY25, approximately 8,830 circuit kilometres (ckm) of transmission lines were added, followed by 5,077 ckm additions during April–December FY26, supporting renewable energy evacuation and grid integration.⁷

Distributed renewable energy (DRE)

The distributed solar segment recorded strong growth during 2025, contributing 16.3 GW_{AC} (36%) of total solar capacity additions in FY 2025–26, including 8.7 GW_{AC} from rooftop solar and 7.7 GW_{AC} under PM-KUSUM.⁸

Rooftop solar remains the largest component within DRE, with cumulative capacity reaching 25.7 GW_{AC} as of March 2026. Growth has been driven by the PM Surya Ghar: Muft Bijli Yojana scheme, enabling rapid adoption across residential consumers, along with continued uptake in the commercial and industrial segment. Cumulative installations have benefited over 40 lakh (4 million) households.

Solar pumps under the PM-KUSUM scheme form the second key pillar of distributed solar. With over 1.39 million pumps installed/solarised during FY 2025–26, and cumulative deployment exceeding 10 GW_{AC}, the scheme supports energy access for the agricultural sector and reduces diesel dependence.

As of March 2026, total distributed solar capacity reached approximately 40 GW_{AC}, comprising 25.7 GW_{AC} rooftop and 14.1 GW_{AC} from KUSUM and off-grid systems, reflecting continued growth in decentralised solar deployment.

⁷ PIB 16 Jan 2026

⁸ PM-KUSUM: Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan, scheme for the de-dieselisation of the agricultural sector and enhancing the income of farmers

Solar manufacturing

India's solar manufacturing ecosystem expanded rapidly during 2025, supported by policy interventions such as the Production Linked Incentive (PLI), Approved List of Models and Manufacturers (ALMM), and Basic Customs Duty (BCD). Domestic module manufacturing capacity increased significantly, reaching 144 GW by the end of 2025, and further expanding to 172 GW by March 2026.

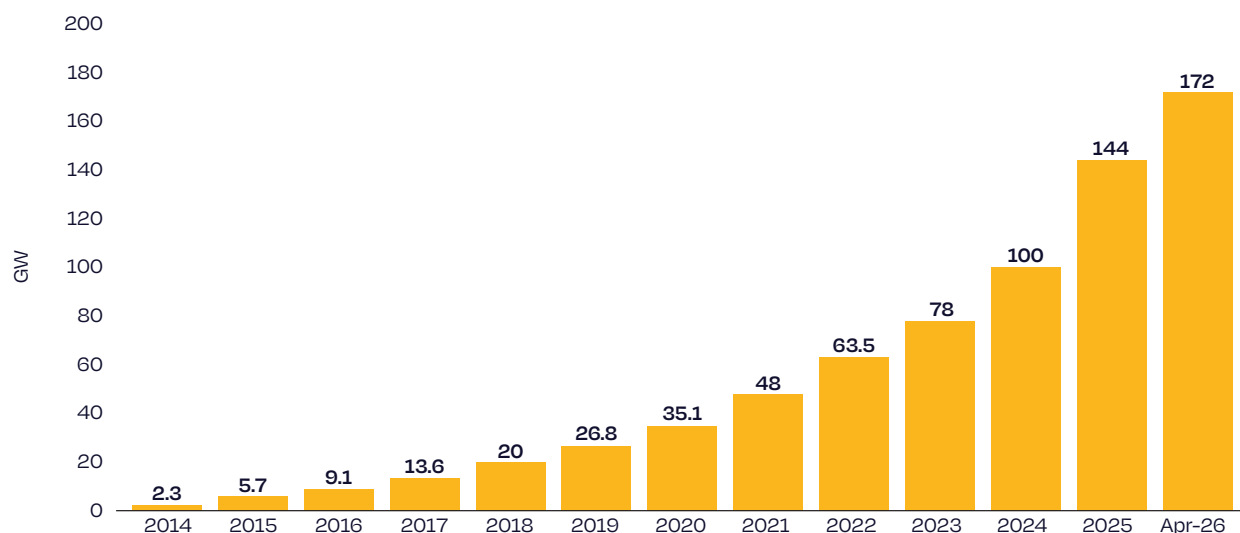
Under the PLI scheme, integrated manufacturing capacity of 39.6 GW has been awarded, with phased commissioning expected by April 2026. Complementary measures such as Basic Customs Duty (40% on modules, 25% on cells) and ALMM List-II (cells) are strengthening domestic supply chains and reducing import dependence.

In addition, policy measures such as the Renewable Energy Equipment Import Monitoring System (REEIMS) are improving supply chain transparency. However, upstream segments such as wafers and polysilicon remain limited, indicating the next phase of manufacturing development.

GW Figure 3.2

India

Solar module manufacturing capacity, 2014-2026



© SolarPower Europe. Source: Ministry of New and Renewable Energy (MNRE)

Outlook for 2026-2030

India is expected to remain one of the fastest-growing solar markets globally through 2030, supported by strong policy continuity and a robust pipeline of projects under implementation and tendering. Annual capacity additions are projected to remain elevated, driven by sustained demand across utility-scale, C&I, and distributed segments.

The policy landscape is expected to further strengthen domestic manufacturing and supply chain resilience. The implementation of ALMM List-II (solar cells) from June 2026, followed by ALMM List-III for wafers and ingots by June 2028, is expected to accelerate backward integration and reduce import dependence. Continued scale-up under the PLI scheme will further support expansion across the solar manufacturing value chain.

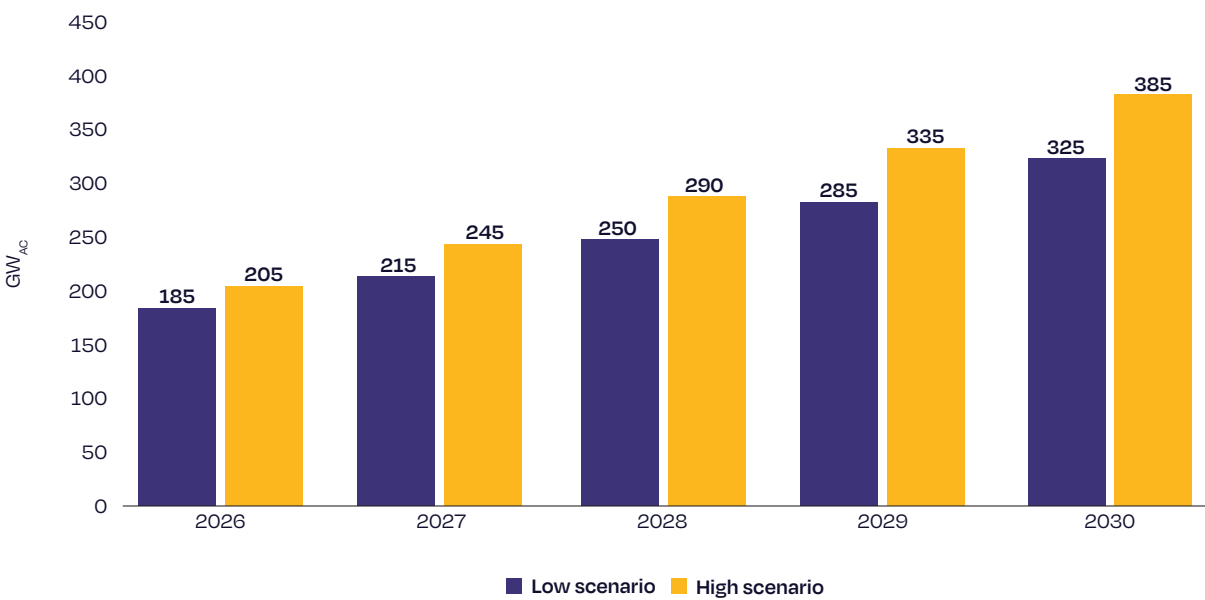
On the demand side, distributed solar is likely to gain further momentum with the expected rollout of PM-KUSUM 2.0, building on the progress of the current scheme to expand solarisation of agricultural pumps and feeder-level infrastructure. Alongside this, continued deployment under the PM Surya Ghar programme is expected to sustain growth in rooftop solar installations. The C&I segment is also expected to expand further through wider adoption of GEOA and increasing use of VPPA mechanisms under the unified RCO framework.

The market is expected to transition toward more dispatchable renewable energy systems, with increasing deployment of hybrid and storage-linked projects, supported by VGF schemes for BESS and regulatory provisions enabling storage integration. This will be critical in managing intermittency and enabling higher renewable penetration.

GW Figure 3.3

India

Cumulative solar PV installed capacity scenarios, 2026-2030



© SolarPower Europe. Source: NSEFI

India's solar capacity is projected to reach between 325–385 GW_{AC} by 2030 outperforming its own target of 280-300 GW_{AC} by 2030, indicating a strong scale-up from current levels. Continued progress in transmission infrastructure expansion, energy storage deployment, and upstream manufacturing development will be critical in sustaining this growth trajectory and ensuring efficient integration of solar capacity into the power system.

4.4 United States

Solar market slows slightly in 2025 due to policy unpredictability

Author: *Seth Miller*, Director of Digital Communications, The Solar Energy Industries Association (SEIA)

Overview of PV developments

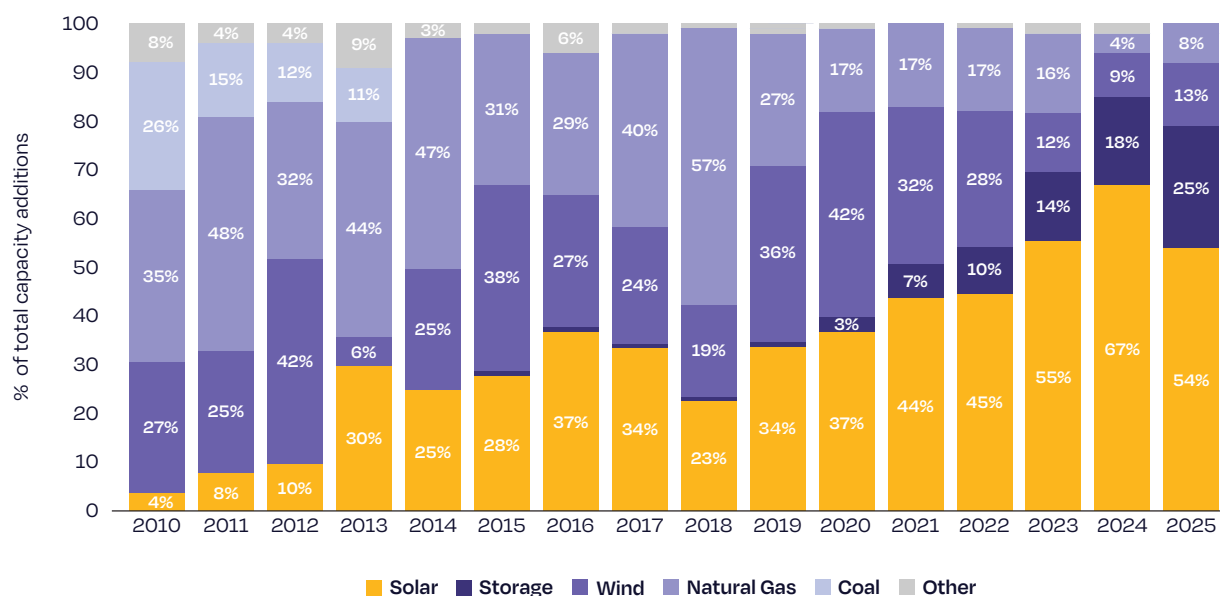
Despite 2025's changing policy landscape, solar has continued to dominate new additions in the U.S. energy market.

According to the Solar Energy Industries Association's (SEIA) Solar Market Insight Year in Review for 2025, the solar industry added 43.2 GW of new capacity, a 14% decline compared to the 50 GW installed in 2024. Solar PV made up 54% of all new electricity-generating capacity added to the U.S. grid in 2025 (Fig. GW 4.1). Combined, solar and energy storage constituted 79% of all new capacity during this timeframe and are expected to make up a majority of the new capacity in the U.S. between now and 2060.

GW Figure 4.1

United States

Annual additions of new electric generating capacity, 2010-2025



© SolarPower Europe. Source: SEIA/Wood Mackenzie Power & Renewables U.S. Solar Market Insight 2025 Year in Review, EIA

Drivers for growth

The pace of solar energy addition is vital to meeting the rapidly growing electricity demand in the United States. In their high case, Wood Mackenzie's North America Power Research anticipates that U.S. electricity demand will experience a compound annual growth rate of 3.2% from 2026 to 2040, spurred by electrification of homes and businesses, the rapid growth of data centers, and increased buildout of U.S. manufacturing. These new loads present a unique challenge for the United States electric grid, which has not seen significant load growth in several decades. Here, solar energy's speed-to-market and low-cost output make it a key technology in meeting the increased demand without spiking electricity prices.

Solar manufacturing also had big wins in 2025. With the opening of a wafer manufacturing facility in Q3, the United States now has the capacity to produce every major component of the solar supply chain domestically. The ability to manufacture entirely in the U.S. is a major milestone for the country that invented the silicon solar cell nearly 70 years prior. In 2025, cell production capacity continued to grow and module manufacturing increased more than 50% with 65.5 GW of capacity now online.

The U.S. also experienced the largest single year of new **battery capacity additions** on record, with a 30% growth in installation from 2024.



25.6 MW Mount Olive Solar Project, New Jersey, United States

Challenges

While energy demand remains a strong driver of growth, changing federal policy continues to present challenges for the American solar industry. The One Big Beautiful Bill Act (OBBA), passed in July of 2025, accelerated phase-out timelines for solar tax incentives and created new foreign entities of concern (FEOC) restrictions on the tax credits.

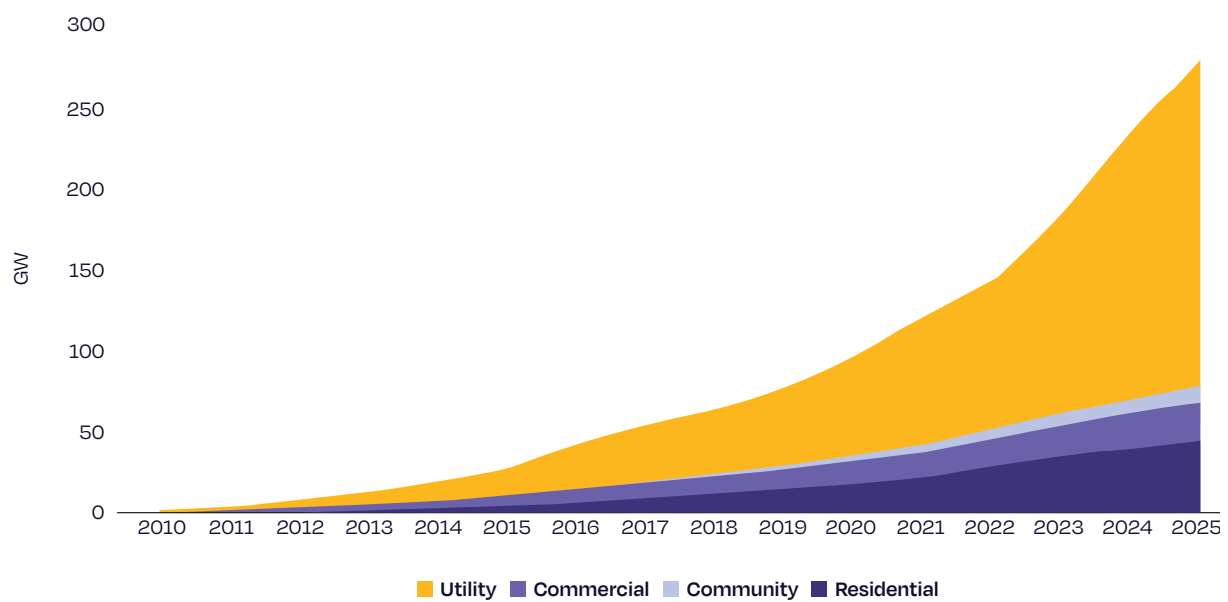
The Residential Clean Energy Tax Credit (25D) which allowed homeowners to deduct 30% of system costs from taxes, expired on December 31, 2025. The Clean Energy Investment (48E) and Production (45Y) Tax Credits, tech-neutral credits for the investment and production of clean energy, were also given new deadlines. While the U.S. Department of the Treasury has released some interim guidance on OBBA's new provisions, there are still several areas of uncertainty that could affect deployment and manufacturing going forward. Additionally, the Trump Administration's Department of Interior created new bureaucratic hurdles for solar projects on federal lands, slowing permitting approvals and delaying these grid additions.

As a collective result of these changes, 2025 saw a slight slowdown in individual market segments, including a 16% decline in utility-scale solar installations and 2% slowdown in the residential segment compared to 2024. Several gigawatts of projects originally set to come online in 2025 were delayed because of this policy-related unpredictability.

GW Figure 4.2

United States

Cumulative solar PV installations, 2010-2025



© SolarPower Europe. Source: SEIA/Wood Mackenzie Power & Renewables U.S. Solar Market Insight 2025 Year in Review

Despite the regulatory actions targeting clean energy and changing tax policy, the economics of solar remain strong as one of the few solutions that can quickly meet surging electricity demand driven by data center growth. The U.S. is expected to add 490 GW of new solar capacity by 2036, bringing cumulative installed capacity to nearly 770 GW. This rapid deployment will help lower energy costs, enhance reliability, and boost American energy independence.

Solar and storage have and will continue to persevere through changing regulations and challenges, providing reliable and affordable energy to consumers.



Solar farm at Carrizo National Monument, Santa Margarita, California, United States of America

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4.5 Brazil

Solar PV market faces first slowdown amid policy shifts and grid challenges

Authors: *Dr. Rodrigo Lopes Saucia*, CEO; *Dr. Vinicius Suppion*, Technical and Regulatory Specialist; ABSOLAR

Overview of PV developments

In 2025, the Brazilian solar PV market demonstrated remarkable resilience, navigating the most challenging conditions since the technology's introduction in the country. Distributed generation sustained the pace of new capacity additions, while bottlenecks in centralised generation were responsible for a 12.2% gap between actual market performance and the market forecast.

Despite adverse conditions, Brazil remains a key market for solar PV. By the end of 2025, the country reached 64.8 GW_{AC} of total installed solar PV capacity in operation. In 2025 alone, annual additions totalled 11.6 GW_{AC}, comprising 8.8 GW_{AC} of distributed generation and 2.8 GW_{AC} of centralised generation. This is a 25% decrease compared to the 15.5 GW_{AC} installed in 2024, making 2025 the first year on record in Brazil with an annual solar market slow-down.

Distributed and centralised solar PV developments

In Brazil, solar PV systems are categorised into two main segments:

1. Distributed generation: this encompasses small and medium-sized solar PV systems, up to 5 MW in capacity. These systems participate in the Brazilian national net-metering program, allowing for the exchange of surplus electricity with the grid;
2. Centralised generation: large-scale solar PV power plants with capacities exceeding 5 MW. These plants commercialise their electricity through regulated market auctions administered by the Federal Government or through bilateral PPAs within the free electricity market.

In 2025, large-scale solar power plants experienced serious curtailment events, with 25.7% of all solar electricity generated last year in Brazil unable to reach consumers. This figure is nearly double the curtailment level observed in 2024 (13.4%), most of which occurred without adequate financial compensation to generators.

The Brazilian Solar Photovoltaic Energy Association (ABSOLAR) continues to advocate on behalf of large-scale solar entrepreneurs before the National Electric Energy Agency (ANEEL) and the Ministry of Mines and Energy (MME), pressing for regulatory reforms to ensure fair compensation for market players affected by these losses. In this context, Law No. 15,269/2025 introduced the possibility of partial compensation for past curtailments, indicating greater legal certainty for investors. As a subsequent development, the MME opened Public Consultation No. 210/2025, for a formal establishment of partial compensation mechanisms for curtailments through a Commitment Agreement. The initiative aims to reduce litigation on the matter and provide greater predictability for the sector. The Public Consultation demonstrates the federal government's openness to engaging with investors and companies regarding the terms and conditions of a potential reimbursement agreement.

In 2025, ABSOLAR achieved a significant milestone by obtaining quotas from the Ministry of Development, Industry, Trade, and Services that reduced import tariffs on PV modules from 25% to 9.6% for projects exceeding 5 MW. Valid until July 2027, these quotas are critical to ensuring the viability of large-scale projects currently under development and implementation. The quotas represent a tax exemption of 717.4 million USD (621.8 million EUR) from July 2025 to July 2026 and 403.2 million USD (349.5 million EUR) from July 2026 to July 2027.

At the same time, distributed generation still encounters significant obstacles in connecting new solar PV systems to the distribution grid, primarily due to alleged reverse power flow issues at connection points. This constrains the expansion of small- and medium-scale solar PV in several regions, delaying investments and limiting opportunities for green job creation. ABSOLAR therefore persists in advocating for consumers' right to self-generate electricity before ANEEL and the Federal Government.

Last year, distributed solar PV exceeded ABSOLAR's forecasts by 6%, adding 8.8 GW_{AC} of newly installed systems, an impressive achievement given the connection challenges. Although this marks a 7.3% reduction compared to 2024, the result remains strong under such difficult conditions, with the decline proving more moderate than initially expected. This result can be attributed to a resilient rooftop market, combined with increased electricity prices in the country.

In 2025, Brazil encountered major challenges in expanding large-scale solar PV projects. Severe curtailment in operating plants caused significant financial losses, driving investors to push back timelines and postpone projects under development. In this context, Brazil commissioned 2.8 GW_{AC} of new solar PV plants in 2025, well below the 5.6 GW_{AC} recorded in the previous year.



5 MW UFV Poté solar PV plant, North of Minas Gerais, Brazil

Solar PV Forecast

Due to its size, population, local economy, and outstanding solar resource, Brazil will remain a leading solar PV market in coming years. In 2026 alone, annual installed capacity is expected to exceed 10 GW, highlighting Brazil's significant role in the global context. Economic, political, and regulatory headwinds may slow the pace, but they also demonstrate the sector's ability to thrive despite challenging conditions.

On the political front, 2026 will be an election year in Brazil, with elections for the President of the Republic, Senators and Federal Deputies, as well as State Governors and State Deputies. This is expected to slow down progress on key legislative agendas relevant to the PV sector. Political uncertainty around Brazil's future leadership also slows down new investments until after the elections. From an international perspective, increasing global tensions such as the war in the Middle East and the war between Russia and Ukraine affect oil prices and related products.

From an economic standpoint, in 2026 Brazil increased the import tax rate on PV inverters from 12.6% to 20%. Combined with China's gradual withdrawal of export incentives for PV modules and batteries (previously refunding up to 9% of the tax paid), this is expected to drive up the cost of solar PV technology.

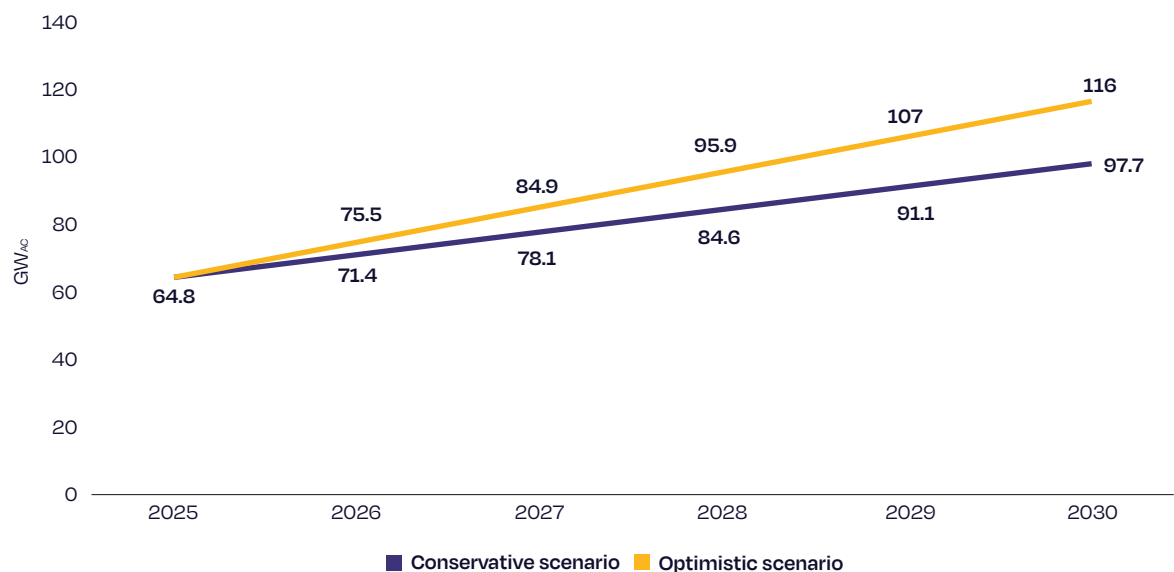
Based on ABSOLAR data and official projections from Brazil's Energy Research Office (EPE), the country's solar PV capacity is set to reach remarkable levels by 2030, ranging from 97.7 GW_{AC} under a Conservative Scenario to 115.6 GW_{AC} under an Optimistic Scenario. Distributed generation is expected to represent a majority share of this growth, with consistent annual additions of 3.9 GW_{AC} to 6.6 GW_{AC} and cumulative capacity projected to reach between 64.4 GW_{AC} and 77.8 GW_{AC} by 2030. In the centralised generation segment, ABSOLAR forecasts steady annual additions of 2.6 GW_{AC} to 3.5 GW_{AC}, leading to cumulative capacity between 33.4 GW_{AC} and 37.8 GW_{AC} over the same period. Overall, Brazil is expected to add an average of 6.6 GW_{AC} to 10.2 GW_{AC} of new solar PV capacity per year from 2026 to 2030.



121 MW Ciranda 2 solar PV plant, São José do Belmonte, Pernambuco, Brazil

Brazil

Cumulative solar PV installed capacity 2025 and forecast 2026-2030



Year	2025	2025	2025	2025	2025	2025
Distributed Solar PV (GW _{AC}) - Conservative Scenario	44.8	48.5	52.3	56.1	60.1	64.4
Centralised Solar PV (GW _{AC}) - Conservative Scenario	20	22.9	25.8	28.5	31	33.4
Total - Conservative Scenario	64.8	71.4	78.1	84.6	91.1	97.7
Distributed Solar PV (GW _{AC}) - Optimistic Scenario	44.8	51.6	57.2	64.6	72.1	77.8
Centralised Solar PV (GW _{AC}) - Optimistic Scenario	20	23.9	27.7	31.3	34.7	37.8
Total - Optimistic Scenario	64.8	75.5	84.9	95.9	107	116

© SolarPower Europe. Source: ABSOLAR and official projections from EPE

Challenges and opportunities

Among ABSOLAR's key priorities for distributed solar PV generation in 2026 is the advancement of adequate valuation of system benefits delivered by distributed generation. These are set to be incorporated into distributed generation electricity tariffs starting in 2029, in line with Law No. 14,300/2022. In parallel, ABSOLAR is working to support the regulation and large scale deployment of solar PV within social housing programs, with the aim to expand market volume and enhance social impact. Additionally, ABSOLAR will advocate on behalf of the solar sector with the national energy regulator to strengthen oversight and ensure regulatory compliance by distribution utilities in their interactions with distributed generation assets and consumers. These actions aim to reinforce regulatory certainty, protect investor returns, and sustain long term market growth.

In the large-scale solar PV sector, limited transmission infrastructure in certain regions continues to constrain the rollout of new large-scale projects, and the pace of expansion remains a major concern for the sector. At the same time, the absence of fair compensation mechanisms and rising curtailment rates faced by solar PV plants are perceived as additional risks, creating headwinds for new investments and underscoring the need for regulatory and structural improvements. In this scenario, ABSOLAR is concentrating its efforts on securing fair and predictable compensation mechanisms for curtailments, to protect project revenues and improve bankability. At the same time, the association is working to stimulate investment linked to large electricity-intensive loads, including data centers and green hydrogen production facilities, to strengthen long-term demand for new large-scale solar assets. In parallel, the Association is actively engaged in shaping the regulatory framework for Brazil's carbon market, established under Law No. 15,042/2024, with the objective of unlocking additional revenue streams and enhancing the investment attractiveness of renewable generation assets.

In 2026, Brazil is expected to hold its first capacity auction for battery energy storage systems (BESS), a milestone that should stimulate local demand and take the market to a new level. The publication of specific regulations for BESS, together with auction rules, is expected to take place in the first semester of 2026. BESS will play a vital role in overcoming grid limitations and increasing system and operation flexibility in the national grid, and is set to inject new momentum into the expansion of both distributed generation and large-scale solar energy across the country. In 2026, ABSOLAR's priorities for electricity storage are centered on enabling the successful execution of Brazil's Capacity Reserve Auction with Batteries and the auction dedicated to supplying and decarbonising Isolated Systems. In parallel, the association is working to accelerate the integration of energy storage systems alongside both large scale and distributed solar PV projects. ABSOLAR is also actively advocating to reduce the tax burden currently applied to energy storage technologies, as well as to develop dedicated financing mechanisms with competitive terms, aimed at strengthening project economics, attracting international capital, and supporting market scale-up.

Regarding future electricity demand in the country, according to the Ten-Year Energy Expansion Plan (PDE) 2035, published by the Energy Research Office (EPE), 54.2 GW_{AC} of new large-scale electricity consumers will be connected to the National Interconnected System (SIN) by 2038, driven by 26.3 GW_{AC} from data centres and 27.9 GW_{AC} from green hydrogen projects. Moreover, BloombergNEF ranks Brazil as a leading contender for the world's lowest-cost green hydrogen producer by 2030, with a projected levelised cost of just 1.47 USD (1.27 EUR/kg) per kilogram of green hydrogen.

ABSOLAR will continue to defend the solar PV, energy storage, and green hydrogen sectors in Brazil, and will keep developing and implementing strategic recommendations and best-practices to increase the widespread adoption of these sustainable technologies in the country.

4.6 Saudi Arabia

The regional growth engine

Author: Halima Umar, research intern, Middle-East Solar Industry Association (MESIA)

Overview of PV developments

Saudi Arabia has rapidly consolidated its position as the largest and fastest-growing solar PV market in the MENA region, delivering an unprecedented expansion in 2025. Within just 12 months, the Kingdom increased its installed renewable capacity to approximately 11.7 GW, up from around 4.3 GW in 2024. This represents a year-on-year growth of over 170%, one of the fastest scale-ups globally.

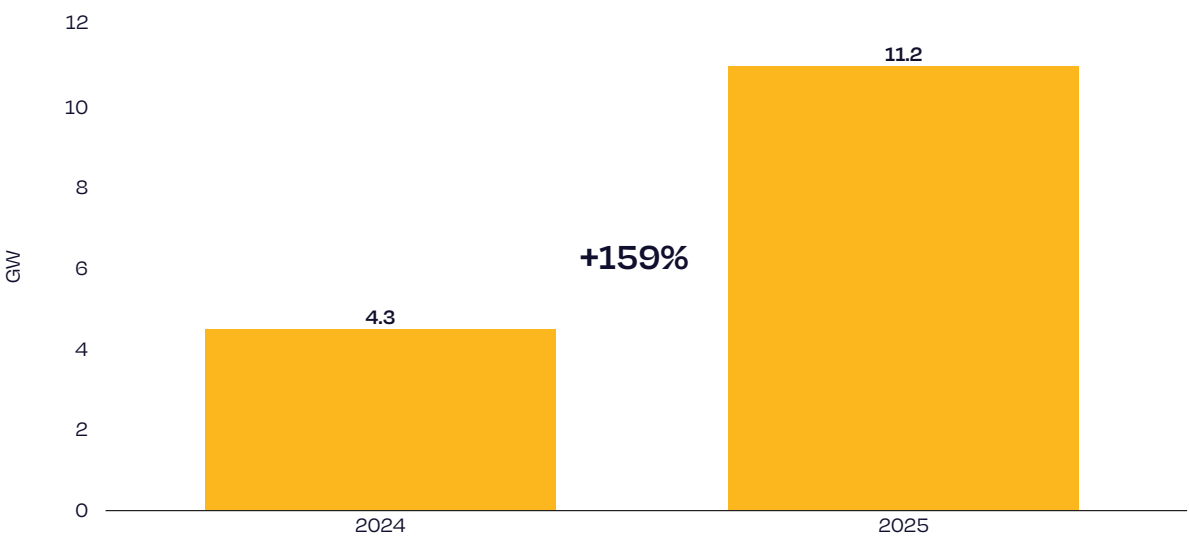
This surge has been driven primarily by utility-scale solar PV, with giga-projects such as Al Shuaibah 2 (2,030 MW) and Ar Rass 2 (2,000 MW) playing a central role, reflecting the Kingdom's continued focus on large-scale deployment. In parallel, Saudi Arabia achieved world-record low levelised costs of electricity (LCOE) for solar PV, reaching 1.09 USD cents/kWh (0.95 EUR cents/kWh) in 2025 (Najran project), reinforcing its global competitiveness.⁹

The scale, speed, and cost-efficiency of deployment demonstrate Saudi Arabia's transition from an emerging solar market to a global benchmark for rapid renewable energy expansion. This progress has been underpinned by the National Renewable Energy Program (NREP), and supported by strong institutional coordination and increasing private sector participation.

GW Figure 6.1

Saudi Arabia

Cumulative solar PV installed capacity, 2024-2025



© SolarPower Europe. Source: Dii Desert Energy, MESIA

9 Dii Desert Energy (2026), MENA Energy Outlook 2026

National targets for solar PV

Saudi Arabia has significantly accelerated its renewable energy ambitions under Vision 2030. The Kingdom is targeting 100–130 GW of renewable capacity by 2030, requiring annual additions of approximately 20 GW.

In parallel, the Saudi Green Initiative aims for 45–50% of national electricity generation to come from renewable sources by 2030.

These ambitions reflect both rising domestic electricity demand and the strategic objective of positioning Saudi Arabia as a global clean energy hub.

Key drivers for solar growth

Several structural factors underpin Saudi Arabia's rapid solar expansion. Record-low solar tariffs (reaching 1.096 USD cents/kWh (0.95 EUR cents/kWh) for the Najran PV project) have positioned solar PV as the most cost-competitive energy source in the Kingdom. High solar irradiance levels enable strong project performance and improve project economics, supporting large-scale deployment. A strong policy framework, led by the NREP, continues to ensure a steady pipeline of bankable projects, evidenced by approximately 15 GW of capacity reaching financial close in 2025 alone. Strategic capital reallocation from oil and gas towards renewable energy is also accelerating deployment.

Emerging demand is also playing a critical role, with the rapid expansion of digital infrastructure projected to grow from 414 MW in 2024 to 854 MW by 20281. This is creating a new class of large-scale, creditworthy off-takers capable of supporting long-term power purchase agreements.

Utility-scale vs. distributed PV, and storage developments

Saudi Arabia's solar sector remains strongly dominated by utility-scale projects, which benefit from economies of scale and centralised procurement models.

2025 marked a major milestone in the Kingdom's emergence as a global leader in energy storage deployment. Approximately 10.4 GWh of battery energy storage systems (BESS) were commissioned within the year, establishing a global benchmark for battery capital costs at USD 73–75 per kWh (EUR 63.2–65 per kWh).

GW Table 6.1

Saudi Arabia

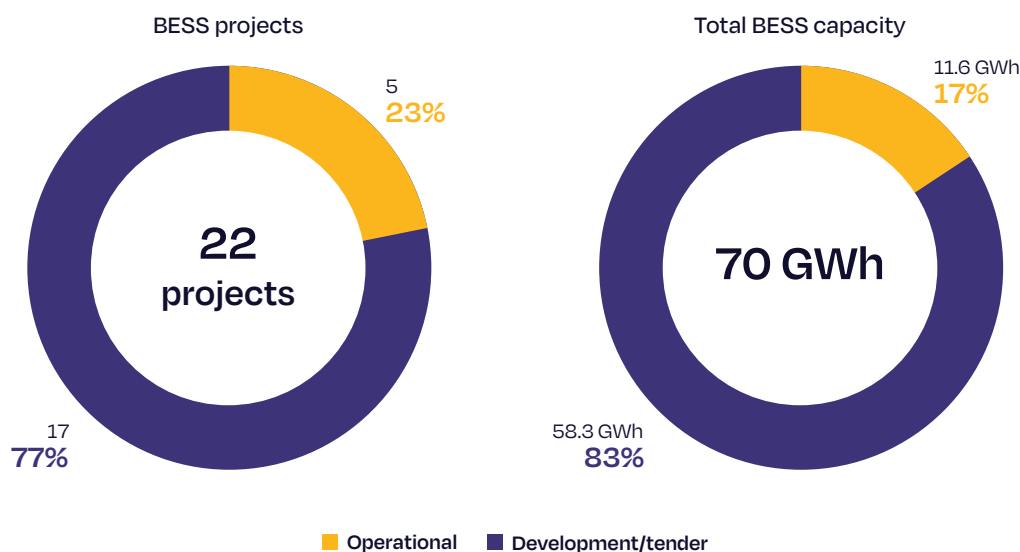
BESS market snapshot, November 2025

Category	Key metric
Operational BESS status (2025)	5 projects (11.6 GWh)
Committed BESS pipeline	22 projects (70 GWh)
Under development/tender BESS capacity	58 GWh
Growth trajectory (2025-2030)	~6-fold increase (43% CAGR)

© SolarPower Europe. Source: Dii Desert Energy, MESIA

Saudi Arabia

BESS projects and capacity in November 2025 and outlook to 2030



© SolarPower Europe. Source: MENA Energy Outlook 2026

In contrast, distributed generation, including rooftop solar, remains comparatively limited due to low electricity tariffs and evolving regulatory frameworks, although commercial and industrial uptake is gradually increasing.

Market challenges

Despite its rapid progress, Saudi Arabia's solar sector faces several structural challenges that could influence the pace of future deployment. Solar PV capacity expansion in 2025 tripled the Kingdom's installed renewable capacity in just 12 months, reaching 11.7 GW. This is placing unprecedented pressure on the national grid infrastructure, raising the risk of grid bottlenecks as transmission infrastructure expansion struggles to keep pace.

At the same time, higher levels of solar penetration are leading to a disparity between peak midday power generation and demand, resulting in wholesale electricity prices that may reach exceptionally low values during periods of maximum solar output. This increases the risk of curtailment if excess energy cannot be used or stored.

In addition, supply chain concentration remains a structural consideration. The global solar market is highly concentrated, with around 80% of solar module production dominated by a single country (China), leaving markets like Saudi Arabia exposed to external supply disruptions despite ongoing localisation efforts. Addressing these challenges will be essential to sustaining long-term growth and ensuring system stability.

Outlook for 2026–2030

Saudi Arabia is expected to remain the primary driver of solar expansion in the MENA region, accounting for more than half of the region's renewable capacity additions. This is supported by a strong project pipeline, with around 15 GW of new capacity reaching financial close in 2025, including major developments such as the Bisha and Humaij clusters (3 GW each).

The Kingdom is also expanding rapidly into green hydrogen, led by the NEOM project (1.2 Mtpa) and the planned Yanbu hub (2.2 Mtpa), supporting its positioning within the global clean energy transition.

At the same time, rising demand from digital infrastructure is reshaping the market, with data centre capacity projected to grow from 282 MW in 2024 to nearly 1.9 GW by 2028, providing a stable foundation for long-term renewable electricity demand.

With its scale, project pipeline, and emerging demand drivers, Saudi Arabia is well positioned to shape the regional and global solar market through 2030.



1.5 GW Sudair Solar PV project, Riyadh Province, Saudi Arabia

4.7 Japan

Recovery driven by rooftop solar, PPAs and self-consumption

Author: *Takeaki Masukawa*, Secretary General, Japan Photovoltaic Energy Association (JPEA)

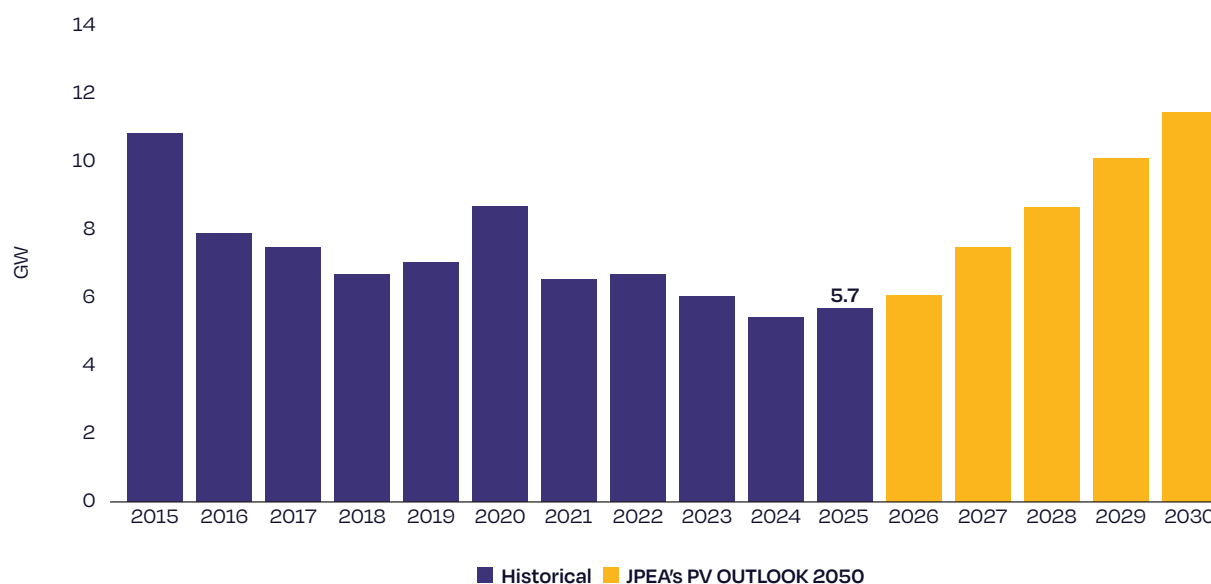
Overview of PV developments

The Japanese PV market has been on a downward trend in recent years, following the reduction in Feed-in Tariff (FIT) support for solar PV. In 2025, around 5.7 GW of new solar PV capacity was installed in Japan, up some 0.5 GW from 2024, bringing cumulative installed capacity to 102 GW. Even with the reduced FIT/Feed-in Premium (FIP) support, Japan's PV market is expected to start growing again from 2027, as outlined in the Japan Photovoltaic Energy Association (JPEA)'s industry report, PV Outlook 2050.¹⁰

GW Figure 7.1

Japan

Annual solar PV installed capacity 2015-2025 and market outlook 2026-2030



Note: Solar PV market outlook from JPEA's PV OUTLOOK 2050.
© SolarPower Europe. Source: JPEA (Japan Photovoltaic Energy Association)

¹⁰ JPEA (2024), PV Outlook 2050

This is expected to be achieved through the expansion of the residential and C&I rooftop markets, as well as the rapid growth of new corporate power purchase agreement (PPA) models—which are primarily driven by the needs of energy consumers significantly impacted by rising fossil fuel costs. Additionally, increased government support aimed at improving energy self-sufficiency and strengthening energy security will contribute to the growth of the solar power market.

National solar and renewable energy targets

According to the Japanese government's Long-term Energy Supply and Demand Outlook published by the Ministry of Economy, Trade and Industry (METI), the cumulative installed PV capacity target for 2030 is a range, between 129 -146 GW (103.5-117.6 GW_{AC}). This target will help meet the 46-50% carbon reduction objective by 2030, compared to 2013 levels. Furthermore, according to Japan's 7th Strategic Energy Plan, approved by the Cabinet¹¹ in 2025, the target share for solar PV in the energy generation mix by 2040 is between 23-29%.

According to JPEA's *PV Outlook 2050*, cumulative installed PV capacity is expected to reach 150 GW (125 GW_{AC}) by 2030. This ambitious outlook is 7 GW higher than the government's target, with an estimated average 9-10 GW of solar PV to be installed every year from 2026 up to 2030.

Drivers for solar growth

The FIT scheme has been the strongest driver of solar market growth in Japan since its introduction in July 2012. However, the relevance of this FIT scheme has since decreased, and a more market-oriented Feed in Premium (FIP) was introduced in April 2022. Instead of setting a fixed FIT rate, the FIP scheme allocates a fixed premium on top of the wholesale electricity price.

Meanwhile, opposition to solar PV has been growing in Japan amid concerns over disaster risks and environmental destruction. In 2025, the Cabinet ordered a review of the FIT and FIP schemes, including whether to end government support for ground-mounted solar PV.

The **'self-consumption business model'** for commercial and industrial users is expanding rapidly in Japan. On-site, self-consumption PV systems are becoming more attractive to businesses, as the Levelised Cost Of Electricity (LCOE) of PV power generation is already competitive compared to rising retail electricity prices for commercial and industrial users. The increase in energy prices from the latest global oil crisis is already impacting Japanese consumers, and is expected to accelerate the expansion of this business model.

An additional driver of solar growth stems from policies setting **PV mandates for new buildings**. The Tokyo Metropolitan Government and Kawasaki City has made it mandatory to install PV systems on new buildings, including detached houses, starting from April 2025. Similar installation mandates are spreading to municipalities across the country, such as Sendai City. As a result, the PV market, especially residential rooftop solar, is expected to expand significantly.

In addition to the needs of renewable energy users, **PPA business models** are beginning to gain traction in the Japanese PV market, driven by rising electricity prices.

¹¹ The Cabinet is the executive branch of Japanese government, including the Prime Minister's Office of Japan

Utility-scale vs. distributed & rooftop solar developments

In 2025, residential PV capacity (below 10 kW) is estimated to have exceeded 1 GW_{AC}, as it did in 2024. JPEA expects this segment to grow further, supported by the FIT and various subsidies for net-zero energy houses (ZEH) and battery systems. Beyond 2025, municipal PV installation mandates for new buildings could be a strong driver of residential rooftop market growth.

Meanwhile, distributed solar PV under 1 MW, mostly ground-mounted, is on a downward trend since 2016, mainly due to reduced FIT support. This segment needs to shift from a simple ground-mounted PV business model, to a self-consumption model aligned with the energy needs of renewable energy users or the local community. The segment is also expected to further expand with the growth of corporate PPAs and the new FIT scheme for rooftop PV, which provides higher tariffs during the initial five-year period to support early cash-in.

Large solar PV systems of 1 MW and above, including utility-scale systems, are also in decline. In addition to the FIT termination, power grid constraints and land availability, opposition from local communities have also contributed to market contraction. In order to bring this sector back on a growth trajectory in the medium to long term, reforms in land use—such as Agri-solar projects—are essential.



Rooftop solar PV, SENKO No.2 PD Center, on-site PPA model, Hakusan City, Japan

Challenges

One of the biggest challenges for the industry is opposition to solar PV from local communities and the general public, driven by **misinformation about solar** and concerns over some large-scale PV plants which have caused disputes with residents. The industry must first rebuild public trust in solar energy, which has been severely undermined by misinformation and negative perceptions. This foundational effort is JPEA's primary focus for this year.

Another important challenge is the **smooth transition from FITs to more market-oriented FIPs** and PPA-type business models. This decade will see a transition towards market growth with little reliance on the FIT/FIP regime.

Limited grid capacity and curtailment risks are the primary causes of the downward market trend in Japan. In 2025, the curtailment of solar PV in the Kyushu area was around 9%, and the associated risks are becoming apparent. METI is working on additional mitigation measures to minimise curtailment risk, including demand-side management and flexible supply-side operations. Moreover, METI is developing a long-term grid expansion programme to accommodate large amounts of renewable energy.

Another major challenge for solar in Japan is **land availability**. New business models which don't require dedicated land use such as on-site self-consumption models, together with the use of unused or abandoned farmland, can help address this constraint. To date, the conversion of unused/abandoned farmland to solar farms is limited as it requires strict legal procedures and permission from the local authorities. JPEA is working with other industry associations and non-profit organisations to tackle those constraints through reforms on existing laws and regulations.

The **cost of solar PV** in Japan still needs to be reduced or maintained in order to compete with conventional gas and coal-fired power plants. The average cost of ground-mounted solar PV is estimated at around 12.0 JPY/kWh (0.065 EUR/kWh), whereas the FIT for a ground-mounted PV system is set at 8.6 JPY/kWh (0.047 EUR/kWh) for systems 50 kW and above for 2026.

Finally, given that Japan was particularly hard-hit by the 2022 global energy crisis, one of the JPEA's key challenges is to help communicate to the wider public and policymakers the significant role and benefits of solar power in addressing rising energy costs and reducing the country's reliance on energy imports.

4.9 Türkiye

The solar surge fuels a sustainable future

Author: Mehmet İzzet ÖZAYDIN, Chairman; Esen ERKAN YILDIZ, Secretary General; Turkish Solar Energy Association-GÜNDER

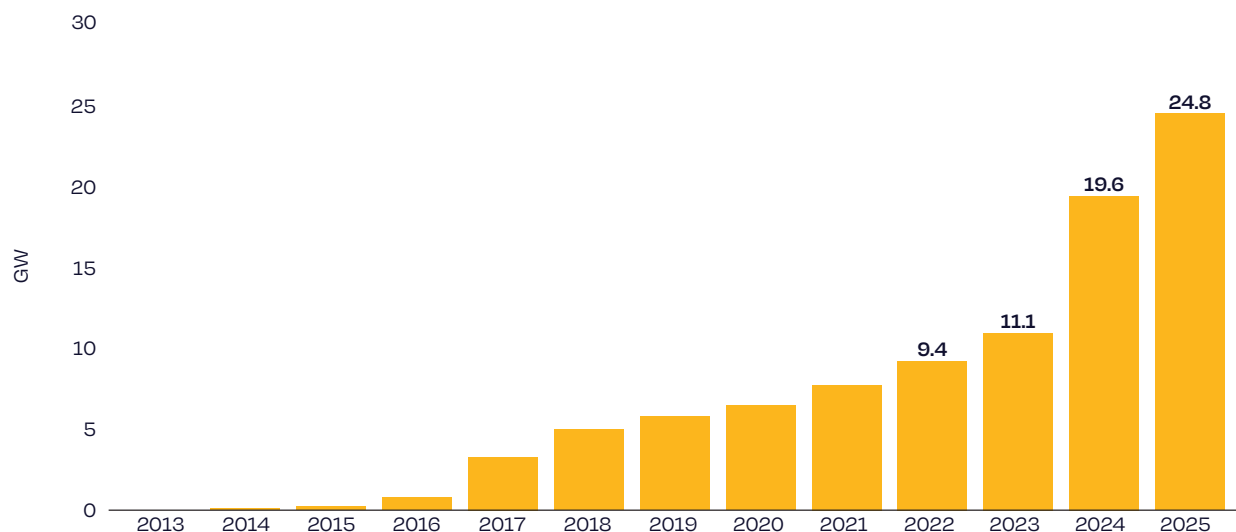
Overview of solar PV development

As of the end of December 2025, Türkiye's total installed solar energy capacity reached **24.8 GW**. This represents a rapid growth compared to the 9.7 GW total installations in mid-2022: in three years, Türkiye has more than doubled its solar capacity (GW Fig. 9.1).

GW Figure 9.1

Türkiye

Cumulative solar PV installed capacity, 2013-2025



© SolarPower Europe. Source: Turkish Electricity Transmission Corporation (TEİAŞ) Load Dispatch Control Centers

As of 2025, approximately **25 companies** are engaged in PV module manufacturing, with a total production capacity exceeding **15 GW**. There are currently **4 companies** actively engaged in PV cell production. Additional manufacturers are expected to commence operations in 2026. One integrated investor is currently involved in the installation phase. Total solar cell production capacity will reach approximately **7.5 GW, from 7 companies**, by the end of 2026. Strengthening domestic production is viewed as a strategic priority to enhance energy security, reduce import dependency, and create economic value.

National targets for solar PV

Türkiye plans to increase its combined wind and solar installed capacity to **120 GW by 2035**. To reach this goal, an annual capacity increase of **7.5–8 GW** is required, with at least half expected to come from solar energy. Integrating rooftop solar potential with energy storage enables a substantial portion of electricity demand to be met through manageable, off-grid solutions. This shifts the grid's role into a balancing structure, by reducing the load on centralised production. Simultaneously, the energy transition is being accelerated through a strengthened regulatory framework, support for domestic technologies, increased international cooperation, and mechanisms such as the **Emissions Trading System (ETS)**.

Factors driving solar growth

Türkiye's solar investment potential for the next decade presents a very promising outlook. Beyond the current 25 GW module manufacturing capacity, planned future investments in solar are distributed across various categories as follows: (GW Table 9.1)

GW Table 9.1

Türkiye

Planned solar energy investments 2026–2035 (Excluding current 25 GW module manufacturing capacity)

Category	Potential (GW)
Industrial facilities rooftop solar PV	20–25
Commercial buildings rooftop solar PV	15–18
Residential buildings rooftop solar PV	17–22
Floating SPP	3–5
Hybrid power plants (wind, biofuel, and hydroelectric)	5–15
Solar PV with storage	15–25
5.1.h scope	15–20
YEKA projects	10–12
Irrigation systems	5–8
Total potential	105–150

Note: YEKA: Renewable Energy Resource Areas, Turkish tender mechanism for large scale renewable projects
© SolarPower Europe. Source: GÜNDER – Turkish Solar Energy Association

Türkiye has the potential to add between **105 and 150 GW** of new PV capacity between now and 2035. Specifically, projections for rooftop and storage-integrated solar projects reflect Türkiye's commitment to exponentially increasing solar's share in its energy portfolio and establishing a sustainable energy infrastructure. Several key factors are driving the expansion of solar energy in Türkiye, centered around strategic independence, economic demand, and supportive policy frameworks.

Large-scale vs. distributed/rooftop applications

A structural solution to Türkiye's capacity challenges lies in rooftop solar combined with storage. Current storage levels remain limited compared to overall electricity demand, highlighting a system that is still largely generation-dependent and grid-centric. A more resilient model requires on-site generation, standalone storage, and local consumption.

The estimated rooftop solar potential in Türkiye is strategically distributed across various building categories. According to current projections, there is a market potential of 20–25 GW in industrial facilities, 15–18 GW in commercial buildings, and 17–22 GW in residential sectors. This combined capacity represents a critical component of Türkiye's goal to increase the share of solar energy in its national portfolio and establish a more decentralised, resilient energy infrastructure. (GW Table 8.1) If equivalent storage is paired with every unit of installed solar power, Türkiye could gain a distributed storage infrastructure of **120–150 GWh**. This capacity would provide the flexibility to manage **12–15%** of daily consumption independently of the grid. Consequently, **35–45%** of Türkiye's total electricity needs could be met on-site in a manageable, off-grid fashion. This shift would replace large centralised plants with hundreds of thousands of small energy hubs across the country; energy would be produced, consumed, and stored locally, with the grid serving primarily as a stabiliser.

In this context, our proposed Distributed Storage Electricity Production License (DDEL) Model transforms the grid from a “warehouse” for surplus production into a “backup” structure used only when needed. This model facilitates large-scale, storage-integrated production in common areas such as rooftops, parking lots, and social facilities of residential complexes, surpassing the individual **25 kW** limit. Under this model, end-users are relieved of investment costs, permitting processes, and technical operations; instead, licensed investors install and operate the system, providing users with more affordable and predictable electricity.



Solar panels in Eastern Turkey

Market challenges

The market faces several challenges that must be addressed to ensure the continued growth of the solar energy sector. The rapid expansion of renewables requires significant investment in transmission and distribution infrastructure to achieve reliable system integration. Furthermore, macroeconomic factors such as high interest rates, constraints on long-term financing, and currency fluctuations can increase project costs and heavily influence investment decisions. Alongside these financial and technical hurdles, maintaining high standards in installation and operation remains critical for the long-term efficiency and reliability of solar energy systems.

2026–2030 outlook

The Turkish solar energy sector is expected to maintain its rapid growth through the second half of the decade. Notably, Türkiye will host the **31st Conference of the Parties (COP31)** to the UN Framework Convention on Climate Change in Antalya from **November 9–20, 2026**. This summit will be a major milestone for Türkiye to showcase its renewable energy progress globally and create new investment and collaboration opportunities.¹²

Furthermore, the mandatory Vocational Qualification Certificate for PV power system personnel has come into effect, marking a significant threshold for quality, safety, and competence in Turkish sector. GÜNDER Accredited Vocational Qualification Center - GÜNDER MYM¹³ will continue to support the industry's adaptation to this process. Research institutions like METU GÜNAM¹⁴ are expected to continue contributing to solar technology development through their work on PV efficiency, storage systems, and innovative energy solutions. Our international collaborations, particularly European-supported research projects like SolarHub¹⁵, further strengthen knowledge sharing and innovation within the sector.



© T.C. Ministry of Environment, Urbanisation and Climate Change–Directorate of Climate Change (DCC)

¹² <https://unfccc.int/cop31/the-road-to-antalya>

¹³ <https://www.gundermym.com/>

¹⁴ <https://odtugunam.org/tr/>

¹⁵ <https://horizonsolarhub.eu/>

4.10 South Korea

Policy push sparks South Korea solar rebound in 2025

Author: SolarPower Europe

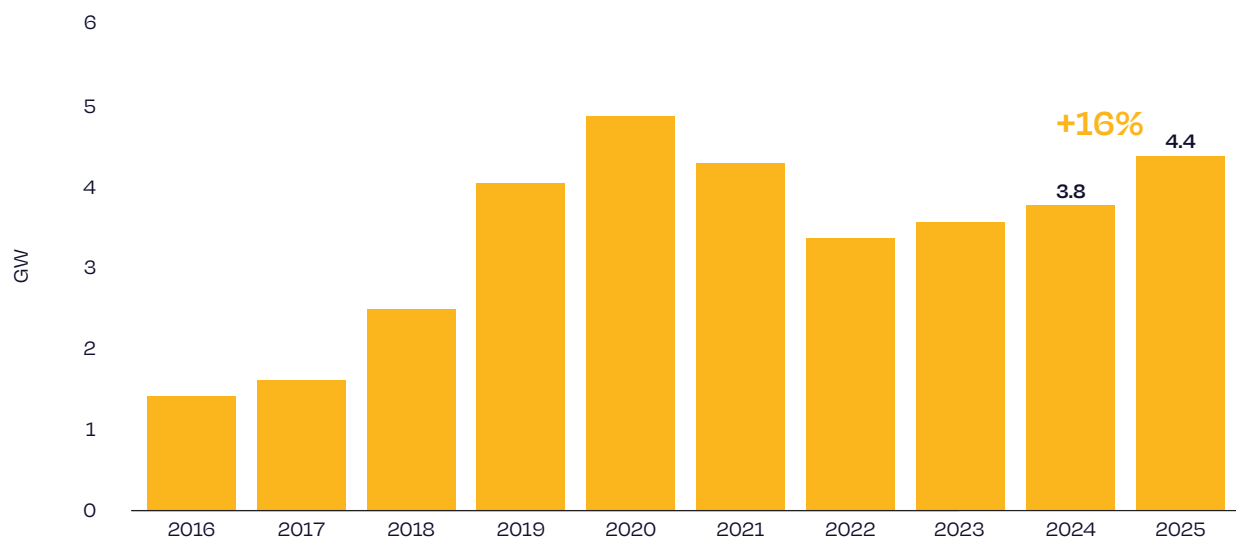
Overview of PV developments

South Korea's solar PV sector entered 2025 at a turning point. After peaking at almost 5 GW in 2020, the annual market stagnated below 4 GW for several years. First signs of recovery started in 2024, when newly installed capacity reached 3.8 GW. Then, following the presidential election in June 2025, the new administration placed climate action and energy security at the core of its policy agenda, triggering a reorganisation of governance structures, and setting ambitious targets to accelerate renewable energy expansion. As a result, in 2025, annual installations increased 16% year on year to reach 4.4 GW, South Korea's strongest solar year since 2020, bringing total cumulative PV capacity to 37.6 GW.

GW Figure 10.1

South Korea

Annual solar PV installed capacity, 2016-2025



© SolarPower Europe

National targets for solar PV

The Korean government has recognised that incremental growth alone will not suffice to meet ambitious new renewable targets; instead, a comprehensive transformation of the power system, market design and policy framework is required to accelerate solar deployment.

Finalised in February 2025, the 11th Basic Plan for Electricity Supply and Demand (2024–2038) set a clear expansion pathway for solar PV, targeting 55.7 GW of solar PV by 2030 and 77.2 GW¹⁶ by 2038. Achieving this requires average annual solar additions of around 3.6 GW between 2026 and 2030, and 2.7 GW between 2030 and 2038. If the market maintains the current trajectory, those targets should easily be achievable.

Building on those targets, and as a response to the Middle East war, the newly created Ministry of Climate, Energy and Environment (MCEE) – established in October 2025 – published its Energy Transition Promotion Plan which targets 100 GW of renewable energy deployment by 2030, focusing on wind and PV. The plan also aims to raise the share of renewables in electricity generation to 20% by 2030, almost doubling from 10.8% in 2025. It also aims to phase out 60 operational coal-fired power plants by 2040. The creation of the MCEE consolidates energy and climate policymaking under a single authority, marking the most significant governance reform in over 30 years, setting positive signals for the acceleration of PV deployment in coming years.

In parallel, the newly finalised 2035 Nationally Determined Contribution (NDC) raises ambition further, targeting greenhouse gas reductions of 53–61% compared to 2018 levels. This reinforces solar PV as a core pillar of Korea's decarbonisation strategy. Moreover, the government introduced a broader transformation agenda under the Korea Green Transformation (K-GX) initiative, linking renewable energy expansion with industrial competitiveness, electrification and grid modernisation. South Korea also aims to transition toward a distributed power system based on local production and consumption, supported by region-based electricity pricing.

Key drivers for solar growth

Several policy initiatives introduced or advanced in 2025 are shaping the Korean solar PV market. One of the major changes is the planned phased-out by the end of 2026 of the Renewable Portfolio Standard (RPS), which requires large power generators to supply a growing share of their electricity from renewable sources. Instead, it will be replaced by a government-led renewable auction system, and long-term contracts, including contract-for-difference (CfD)-type mechanisms. This aims to improve revenue stability and enable more planned capacity expansion.

On distributed PV generation, energy community models are also targeted through programmes such as the “Sunlight and Wind Pension” which promote local participation by redistributing project revenues. Distributed generation is also further supported through region-based electricity pricing. Additionally, a key driver for solar on buildings in Korea resides in the Zero Energy Building (ZEB) mandate, which requires new buildings to meet minimum energy performance standards through improved energy efficiency and on-site renewable generation, including rooftop and building-integrated PV (BIPV). The scope of the mandate is progressively expanded and now applies to private buildings over 1,000 m².

Agrioltaics is also supported with a new legal framework under preparation to expand solar deployment on farmland, extending allowable project durations up to 23 years while maintaining agricultural output. Finally, RE100 industrial complexes and expanded rooftop solar subsidies are promoting corporate procurement of clean electricity.

¹⁶ The target unit is assumed to be in direct current, GW_{dc}.

Utility-scale vs distributed/rooftop developments

South Korea's installed solar PV capacity is heavily concentrated in systems below 1 MW, which account for 83% of total installed capacity. Mid-sized systems between 50 kW and 500 kW make up the largest share, representing 53% of capacity, or 18.0 GW. Smaller systems in the 1–50 kW range account for 12%, while systems between 500 kW and 1 MW contribute a further 17% (5.7 GW).

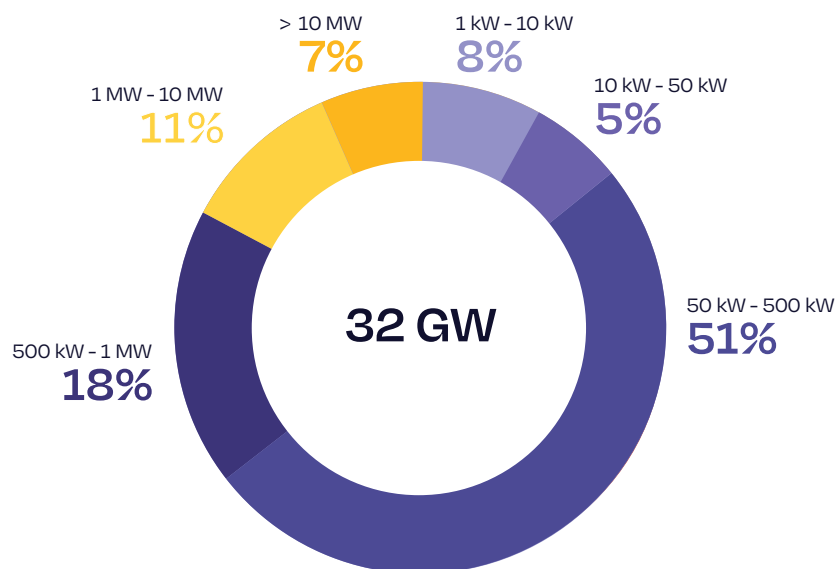
Larger installations are less frequent so far. Systems between 1 MW and 10 MW represent 11% of total capacity, equivalent to 3.6 GW, while projects above 10 MW account for just 7%, or approximately 2.3 GW.

Nonetheless, the ongoing reforms to South Korea's renewable energy framework are expected to reinforce the deployment of large-scale solar PV. The growing use of competitive auctions and Contracts for Difference (CfDs) is improving revenue certainty and supporting investment in utility-scale projects, while reducing reliance on the Renewable Energy Certificate (REC) market. Combined with the expansion of corporate PPAs and distributed energy systems, these reforms are expected to reshape the market into a more balanced structure, with stronger growth in large-scale solar alongside continued distributed deployment.

GW Figure 10.2

South Korea

South Korea cumulative solar PV segmentation, 2024



© SolarPower Europe. Source: Korean New and Renewable Energy Center

Market challenges

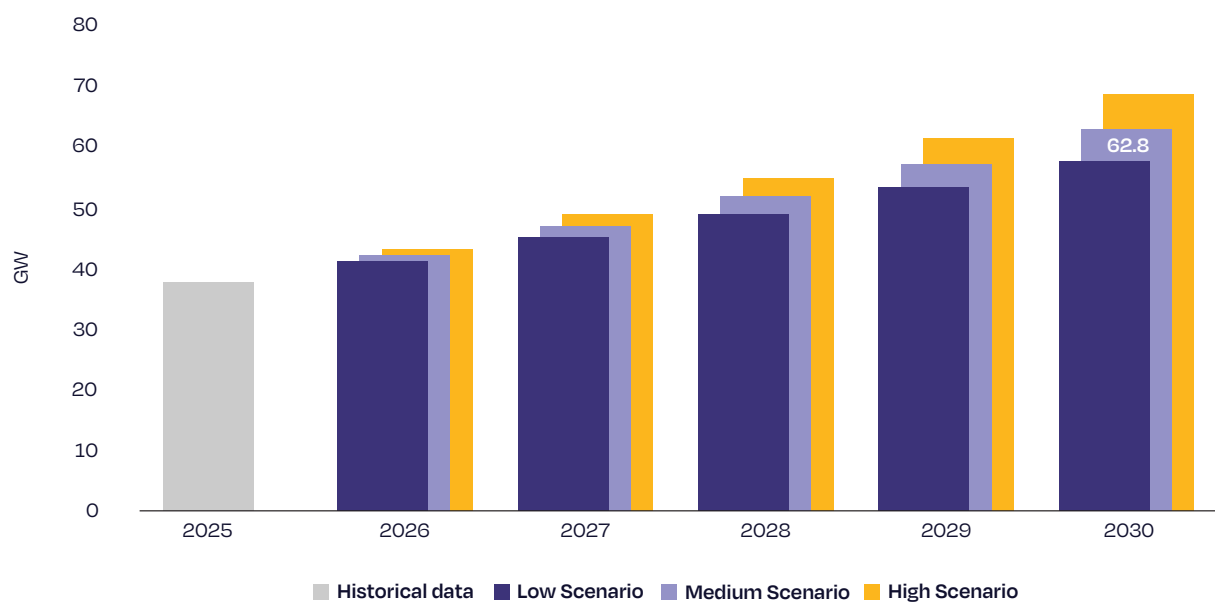
Several structural and institutional barriers have constrained solar PV deployment in Korea in recent years. Grid constraints resulted in delays in grid connections and, in some cases, curtailment of electricity output. The economic viability of PV projects was also eroding due to falling REC prices, thus reducing incentives for private sector investment. Nevertheless, recent policy developments have made strides in targeting these bottlenecks. The so-called “Energy Expressway” is aiming at strengthening transmission networks and grid flexibility. At the same time, the electricity market and tariff reform should also bring more stability to the sector.

Another major challenge is the to growing tension surrounding land-use; from local oppositions to complex permitting processes and restrictions on the development of agricultural and forest land. Agrivoltaics is expected to be supported by la legislative framework thanks to the Agrivoltaics special Act encouraging PV deployment on farmland. In addition, the new requirement for Mandatory Installation of Renewable Energy Systems in Public Parking Lots (effective 2025), should release some pressure on land-use for PV in Korea.

GW Figure 10.3

South Korea

Cumulative solar PV installed capacity 2025 and outlook 2026-2030



© SolarPower Europe

Outlook for 2026-2030

Solar PV deployment is expected to accelerate in the coming years and transition from gradual market growth to a policy-driven expansion through regulatory reforms, including relaxed setback rules¹⁷, the expansion of agrivoltaics, floating PV and BIPV. Detailed deployment pathways and targets will be presented in the upcoming 12th Basic Plan for Long-term Electricity Supply and Demand (2026–2040). If successfully implemented, the combination of auction-based procurement, grid expansion, distributed energy policies and technological innovation could enable Korea to meet its energy targets. The solar PV market is therefore expected to enter a new phase characterised by stronger central planning, increased integration with industrial policy, and a dual structure of utility-scale and distributed systems. Annual solar PV capacity growth of 5% on average is expected between 2026-2030, reaching 62.8 GW by 2030.

By aligning policy, infrastructure and innovation, South Korea aims to position solar PV not only as a key decarbonisation tool, but also as a strategic asset for energy security and industrial competitiveness in the coming decade.



Solar panels installed on Hanwoo cattle farm roof in rural South Korea

¹⁷ Setback rules: minimum-distance rules for solar projects, from roads, residential properties, determined by local authorities. Local setback rules have long been a barrier to PV deployment in South Korea largely because they varied significantly by region and municipality.

4.11 Pakistan

Rooftop by rooftop: how ordinary Pakistanis built an extraordinary clean energy nation

Author: *Ali Ahsan*, Research and Publication Manager, Pakistan Solar Association (PSA)

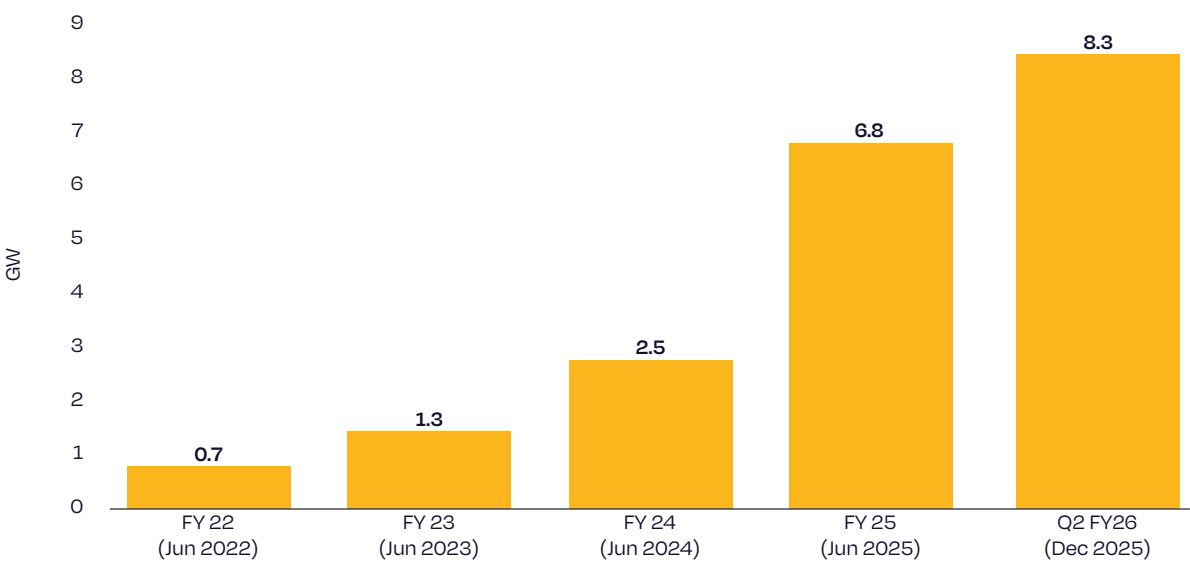
Overview of PV developments

Pakistan's solar PV sector has undergone one of the most remarkable energy transitions in the developing world, driven almost entirely by market forces rather than state mandate. According to data from the National Electric Power Regulatory Authority (NEPRA), official net-metered rooftop capacity stood at 1.3 GW in FY23, grew to 2.5 GW in FY24, and surpassed 6.8 GW in FY25¹⁸ (GW Fig. 11.1). Including off-grid, agricultural, and non-net-metered behind-the-meter systems, a joint study by TransitionZero and Policy Research Institute for Equitable Development (PRIED) estimates total installed solar PV capacity at approximately 34 GW by 2025¹⁹, while independent estimates by Renewables First place total deployed solar capacity at 51 GW by Q3 of FY26 (March 2026).²⁰ According to Ember, renewables as a whole now supply over 43% of Pakistan's power generation, surpassing the country's 2025 renewable energy target ahead of schedule.²¹

GW Figure 11.1

Pakistan

Cumulative solar PV net-metered capacity, June 2022-December 2025



© SolarPower Europe. Source: NEPRA, Renewables First

¹⁸ FY: Pakistan's financial year runs from the 1st July to 30th June. FY23 marks the end of FY22-23, equivalent to June 2023.
¹⁹ TransitionZero (2025): *Shedding Light on Pakistan's Distributed Solar Revolution*
²⁰ Renewables First (2026): *Pakistan Electricity Review 2026*
²¹ Ember (2026): *Electricity Data Explorer Pakistan*

National targets for solar PV

Pakistan's Alternative and Renewable Energy (ARE) Policy 2019 set targets of 20% variable renewable energy (VRE) by 2025 and 30% by 2030. Broader clean energy targets, including hydropower, are set at 60% of electricity generation by 2030. The NEPRA Indicative Generation Capacity Expansion Plan (IGCEP) had projected solar PV capacity to reach 12.8 GW by 2030 and 26.9 GW by 2047, a target already far exceeded on the ground by 2025 according to market-based estimates. The government has reaffirmed its 60% clean energy ambition through the ECO Clean Energy Centre (CECECO) and regional platforms, with 46% of on-grid capacity already renewable as of September 2025.

Key drivers for solar growth

The solar boom in Pakistan is fundamentally economics driven. Grid electricity tariffs rose by 155% between 2021 and 2024 due to IMF-mandated fiscal reforms and subsidy removal, while Chinese module prices fell fivefold over the same period. By 2024, Chinese PV modules were landing in Pakistani ports at 0.08 USD/W (0.06 EUR/W), making rooftop solar cheaper per unit than grid electricity and compressing payback periods to 2–4 years for residential systems and under 3 years for commercial and industrial systems. Pakistan imported 17 GW of modules in 2024, a 127% year-on-year surge, making it the largest importer in the Asia-Pacific region, and cumulative imports reached over 54 GW by early 2026. The macroeconomic benefit has been substantial: Pakistan reportedly avoided over 12 billion USD (10.3 billion EUR) in oil and gas imports between 2021 and February 2026, and fossil-fuel imports fell by 40% between 2022 and 2024. Provincial programmes, including Punjab's 12.6 billion PKR (39 million EUR) scheme targeting 100,000 subsidised rooftop kits, are broadening access beyond urban consumers.



1 MW solar plant (phase 1 of 2 MW total) for Unity Foods Ltd, Pakistan

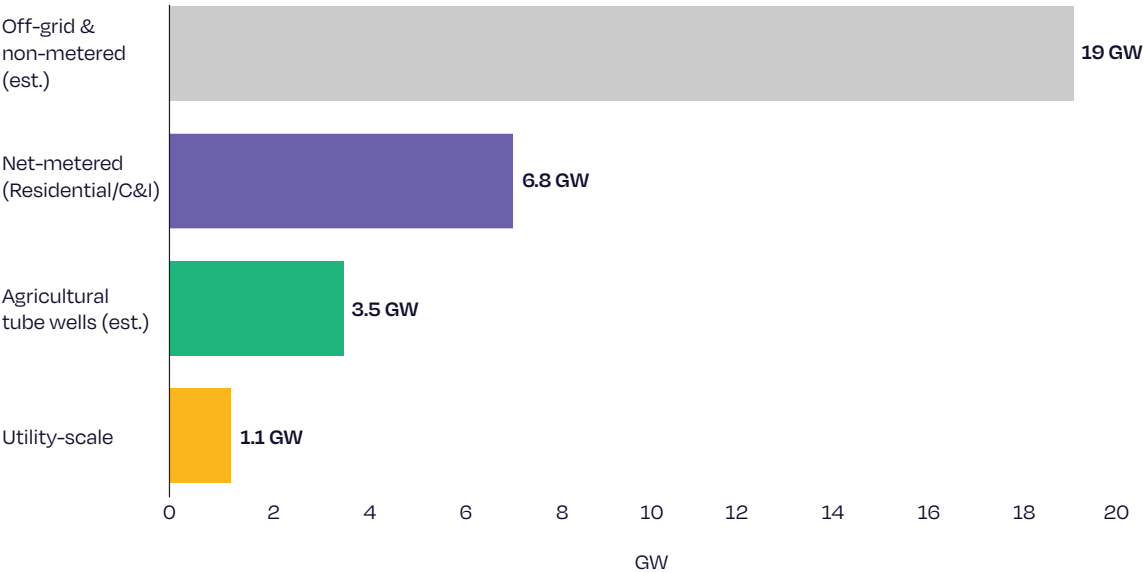
Utility-scale vs distributed/rooftop developments

The defining feature of Pakistan's solar market is the overwhelming dominance of distributed over utility-scale solar (GW Fig. 11.2). During FY2023–24, three new 50 MW solar power plants were commissioned, bringing utility-scale solar capacity to 1.1 GW. No new utility-scale solar projects came online in 2025. Cumulative utility-scale capacity is estimated between 780 MW and 1.1 GW. By contrast, net-metered capacity alone added 2.5 GW in just H2 2024, and a further 1.2 GW in H1 2025. Approximately 95% of Pakistan's 466,000 net-metering connections have capacity below 25 kW, highlighting the dominance of the residential-scale. Commercial and industrial consumers held approximately 51% of formal market share in 2025, led by textile exporters and food processors.

GW Figure 11.2

Pakistan

Cumulative solar PV installed capacity per segment, June 2025



Note: Off-grid/non-net-metered capacities are independently estimated, no official data exists for these segments.
© SolarPower Europe. Source: PSA estimate based on NEPRA, Renewables First

Furthermore, battery storage is increasingly becoming central to Pakistan's energy transition: Pakistan imported an estimated 1.25 GWh of lithium-ion (Li-ion) battery packs in 2024, while full-year 2025 Li-ion battery imports reached \$294 million, doubling year-on-year and surpassing solar PV imports in value for the first time in November 2025. By March 2026, Li-ion imports had surged to \$60 million, compressing the battery-to-solar import value ratio from 1:8 in H1 2025 to 1:3, signalling the rapid emergence of a storage-integrated energy market.²²

22 Pakistan Solar Association (2026), Pakistan's Solar Super-Cycle Is Sustained

Market challenges

The most consequential near-term challenge is the transition from net metering to net billing. On 10 February 2026, NEPRA notified the Prosumer Regulations 2026, replacing the 2015 net-metering framework for all new prosumers. Under the new net billing model, exported solar electricity is credited at approximately 8–11 PKR (0.02–0.03 EUR) per unit against an import tariff of up to 50 PKR (0.15 EUR) per unit, a severe asymmetry that could extend residential payback periods from 4 to 8 years and more, and may reduce new rooftop adoption by 30–40% through 2027. Existing net-metering contracts have been grandfathered, preserving investor confidence for current users.

Structural power sector issues compound the challenge. Capacity payments to thermal power plants exceeded 2.1 trillion PKR (6.5 billion EUR) in 2024. Total circular debt, the cascade of unpaid obligations across the power sector, reached 2.4 trillion PKR (7.4 billion EUR) by June 2024, though government-led reforms reduced this to 1.6 trillion PKR (4.5 billion EUR) by June 2025. In June 2025, the government imposed a 10% tax on imported solar panels, reduced from an initial proposal of 18%, adding to cost pressures for lower-income adopters. A demand-erosion model presented at a NEPRA hearing in November 2025 warned that if behind-the-meter generation reaches 15% of total electricity demand by 2030, grid tariffs could rise by 31% for remaining consumers, widening the risk of a tariff death spiral. Finally, grid modernisation has not kept pace with distributed solar growth, generating reverse-flow issues at distribution transformers and feeder levels that require urgent investment.

Outlook for 2026–2030

Despite near-term regulatory uncertainty, the structural drivers of Pakistan's solar growth remain intact. Battery storage adoption is accelerating: the Institute for Energy Economics and Financial Analysis (IEEFA) projects annual battery imports could reach 8.8 GWh by 2030, enough to meet over a quarter of peak demand. Net-metered on-grid solar capacity is projected to grow from approximately 8.3 GW in December 2025 to 9.5 GW in December 2026, and to 18.1 GW by 2031 at a CAGR of 17.8%. Total cumulative deployed solar capacity across all segments since June 2017 is expected to reach 60 GW by December 2026. This is more than the entire officially installed power capacity of Pakistan, across all power sources. The International Energy Agency (IEA) has explicitly named Pakistan among key markets where solar is set to surge between 2025 and 2030. With clean energy already making up 46% of the grid, the government's 60% renewable electricity target by 2030 is within reach if utility-scale investment accelerates and the net billing transition is managed predictably. A phased, transparent export rate reduction, combined with grid modernisation investment, will be critical to maintaining investor confidence and sustaining one of the world's most remarkable people-led energy transitions.

4.12 United Kingdom

The UK's solar capacity hits 23.7 GW in 2025

Author: Gareth Simkins, Senior Communications Adviser, Solar Energy UK

Overview of PV developments

The growth of the British solar industry continues to accelerate, with deployment totalling around 3.5 GW last year, close to double the 2.3 GW seen in 2024, according to figures from Solar Power Portal. It estimates that total capacity was approximately 23.7 GW by the end of 2025. The official figure of 19.5 GW fails to account for the highly active commercial-scale market.

Records were set at all scales. Cleve Hill, the UK's largest solar farm at 373 MW, came online. It is five times larger than any other existing solar plant in the UK, and the first of a series of planned Nationally Significant Infrastructure Projects (NSIPs).

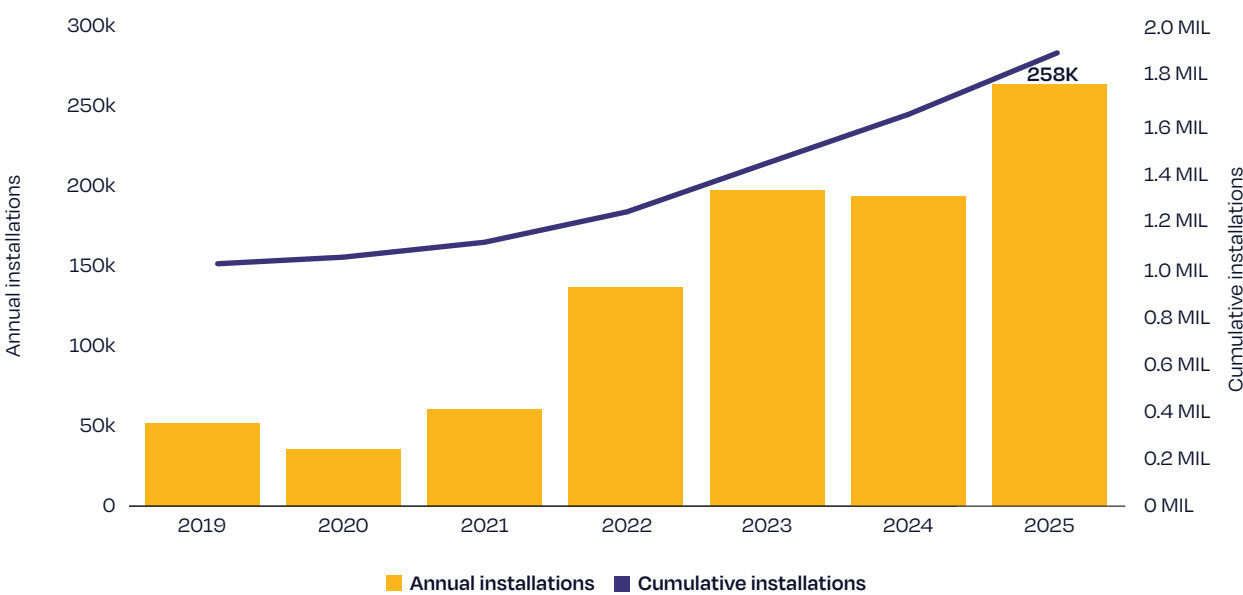
At the sub-50 kW scale, monitored by standards body MCS, a total of 257,918 installations were logged, 32% more than in 2024 and setting a new record. Growth was driven partly by the home retrofit market and partly by regulations promoting solar on new homes.

Of the total 3.5 GW installed in 2025, 2.1 GW is ground-mount PV, up 50% on 2024, and more than 4 GW is currently under construction.

GW Figure 12.1

United Kingdom

UK annual and cumulative PV installations below 50 kW, 2019-2025



© SolarPower Europe. Source: MCS

New capacity is coming largely from projects with Contracts for Difference, which provide a guaranteed income regardless of the prevailing wholesale cost of power. In addition, eight NSIPs were approved by central government in 2025, totalling 2.5 GW. The largest were Heckington Fen and Tillbridge, both at 500 MW and in Lincolnshire.

The remaining 1.4 GW deployed last year was split almost evenly between MCS and commercial-scale rooftop installations. A 31 MW rooftop installation is currently being built at the Port of Liverpool, which will become by far the largest commercial array, taking over from 6.5 MW at the Port of Hull. Overall, more than 5 GW is expected to be deployed at all scales in 2026.

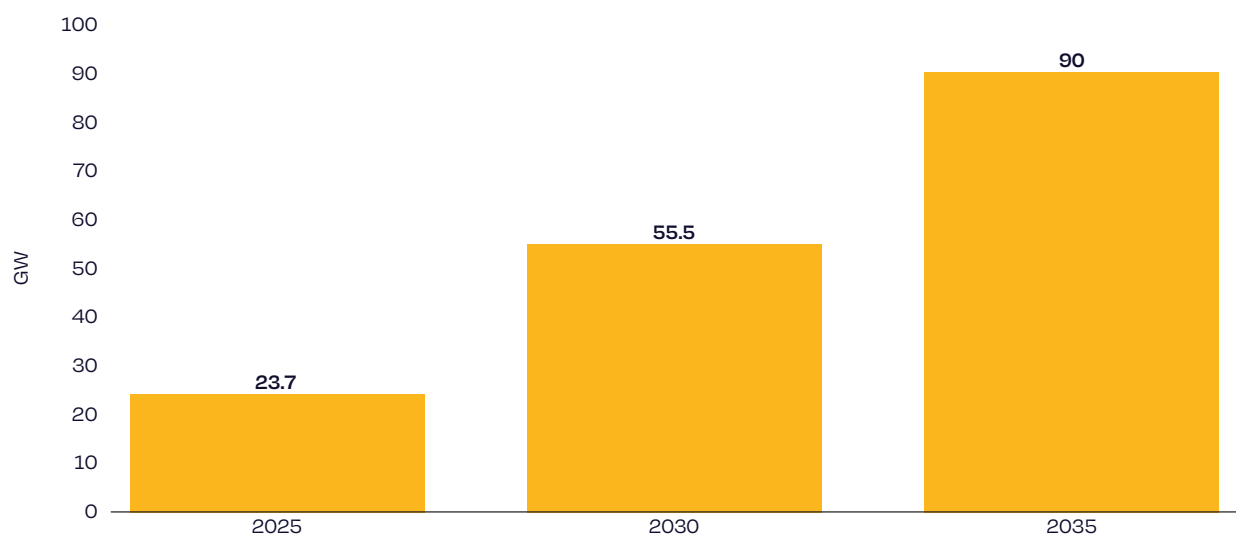
National targets for solar PV

After two years' gestation, the government-industry Solar Roadmap emerged in June, laying out detailed policy measures intended to help reach the official solar capacity target of 54-57 GW by 2035. The wide-ranging document addresses grid access, bolstering the UK PV supply chain and improving workforce skills, among other topics. The body responsible for leading its development, the Solar Taskforce, has now become the government's advisory body, the Solar Council, meeting around three times a year. Meanwhile, state-owned GB Energy is installing solar and battery energy systems on schools and hospitals.

GW Figure 12.2

United Kingdom

Solar PV installed capacity 2025 and targets 2030-2035



Note: 2030 target is a range, 54-57 GW

© SolarPower Europe. Source: Solar Energy UK and the Department for Energy Security and Net Zero

Drivers for solar growth

Announced in January, the Warm Homes Plan will deliver grants and interest-free loans for residential solar, battery and heat pump installations, further accelerating growth in the residential sector. The forthcoming Future Homes Standard and Future Buildings Standard are also expected to make rooftop solar all but mandatory for new construction in England. This should roughly double the number of MCS-scale installations each year, once the rules enter force.

The Local Power Plan set out plans for the government to invest 1 billion GBP into community energy groups, both as grants for feasibility studies and as direct investments.

The seventh round of CfDs was delayed to February 2026. The auction resulted in 4.9 GW of ground-mounted projects receiving support. The strike price was 65.23 GBP/MWh (75.29 EUR/MWh), 10% cheaper than the sixth round and 56% cheaper than the levelised cost of a combined-cycle gas turbine. It is expected to deliver 157 projects, requiring investment of around 5 billion GBP (5.7 billion EUR).

When combined with corporate PPAs and merchant projects, the capacity secured is broadly in line with the amount needed to meet the 54–57 GW target set in the Clean Power 2030 Action Plan of 2024. The installations will be built between 2027 to 2029.

Market challenges

At the end of 2025, the National Energy System Operator announced the long-awaited results of reforming the queue for grid connections, which had long suffered from poor management and underinvestment. However, the 'Gate 2' process – described as "painful but necessary" by Solar Energy UK at the time – has led to many developers losing their place in the queue. Some have reduced their UK presence as a result. Other market challenges, such as the regulatory position on 'balcony solar' systems, are being resolved under the Solar Roadmap.

Outlook for 2027-2031

Government support for solar remains strong and unwavering, in the face of mounting rhetoric from opponents of net zero. In a parliamentary debate on 5 March, in the wake of US strikes on Iran, Energy Secretary Ed Miliband said: "The lesson of Russia's invasion of Ukraine, and the lesson of recent days, is that our mission is the only route to greater energy independence for Britain, and we will double down on it. Every solar panel we install... makes us more secure as a country and protects families and businesses from those kinds of energy shocks."



4.13 South Africa

The solar boom accelerates the market beyond 10 GW total installed capacity

Author: *Sim Khuluse*, Technical and Policy Manager; *Dr. Rethabile Melamu*, CEO; The South African Photovoltaic Industry Association (SAPVIA)

Overview of PV developments

South Africa solidified its position as a GW-scale market in 2025, building on the remarkable growth observed in 2023 and 2024 at the height of loadshedding, and in the previous decade. Just over 15 years since the launch of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in 2011, the country has grown into Africa's largest solar market and now ranks among the top 20 solar PV markets globally.²³ In 2025, the market added an estimated 1.6 GW of new PV capacity and, across all market segments (utility, commercial and industrial (C&I) and residential), cumulative installed capacity now exceeds 10 GW. This milestone reflects the combined momentum of government procurement²⁴, rapidly growing private-sector investment, and a growing appetite for energy independence from small businesses and households.



115 MW solar PV and 90 MWh BESS Umoyilanga Hybrid Project (RMI4P), South Africa

²³ AFSIA (2026), *Africa Solar Outlook 2026*

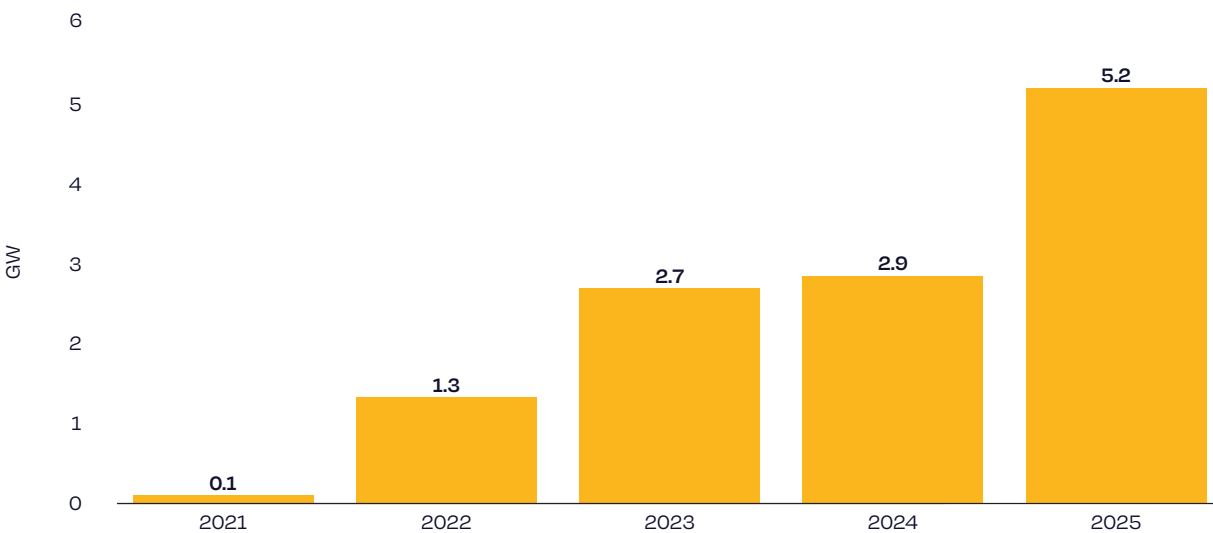
²⁴ See for example the Umoyilanga Hybrid Project (RMI4P), developed by EDF Renewables and Perpetua Holdings. The facility integrates 115 MWp Solar PV and 90 MWh BESS to provide 75 MW of dispatchable power. The Risk Mitigation Independent Power Producer Procurement Programme (RMI4P) is a strategic South African government initiative launched to urgently add new electricity generation capacity to the national grid.

As South Africa moves into the second half of this decade, the industry has transitioned from a reactive, crisis-response sector defined by the load shedding emergency years of 2022 and 2023 into a more mature and market-led industry. Solar PV is no longer a peripheral contributor to the grid: it has become a primary driver of new generation capacity nationwide. The registration of generation facilities with the National Energy Regulator of South Africa (NERSA) is a legal requirement under the Electricity Regulation Act for all grid-connected projects exceeding 100 kW in capacity. Annually registered capacity grew exponentially in the last 5 years, with a stark 4,082% increase in annually registered capacity in 2025 compared to 2021 (GW Fig. 31.1).²⁵ Furthermore, 2025 saw over 5.2 GW in new registrations, nearly twice the capacity of 2024. Registered cumulative capacity has surpassed 12 GW. Although the number of registrations dipped slightly in 2023, registered capacity doubled. This is attributed to the removal of the licensing threshold for projects up to 100 MW, which shifted developers away from numerous small projects in favour of fewer, much larger projects. Thanks to a substantial pipeline of projects registered with NERSA amidst a broader renewable energy potential exceeding 220 GW, solar PV has proven to be the fastest-to-deploy and most cost-competitive source of new electricity generation in the country.

GW Figure 13.1

South Africa

Annual solar PV registered capacity 2021-2025



Note: Registered capacity includes projects that were registered with NERSA and not yet constructed.
© SolarPower Europe. Source: NERSA

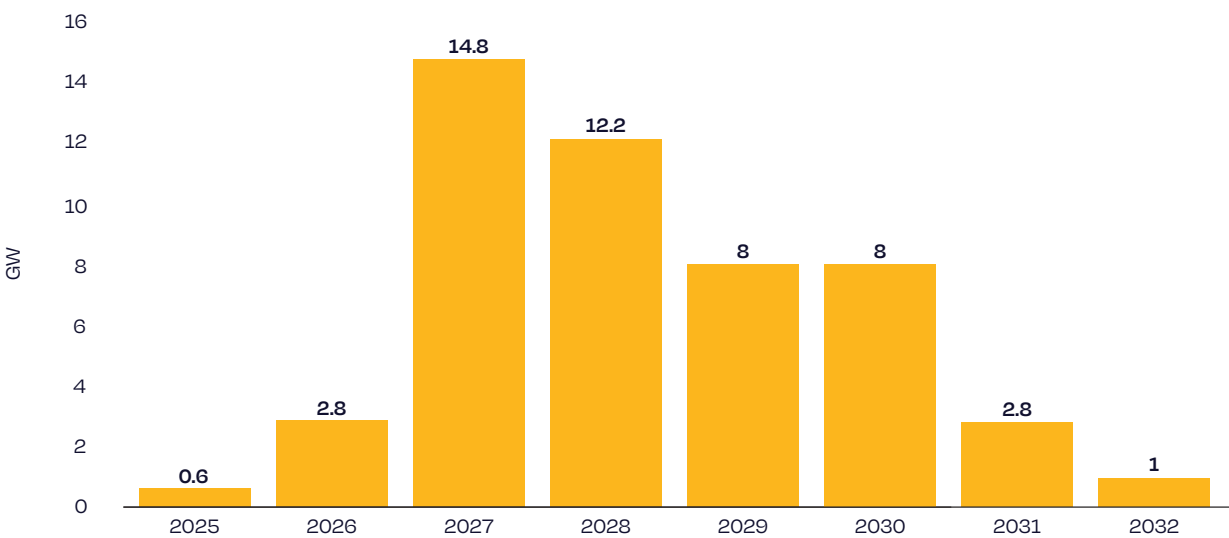
²⁵ Registered capacity, different from installed capacity, includes projects that were registered with NERSA and not yet constructed.

The South African Renewable Energy Grid Survey (SAREGS) is an annual industry initiative conducted through a partnership between the National Transmission Company South Africa (NTCSA), SAPVIA and the South Africa Wind Energy Association (SAWEA). The survey's primary objective is to provide the grid operator with critical, data-driven visibility into the pipeline of renewable energy projects currently under development across the country. This insight is essential for effective transmission planning. The 2025 survey successfully identified over 46 GW of advanced-stage solar PV projects proposed for grid connection up to 2030 (see GW Fig. 13.2).

GW Figure 13.2

South Africa

2025 SAREGS results of solar PV projects proposed for grid connection



© SolarPower Europe. Source: NTCSA

National targets for solar PV

Some policy developments from 2025 are worth noting. In particular, the approval of the updated Integrated Resource Plan (IRP) by the national cabinet in November 2025 has provided an increasingly firm foundation for solar expansion. This electricity infrastructure plan is the country's most ambitious energy blueprint to date, and the first of its kind to exclude new coal procurement. Over the full planning horizon up to 2039, the IRP targets 25 GW of utility-scale solar PV, 16 GW of distributed generation capacity and 8.5 GW of battery energy storage. In the near term, the plan sets a 2030 milestone of 11.27 GW of new solar PV, a target which, combined with existing installed capacity, would place South Africa firmly on a path to a renewables-led grid. These commitments signal a clear determination from the government to decarbonise South Africa's energy mix while meeting rapidly rising electricity demand and driving economic growth. Reinforcing this policy direction is the South African Renewable Energy Masterplan (SAREM), approved in April 2025, which mandates the addition of 3 to 5 GW of new renewable energy capacity annually until 2030. Together, the IRP 2025 and SAREM provide the most coherent and bankable policy environment the sector has seen, with SAPVIA noting that the two plans offer unprecedented planning certainty for investors and developers alike.

On the procurement side, REIPPPP Bid Window 7 (the 7th and the latest of tender processes) has delivered a landmark result for the South African solar industry. Originally launched in December 2023 to procure 1.8 GW of solar and 3.2 GW of wind, the round expanded significantly following the reallocation of unused wind capacity and value for money awards.²⁶ By end-2025, a total 3.9 GW of solar capacity across 18 independent power producers had been approved by the Department of Electricity and Energy, the largest single solar procurement round in South African history. These projects are now advancing toward financial close and construction, with the bulk expected to reach commercial operation between 2027 and 2029.

South Africa's climate commitments reinforce the urgency of this trajectory. Under the updated Nationally Determined Contribution (NDC) submitted to the UNFCCC, South Africa is committed to limiting economy-wide greenhouse gas emissions to between 350 and 420 MtCO₂e by 2030, a target codified in law through the Climate Change Act of 2024. Meeting this commitment requires the electricity sector to lead the decarbonisation effort, with solar PV maintaining a compound annual growth rate of 11.6% through the decade. This trajectory is essential to close the generation gap as South Africa pursues the addition of over 35 GW of total new capacity by 2030, replacing retiring coal with clean, cost-competitive alternatives.

Key drivers for solar growth

The growth in the deployment of solar PV in South Africa's market is underpinned by a convergence of economic, regulatory, and market forces. Key among these is the economic necessity of self-generation driven by consistent and steep average electricity price increases, from 0.42 ZAR/kWh (0.02 EUR/kWh) in 2021 to an estimated 2.2 ZAR/kWh (0.12 EUR/kWh), translating to 429% increase. For instance, NERSA has confirmed tariff increases of 8.76% for the 2026/27 period (and over 9% for municipalities), and grid electricity costs have continued to rise well above inflation. Combined with the declining global cost of solar modules, inverters and battery energy storage systems and the increasing affordability of battery storage, the business case for private generation has become a financial imperative for households and businesses alike.

Furthermore, several strategic shifts are accelerating this transition:

- The establishment of the South African Wholesale Electricity Market (SAWEM) represents the most significant structural reform to the sector in a generation. Since the NTCSA received its Market Operator Licence in late 2025, the legal foundation for a competitive, multi-buyer market is now established. While the full launch was postponed to the third quarter of 2026, the phased rollout will allow generators and traders to prepare for transparent, price-discovered electricity trading, effectively breaking Eskom's longstanding single-buyer dominance.
- The growing volume of corporate power purchase agreements (PPAs) and wheeling arrangements reflects a structural shift where large energy users have moved from passive consumers to active procurement participants. There are emerging business models: for instance, one of SAPVIA's members has developed a project within the current private wheeling market with around 10 energy-intensive industrial and commercial offtakers, representing mining, telecoms, petrochemicals, data centres, and financial services.
- Corporate de-carbonisation commitments are no longer optional. Mining houses and heavy industry are turning to solar to de-risk against grid unreliability of supply, though this has improved somewhat; affordability and competitiveness under international frameworks such as the EU Carbon Border Adjustment Mechanism (CBAM) are emerging as key drivers.

²⁶ Value for Money award: mechanism whereby the government (South African Department of Energy IPP Office) to negotiate with and approves runner-up bidders after the main round is closed, provided they offered competitive pricing and economic benefits.

- Internationally, South Africa's Just Energy Transition Investment Plan (JET-IP) has successfully channelled multilateral and concessional finance into grid infrastructure and renewable development, significantly reducing the cost of capital for qualifying projects. However, grid capacity remains the single biggest bottleneck in South Africa's energy transition. In 2025, the government officially approved the Independent Transmission Projects (ITP) Programme to enable and catalyse the implementation of targets set out in IRP 2025. The ITP allows the private sector to design, finance, and build high-voltage transmission infrastructure, which is then operated by the NTCSA.

Together, these forces have created a conducive environment for growth, transitioning renewable energy, and solar PV specifically, from a public procured market to a more dynamic and liberalised market with greater participation from IPPs and traders.

Utility-scale vs. distributed/rooftop developments

South Africa's solar PV market is characterised by a dual structure, between REIPPPP projects and non-REIPPPP projects, that is increasingly complementary. The market continued to expand in 2025, adding an estimated 1.6 GW of new capacity to reach a total installed base of approximately 10 GW across all market segments: utility, C&I and residential. The segmentation of installed capacity comprises 2.6 GW of REIPPPP projects, with the remaining 7.5 GW from non-REIPPPP across market segments. New capacity additions in 2025 were led by the utility-scale and C&I segments, where private PPAs, wheeling arrangements, and the continued roll-out of committed projects under public procurement programmes drove the bulk of activity.

These projects are largely situated in the Northern Cape and Free State provinces, where South Africa's exceptional solar irradiation delivers world-class capacity factors.



Solar panels on a farm near Worcester, Western Cape, South Africa

Market challenges

Despite substantial progress, the sector is still confronted with persistent constraints. For one, the persistent grid capacity and access bottlenecks stifle the rate of project deployment. There are tens of MW in project pipelines and, to a large extent, available capital to deploy. However, grid capacity in high resource regions has been fully utilised, and the condition and capacity of the distribution infrastructure are also a serious concern. Without urgent grid modernisation and expansion, the country risks undermining the progress made in the renewable sector.

Utility-scale projects face significant hurdles in the implementation of wheeling frameworks by distribution entities, and there are regulatory inconsistencies affecting the Small-Scale Embedded Generation (SSEG) market. SAPVIA is actively working with municipalities and has called for clear uniform rules of engagement, particularly municipal SSEG registration process.

Despite the progress described above, energy affordability and access remain an unresolved challenge. The solar increase has largely benefited middle-class households and commercial enterprises with the capital to invest. Indigent households, medium and low-income households and low-cost housing developments have been largely excluded from the solar dividend. Expanding access to affordable solar through community-driven schemes, rent-to-own models, and municipal SSEG integration will require both concessional financing and a standardised governmental framework to cater for more than 1 million households in South Africa that are yet to be electrified.

Outlook for 2026-2030

The outlook for South Africa's solar PV market through the end of the decade is broadly positive, albeit contingent on execution. As the base case, SAPVIA's predictions point to cumulative new capacity of over 21 GW between now and 2030, underpinned by the REIPPPP Bid Window 7 pipeline, private PPAs and continued growth in the C&I segment. The prediction assumes Transmission Development Plan (TDP) implementation continues at the current moderate pace, and that grid bottlenecks remain a constraint.

The integration of battery energy storage systems is set to define the next phase of market evolution. Roughly 17 GW of BESS projects currently in advanced development stage are to be connected to the grid by 2030. This reflects the maturation of the technology and its increasing cost competitiveness. As rising electricity tariffs continue to drive demand for self-consumption optimisation, solar-plus-storage solutions are expected to become the standard configuration across all market segments.

The launch of SAWEM, the continued rollout of REIPPPP projects, and competitive feed-in credit schemes position the sector for sustained, market driven growth. If South Africa can solve the grid access challenge and ensure that policy frameworks remain coherent and consistent, the country has every prospect of delivering on its IRP targets and cementing its place as a global solar leader.

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4.14 Switzerland

Swiss PV market faces decline and sets ambitious growth targets

Author: *David Stickelberger*, Senior Policy Advisor; *Wieland Hintz*, Deputy Managing Director, Swissolar

Overview of PV developments

For the first time since 2017, the Swiss market recorded a decline. According to Swissolar estimates, around 1.5 GW of solar PV capacity was newly installed in 2025, corresponding to a decrease of around 15% compared to 2024. Solar power provided 14% of the final power consumption in 2025. The Swiss PV market continues to be dominated by installations on buildings, and the residential sector was particularly affected by the decline. On the other hand, the first alpine ground-mounted plants were connected to the grid. In 2026, a stabilisation of the PV market is expected, along with a strong growth of the battery market.

National targets for solar PV

The Energy Act sets out ambitious targets for the expansion of new renewable energies (excluding hydropower), which should supply 35 TWh annually by 2035 and 45 TWh by 2050. Since the start of the year, an interim target of 18.7 TWh annually for photovoltaic power by 2030 has been set at regulatory level. To put this into perspective: Switzerland's current electricity consumption is around 60 TWh per year, and it should be at least 80 TWh by 2050. To achieve the abovementioned PV target, annual capacity expansion would need to exceed 2 GW.



© Swiss Solar Prize 2025

190 kW roof + 1178 kW façade solar PV, Kenova AG waste incineration plant, Zuchwil, Switzerland

Key drivers for solar growth

In 2023, Switzerland experienced a sharp increase in electricity prices, followed by a decrease. Parallel to high purchase prices, the remuneration for electricity fed into the grid has also risen massively and decreased again. There is an upfront (one-off) payment on a national level that covers around 12-25% of the investment costs, depending on the size of the system. This percentage is higher for full-feed-in systems, but for systems of 150 kW or more, the payment is determined by auction. In addition, investments can be deducted from income tax. Around 80% of the newly installed heating systems are heat pumps, and more than 20% of newly registered vehicles are electric vehicles, which provides an additional incentive to install solar panels.

Utility-scale vs. distributed and rooftop developments

In Switzerland, solar systems have predominantly been installed on buildings. The total PV potential on buildings is at more than 70 GW. The residential and commercial sectors each contribute roughly half of the installed capacity. PV systems on façades is a small, but fast-growing segment, mainly in the commercial sector, and a simplified permission procedure should give the market a further boost. Swissolar is currently conducting extensive fire tests, which are expected to significantly simplify the installation of façade-mounted PV systems in the future.

Since 2023, it is possible to construct large-scale solar plants in the Alps with a simplified procedure and high subsidies, potentially increasing winter production. In the meantime, the first 4 plants have been partially connected to the grid, several other plants are expected to be built in the next years. The expected annual production will be around 0.5 TWh. Several Agri-PV projects have been realised, but permissions are still difficult to obtain.



11 MW Madrisa alpine PV power plant (partially operational), Klosters, Switzerland

Market challenges

A new regulation for grid-fed electricity prices, valid as of 2026, is a cause for uncertainty in the industry. These prices are tied to quarterly average reference market prices, combined with a floor price. Low summer electricity prices affect economic efficiency, but create incentives to increase self-consumption, for example, using batteries. The new flexibility provisions have the same effect, allowing distribution grid operators to limit the feed-in of up to 3% of annual production without compensation. In practice, distribution network operators implement this by limiting the feed-in power to 70% of the DC power.

Outlook for 2026-2030

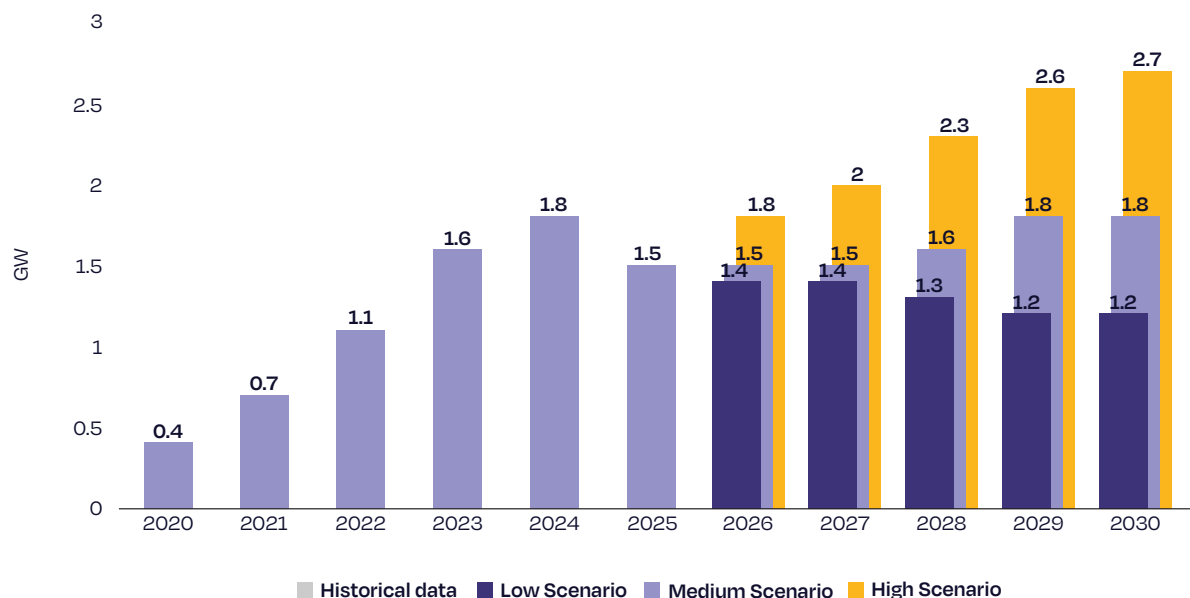
In 2026, a market stabilisation is expected, as stakeholders adapt to the significantly changed operating conditions. New PV systems are now routinely installed alongside batteries, enabling grid-friendly behaviour and optimised self-consumption. A key catalyst is the revised regulation for collective self-consumption and the 'local electricity communities'. These communities can leverage the public electricity grid at a local level at a reduced tariff, promoting the alignment of production and solar power generation and minimising unnecessary grid expansions. The Gulf war will accelerate the shift away from fossil fuels and, as a result, boost the use of heat pumps and electric vehicles.

Parliament has begun deliberations on the electricity agreement between Switzerland and the EU. This would entail the full liberalisation of the electricity market. A referendum on this agreement is expected in 2028. The associated uncertainties could have a negative impact on the market. Among other things, the discussion centres on how the current minimum feed-in tariff for solar power can be financed in a liberalised market. We therefore expect only slow market growth from 2027 onwards.

GW Figure 14.1

Switzerland

Annual solar PV installed capacity 2022-2025 and scenarios 2026-2030



Note: Scenarios by Swissolar. Low scenario - Slowed expansion, legal target values missed (14.7 TWh by 2030, 20 TWh by 2035); Medium scenario - Improvement of framework conditions (16 TWh by 2030, 24 TWh by 2035); High scenario - according to the Electricity Act, rapid and comprehensive improvement of framework conditions (18.7 TWh by 2030, 31 TWh by 2035)
© SolarPower Europe. Source: Swissolar

4.15 Ukraine

War time resilience through solar + BESS drives 1.5 GW new PV capacity in 2025

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Overview of PV developments

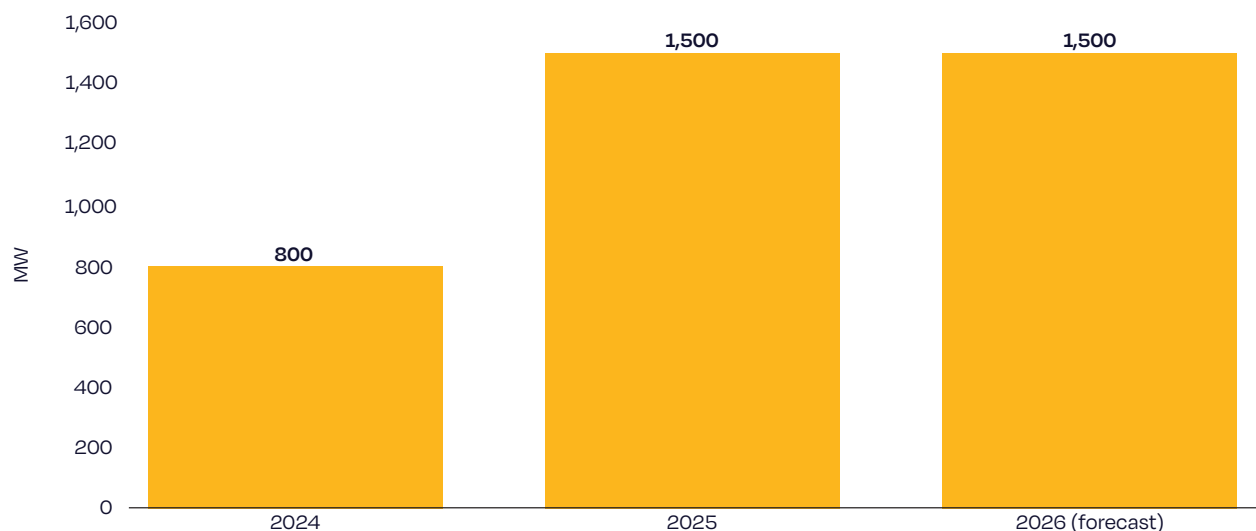
In 2024, the market recovered rapidly, with approximately 800 MW of new solar capacity installed, predominantly for self-consumption. In 2025, this trend accelerated significantly. According to estimates from the Solar Energy Association of Ukraine (SEAU), around 1.5 GW of new solar capacity was commissioned during the year. As of January 1, 2026, the total installed capacity of solar generation in the territory controlled by the Government of Ukraine exceeds 8.5 GW, including utility-scale solar power plants, C&I systems operating under the net billing mechanism, solar installations dedicated exclusively to self-consumption by legal entities, and residential solar systems.

These figures are estimates based on SEAU market analytics, customs import data, and industry surveys. Ukraine lacks mandatory registration for self-consumption solar systems connected to internal grids, leading to significant understatement in official statistics. Analysis of State Customs Service data shows that PV modules equivalent to approximately 3 GW of installed capacity were imported in 2025 alone – highlighting the true scale of market growth.

GW Figure 15.1

Ukraine

Annual solar PV installed capacity 2024-2025 and 2026 forecast



© SolarPower Europe. Source: SEAU

National targets for solar PV

Ukraine's energy targets have been fundamentally reshaped by the war. The country needs up to 10 GW of new or restored generation capacity across all types in the shortest possible timeframe. Solar is the optimal solution given its short deployment timelines and competitive installation costs.

The government's long-term strategy envisions a transition from a centralised to a flexible, distributed, and resilient energy system, with solar playing a central role. The new green auction mechanism introduced by Law No. 4777-IX provides market support through a feed-in-premium instrument for 12 years, improving the investment case for utility-scale Solar+BESS projects, selling electricity at auction-set prices of up to 0.12 EUR/kWh.

Key drivers for solar growth

Five key factors drove market expansion in 2025. The first is the energy security imperative, as blackouts and power deficits pushed businesses, municipalities, and households to invest in own generation and storage. Second, full VAT and import duty exemptions on PV modules and BESS were first introduced in 2024 and extended to 2028. Third, falling global equipment prices improved project economics. Then, Ukrenergo's²⁷ ancillary services auctions for FCR and aFRR under 5-year euro-denominated contracts created new revenue streams for BESS and Solar+BESS projects. Finally, preferential lending programmes through state banks, complemented by grants from the State Decarbonisation Fund of Ukraine also helped drive Ukraine's PV market expansion in 2025.



5 MW solar plant, Cherkasy, Ukraine

²⁷ Ukrenergo is Ukraine's state-owned TSO

Utility-scale vs. distributed/rooftop developments

The most dynamic segment in 2025 was private business investment in own solar generation combined with BESS – across industrial, logistics, agricultural, and retail companies, as well as municipalities. The Solar+BESS model became dominant: without storage, solar cannot deliver the flexibility and resilience the grid requires.

The residential segment remained stable, with total home solar capacity exceeding 1.7 GW – supported by the legacy green tariff mechanism.

Market challenges

Despite strong growth, the market faces serious obstacles, the first of which is a balancing market debt crisis which now exceeds 893 million EUR as of April 2026. The absence of effective war risk insurance mechanisms, along with complex and slow grid connection procedures are also a challenge. Finally, the statistical invisibility of a large portion of installed solar and storage capacity creates an obstacle for data transparency. While the lack of mandatory registration has reduced bureaucratic barriers and accelerated energy resilience across Ukrainian businesses, it also makes accurate market measurement very challenging.

Outlook for 2026–2030

SEAU expects over 1.5 GW of new solar and more than 3 GWh of BESS to be commissioned in 2026. The trajectory to 2030 will be shaped by the duration of the war, reconstruction pace, regulatory stability, corporate PPA development, and the scaling of storage. Ukraine has the potential to become one of Europe's most dynamic solar markets.

Key policy priorities:

- resolving energy market debt;
- establishing war risk insurance;
- launching the first feed-in-premium auctions for Solar+BESS in 2026;
- simplifying grid connection;
- developing PPA frameworks;
- scaling distributed Solar+BESS and small energy islands;
- expanding financing instruments for critical and social infrastructure.

Ukraine's energy transformation is already underway – from a centralised to a flexible, distributed model. Solar PV plays a central role in this process, and the market's investment attractiveness remains high.

About SEAU: The Solar Energy Association of Ukraine is the leading industry body representing the solar PV and BESS sector. SEAU unites over 90 companies and business groups, and over 400 solar home owners, with a community of more than 9,000 experts.

4.16 Smaller GW markets

This section covers a group of emerging solar markets installing between 1 GW and 1.5 GW annually, including Chile, Malaysia, the Philippines, Taiwan, Thailand, Uzbekistan and Iran. While we have increased the threshold to 1.5 GW of annual installations for a full deep-dive article, the following section offers a brief overview of smaller GW-scale markets in 2026. We would like to thank Voltalia and Taiwan Photovoltaic Industry Association (TPVIA) for their valuable contributions to this section.

Malaysia

The Malaysian solar PV market reached the GW milestone of annual installations for the first time in 2025, with a record 1.4 GW additions and a 70% annual growth. After three years of steady growth, with annual installed capacity doubling in 3 years from around 400 MW in 2020 to over 900 MW in 2023, the market saw a 8% dip in 2024, before bouncing back in 2025. Last year's performance brought Malaysia's cumulative installed PV capacity to over 6 GW by the end of 2025.

While ground-mounted projects account for roughly one third of the total cumulative installed capacity, the largest share of systems are installed at rooftop level. The attractive Net Metering Mechanism (NEM), which enables users to offset their electricity bills by exporting excess solar energy to the grid, has led to the installation of more than 2.7 GW by 2025. The latest revision, NEM 3.0, includes 3 segments: residential, C&I and government facilities, with respective quotas of 600 MW, 1700 MW and 100 MW, bringing total capacity available to 2.4 GW. As of May 2026, the residential segment is almost fully subscribed (96%), while the C&I and government segments continue to progress, each reaching around 65% uptake.²⁸



Solar panels on top of commercial building, Putrajaya, Malaysia

²⁸ SEDA, Malaysia (2026), Net Energy Metering (NEM) 3.0

In terms of electricity generation, solar PV reached 4.5 TWh in 2025 and accounted for just above 2% of the national electricity mix, otherwise largely dominated by coal and gas.²⁹ Malaysia has pledged to achieve net zero emissions by 2050. Overall growth in total primary energy demand is expected to be limited, meaning that the fossil share will be replaced by non-fossil sources. To ensure this target is met, the government published the National Energy Policy 2022-2040 and the National Energy Transition Roadmap (NETR). The latter sets ambitious objectives, calling for a gradual increase in the share of renewables in the energy mix to 31% by 2025, 40% by 2035, and 70% by 2050. The 2025 interim objective was successfully met, driven mostly by solar and hydro. To back the transition, the government has also implemented policies to support deployment, such as the ongoing Large-Scale Solar (LSS) initiative, the NEM, Self Consumption and feed-in tariffs programmes.

Chile

In 2025, Chile added 1.3 GW of new solar capacity, a 37% decrease from the 2.1 GW installed in 2024. This comes as the country recorded a significant 3.8 GW increase in installed electricity generation capacity, solar thus contributing 35% of new additions. In cumulative terms, 11.5 GW of solar PV operating capacity was reported in December 2025, a more than 10-fold increase in a decade. Solar now accounts for a third of total installed capacity in the national electricity mix, as hydropower and wind complete the podium with respectively 20% and 15%.

However, wide regional disparities remain. For instance, the Antofagasta region alone accounts for more than a third of the national capacity. Utility-scale solar is dominant, while distributed systems contribute only around 30%. Rooftop PV development is hindered by regulatory constraints, and its growth rate has dropped from 20% in 2022 to 7% in 2025. According to ACESOL, solar contributed nearly 25% to the total 86.3 TWh electricity demand in 2025.³⁰



Solar energy park in the Atacama Desert, Chile

²⁹ Ember (2026), Data Electricity Explorer.

³⁰ ACESOL (2026), Reporte Solar 2025

Consistent growth is expected in coming next years, with 28 GW projected total installed capacity reached by 2030 in our most likely Medium Scenario. However, numerous challenges remain, among which serious grid bottlenecks. More than 6.1 TWh of renewable generation was curtailed in 2025 due to a lack of transmission infrastructure and an electrification not keeping the pace. To mitigate this issue and enhance flexibility capacity, the country has seen strong BESS project activity. Chilean association ACERA reports a record 3.5 GWh installed in 2025.³¹ Following February 2025 near nation-wide blackout, the government implemented the Necessary and Urgent Works mechanism to strengthen grid reliability, investment totals at 74 million EUR. Further discussions on the modernisation of the electricity distribution model are ongoing.

Philippines

The Philippines installed 1.1 GW of solar PV in 2025, a 5% increase year-on-year in annual deployment. Market growth seems to be maintained after the 510% surge observed in 2024, when the country reached the GW level for the first time. Cumulative installed capacity reached 3.9 GW, of which 3.5 GW is ground-mounted PV. According to Ember, solar PV generated 3 TWh in 2025, reaching 2.4% of total electricity supply: this is a 44% increase year-on-year compared to 2024, when solar's share in electricity generation was 1.7%.

The Department of Energy, through the National Renewable Energy Program and the Philippine Energy Plan, is targeting a 35% renewable energy share in total generation mix by 2030, and more than 40% by 2040. Laws such as the Electric Power Industry Reform Act, the Net Metering Policy and the Expanded Roof-Mounted Solar Program are expected to spur solar capacity deployment. In early 2026, the government also eased customs regulation which previously slowed the entry of renewable energy technologies into the country. This is part of the broader target of achieving



Solar farm, Miagao, Iloilo, Philippines

³¹ ACERA (2026), Balance 2025 del sistema eléctrico

100% household access to electricity by 2028. While this was already at 95% in 2024 according to the Department of Energy, it also means that more than 3 million households are still not supplied with electricity. Recent projects of note in the country include Meralco PowerGen's MTerra project, completed in February 2026: it is one of the largest integrated solar-plus-storage facilities globally, with 3.5 GW of solar PV and 4.5 GWh of BESS capacity.

Thailand

After years of stagnation at around 900 MW in annual installed capacity, 1.2 GW of solar PV was added in 2025, a 20% increase year-on-year, and a surge compared to the 4% growth observed in 2024, bringing total cumulative capacity to 8.7 GW. Solar electricity generation also recorded a 83% annual increase in 2025, from 5.4 TWh in 2024 to nearly 10 TWh, according to Ember data. Solar PV accounted for 5.3% of the total electricity supply, while Thailand's electricity generation mix remained more than 80% fossil-based in the same year. This remains far from the estimated capacity potential of the country, which stands at 300 GW according to a 2022 study.³²

In 2024, the Energy Policy and Planning Office (EPPO) unveiled ambitious targets in Thailand's National Energy Plan, aiming for 33% and 51% of total electricity demand supplied by renewables by 2030 and 2037 respectively. The EPPO also published the Alternative Energy Development Plan 2024 revision draft, in which solar is expected to account for more than half of new electricity generation capacity by 2037. Specifically, it targets 39 GW of additional solar PV capacity and 2.8 GW for floating solar. In April 2026, the Thai government approved a new electricity tariff structure that removes the previous nationwide 90-MW cap on grid-connected sales. The new scheme introduces unlimited subscription rounds of 500 MW each, which is expected to significantly accelerate rooftop solar deployment in the coming years. Cumulative installed capacity is expected to pass the 20 GW threshold by 2030.



Solar power plant in Thailand

³² Energy Research Institute (ERI), Agora Energiewende, NewClimate Institute (2022), *Towards a collective vision of Thai energy transition: National long-term scenarios and socioeconomic implications*

Taiwan

Taiwan's solar PV sector remains a cornerstone of the country's energy transition, with installed capacity reaching 15.5 GW in 2025, up 1.2 GW from 14.3 GW in 2024. While solar now accounts for two-thirds of Taiwan's renewable energy installed capacity, the country's electricity mix remains 85% fossil-based, and solar contributes only 5.5%, according to Ember data. Solar additions have been slowing down since 2023, when the country installed a record 2.7 GW, due to land availability constraints, grid bottlenecks, and regulatory hurdles. Still, strong demand for renewable electricity from the semiconductor and high-tech industries is a major driver of market expansion. Rooftop installations dominate with around 60% of total capacity, complemented by ground-mounted projects and emerging floating solar systems.

In addition, Taiwan benefits from a relatively complete domestic supply chain, spanning wafers, solar cells, module manufacturing, and downstream project development.

The government targets 31 GW of solar capacity by 2030, a goal that will require significant grid reinforcement, deployment of battery storage, and increased corporate procurement of renewable energy. Despite existing challenges, solar PV is expected to remain central to Taiwan's energy strategy, supported by industrial demand and sustained policy commitment.

Uzbekistan

In 2024, Uzbekistan updated its ambitious national renewable energy targets, with a goal of 18 GW of combined solar and wind capacity and a 54% share of renewable energy in its electricity mix by 2030. This constitutes a sharp increase from the current state of play, as the country's power mix was nearly 80% fossil-based in 2023. In 2025, with about 1.2 GW of annual additions, total installed capacity in Uzbekistan crossed 3 GW. Climate-related commitments, rapidly increasing local electricity demand and a population expected to double within the next two decades are the main drivers for market growth. The government strongly supports large-scale market development through international tenders, with 1.5 GW awarded since 2020, and direct negotiations schemes. The Ministry of Energy also reported in December 2025 that the 2 GW milestone of residential and C&I scale capacity was almost met.

Uzbekistan is by far the leader of the renewable energy sector in Central Asia, but challenges remain. While the Uzbek government plans to significantly develop grid infrastructure, including 500 km of transmission lines, the aging transmission and distribution networks inhibit renewables deployment. Moreover, the lack of regulatory stability may daunt potential investors. Finally, the very low prices negotiated by the Government of Uzbekistan make it difficult for new players to enter the market unless they can secure a large project portfolio.

Iran

Although solar PV still accounts for less than 1% of the fossil-based national electricity generation mix with 0.9 TWh, record growth in solar deployment was recorded in 2025. In December, Iran's Renewable Energy and Energy Efficiency Organization, known as SATBA, reported 2.5 GW of cumulative renewable installed capacity, a 66% increase from 1.6 GW installed in 2024. Solar accounts for 80% of the total renewable installed capacity, its share rising exponentially amid stagnation in wind and small hydropower markets.³³ In 2025 alone, 1 GW of new solar PV capacity was commissioned, twice the volume installed in 2024. This marks an acceleration after the approximate 40% growth in 2024. The largest nation-wide plant in operation, Aftab Shargh 120 MW facility (1st phase), was inaugurated in July 2025. 720 MW of renewable power capacity was under construction in December 2025, with projects under development in half of the 30 Iranian provinces.

33 SATBA (2025), *Report on renewable energy capacity deployment*

Iran's solar PV market is driven by exceptional solar resources, rising electricity demand, energy sovereignty concerns, technology diversification goals, and sustained government interest. However, since international sanctions were reinstated in 2018, Iran has lost access to foreign investors and faces disrupted supply chains, weak macro economic conditions, security issues, regulatory instability, and systemic corruption. Aging transmission infrastructure and the country's historic dependence on oil and gas add further challenges. Despite this, the solar sector continues to grow steadily. According to SATBA, cumulative renewable capacity reached 4.2 GW. Solar PV likely represents most of the 1.7 GW added in less than five months, bringing cumulative solar capacity to 3.7 GW. Growth is supported by ambitious targets: SATBA plans 30 GW of new renewable capacity within four years, a more than six fold increase from March's figures. Feed in tariffs and auctions are in place to secure revenues, though annual adjustments based on market exchange rates may deter investments.

Regulatory incentives include the revised Article 19 of the National Building Code, requiring some buildings to source part of their energy from renewables. The government has allocated 1.3 billion EUR in foreign-currency loans, and Iran's sovereign wealth fund has committed financing for Chinese imports of up to 7 GW of solar capacity. More than 110 GW of renewable project licenses have already been issued.

Since February 2026, Iran's involvement in the Middle East war has led to widespread destruction of energy infrastructure, including solar PV plants, further weakening an already fragile grid. The government has issued public calls to reduce electricity consumption, warning of severe grid imbalance and blackouts during summer 2026. Official statements report EUR 1.3 billion in damage to the power network and a current 25 MW supply shortfall. These conditions are likely to slow utility scale solar growth but could accelerate the distributed solar segment as households seek to reduce dependence on an unstable grid. However, heavily disrupted supply chains and war driven inflation will constrain investments and project development. Public funds are also expected to be diverted toward emergency repairs – especially in the lucrative oil and gas sector – potentially limiting new capacity allocations and reducing tariffs for existing projects. This could render new installations unviable and lead to a market downturn.



10MW solar power plant, Yazd Province, Iran



30

years

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