National Laboratory of the Rockies

Spring 2026 Solar and Storage Industry Update

David Feldman, National Laboratory of the Rockies (NLR)
Jarett Zuboy, NLR
Matthew Heine, NLR
John Davis, NLR

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Photo by Agata Bogucka / NLR 097037

Agenda

1. Global Solar Deployment
2. U.S. PV and BESS Deployment
3. PV System and BESS Pricing
4. Global Manufacturing
5. Component Pricing
6. Market and Policy
7. U.S. PV Imports

Executive Summary

Global Solar Deployment

- In 2025, between 607 GW_{dc} and 698 GW_{dc} of PV were added globally, bringing cumulative installed capacity to 3.0 TW_{dc}.
- China, the EU, and the United States represented a smaller share (72%) of global annual PV installations, with newer markets, such as Pakistan, Brazil, and Saudi Arabia, representing a larger share.
- The IEA reported India rose to second place in annual global PV deployment in 2025, with 56 GW_{dc} installed.

U.S. PV and BESS Deployment

- EIA reported that the United States installed 6.9 GW_{ac} of PV, 4.1 GW_{ac} of BESS, and 0.6 GW_{ac} of land-based wind capacity in the first quarter of 2026.
- In 2025, solar represented 15.7% of net summer capacity and 8.6% of annual generation.
- In 2025, 24 states and territories generated more than 15% of their electricity from solar and wind, with Iowa and South Dakota leading the way, with around 60%.
- LBNL reports there were approximately 2,300 GW_{ac} of electric generation capacity actively seeking interconnection at the end of 2025, of which 773 GW_{ac} were solar, 749 GW_{ac} were storage, 253 GW_{ac} were natural gas, and 196 GW_{ac} were wind.

PV System and BESS Pricing

- The median system price of large-scale, utility-owned PV systems in 2025 was \$1.55/W_{ac}—increasing about 4%, y/y, and 22% since 2020.
- EnergySage reported that the median price for residential PV systems in the second half of 2025 remained relatively flat, y/y, for both PV-only systems (\$2.62/W_{dc}) and those installed with batteries (\$2.43/W_{dc}).
- In early 2026, residential PV-plus-storage systems in California had a median system price of \$2,510/kWh of battery capacity, \$3,178/kW_{ac} of battery capacity, and \$4,611/kW_{dc} of PV capacity.
- LevelTen reports that, in Q1 2026, U.S. utility-scale photovoltaic PPA prices increased for the sixth quarter in a row, up 13%, y/y.

Market and Policy

- As of May 12, 2026, 34 states and Washington, D.C., had introduced plug-in solar legislation—compared with 3 as of fall 2025—and bills in 5 states had been signed into law.
- In February and April 2026, the Department of Commerce announced preliminary affirmative decisions for CVD and AD investigations, respectively, for c-Si PV modules and cells manufactured in Laos, Indonesia, and India. Final decisions are due July 6, 2026.

A list of acronyms and abbreviations is available at the end of the presentation.

Executive Summary (Continued)

Global Manufacturing

- SPV Market Research reported that 2025 global PV shipments were approximately 856 GW—an increase of 11% from 2024, with half of the increase coming from China.
  - 98% of PV shipments were mono c-Si technology, with 60% TOPCon.
- Though margins rebounded in Q1 2026, most module, cell, and wafer manufacturers continued to operate at a loss due to oversupply and low global pricing.
- The United States manufactured approximately 31.3 GW_{dc} of PV panels in 2025 (+59%, y/y).
  - At the end of Q4 2025, the United States had a c-Si cell manufacturing capacity of 2 GW_{dc}.

Component Pricing

- Global PV polysilicon and wafer pricing dropped ~26% in the first 5 months of 2026, though pricing was flat y/y.
- Global PV cell pricing increased 20% in the first 5 months of 2026 (36%, y/y), and global PV module pricing increased 26% (29%, y/y) to \$0.11/W_{dc}.
- The U.S. solar supply chain, however, is only indirectly impacted by Chinese market conditions due to tariffs and other trade restrictions; module prices in the United States remained around \$0.27/W_{dc} at the end of May 2026.
  - Anza reported a price premium on PV modules that have a higher degree of domestic production.
  - Import value of PV modules decreased to \$0.18/W_{dc} in Q1 2026; however, tariffs are likely keeping the price-to-consumer at relatively steady levels.

U.S. PV Imports

- According to U.S. Census data, Q1 2026 module imports fell 34%, q/q, hitting only 4.4 GW_{dc}—a level not seen since the first half of 2022.
- According to U.S. Census data, the United States imported 3.6 GW_{dc} of PV cells in Q1 2026, a decline of 16%, q/q.

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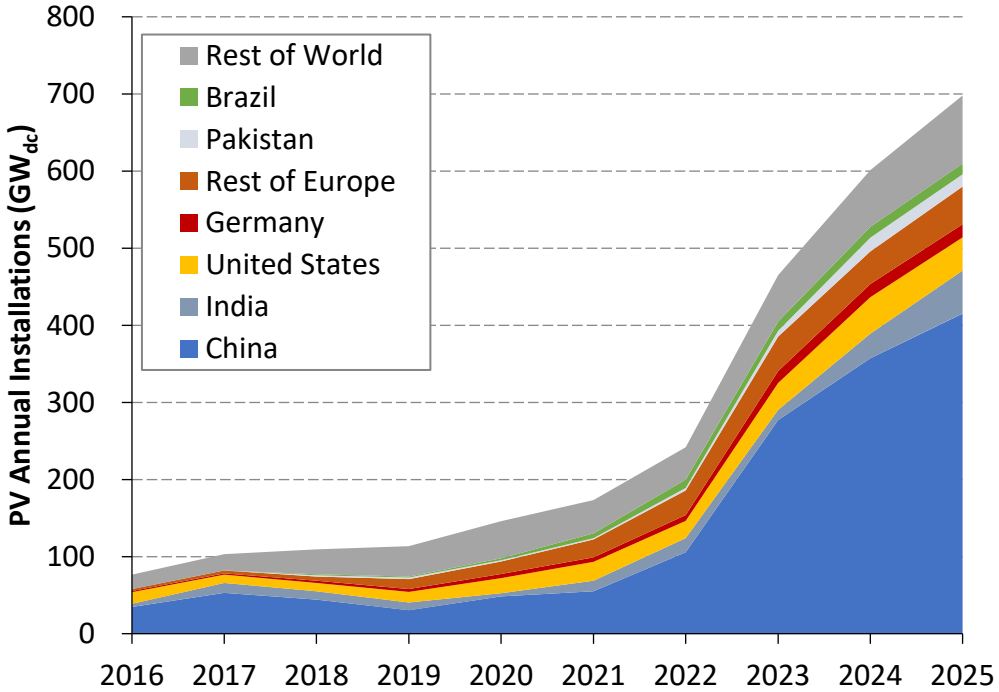
- The IEA reported India rose to second place in annual global PV deployment in 2025, with 56 GW_{dc} installed.
- At the end of 2025, global CSP capacity reached approximately 8 GW_{ac}, with virtually all installed CSP capacity (9 projects, totaling 900 MW_{ac}) located in China.

Global Annual PV Capacity Additions by Country



- From 2016 to 2025, global PV capacity additions grew from 75 GW_{dc} to 698 GW_{dc}.
  - In 2025, global PV installs increased 16%, y/y.
- The total cumulative installed capacity for PV reached 3.0 TW_{dc} at the end of 2025.
- China continues to dominate the global market, representing ~60% of 2025 installs, up 16%, y/y. The rest of the world was also up 16%, y/y.
- Thirty-nine countries installed at least 1 GW_{dc} of PV in 2025, and 26 countries had installed at least 10 GW_{dc} of cumulative capacity.

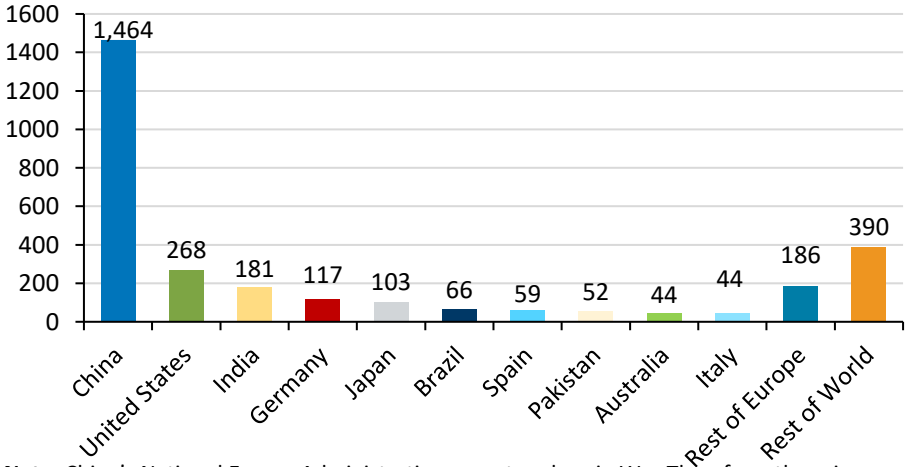
Note: China's National Energy Administration reports values in W_{ac}. Therefore, there is uncertainty in W_{dc} capacity due to differing assumptions on inverter loading ratio. Because of this uncertainty, IEA estimates that between 607 GW_{dc} and 698 GW_{dc} was installed in 2025.

Sources: IEA, Snapshot of Global PV Markets: 2026, April 2026; IEA, Trends in Photovoltaic Applications: 2025, October 2025.

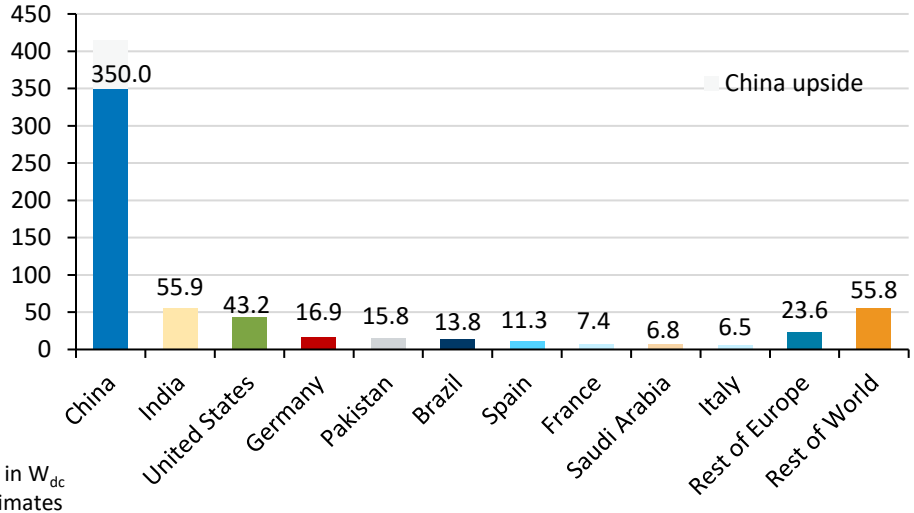
Top PV Markets

- In 2025, China, the EU, and the United States represented a smaller share (72%) of global annual PV installations, with newer markets, such as Pakistan, Brazil, and Saudi Arabia, representing a larger share.
- In the past 5 years, Pakistan and Brazil have each cumulatively installed 50 GW_{dc} of PV.
- Cumulative global deployment is expected to have passed 3 TW_{dc} in early 2026 after passing 1 TW_{dc} in early 2022.
- The IEA reports that, despite large growth in most major markets, the additional demand was not enough to absorb all new global manufacturing capacity.
- India, which climbed to second place for annual PV installations, reportedly installed 15.3 GW_{ac} in Q1 2026; the leading market, China, added 41.4 GW_{ac} in Q1 2026.

Cumulative PV Deployment—2025 (2,970 GW_{dc})



Annual PV Deployment—2025 (607 GW_{dc} to 698 GW_{dc})



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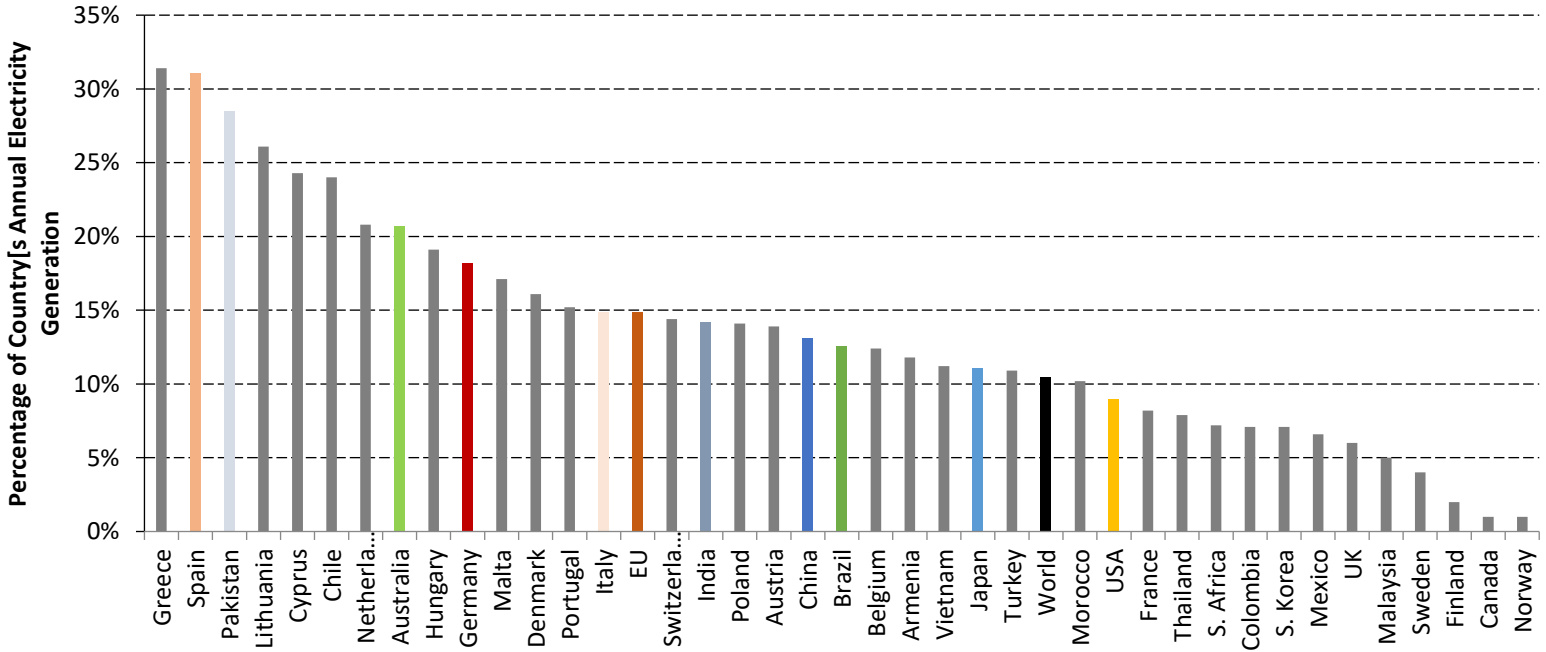
Sources: IEA, Snapshot of Global PV Markets: 2026, April 2026; IEA, Trends in Photovoltaic Applications: 2025, October 2025.

Global PV Penetration

- The IEA estimates that, in 2025, 10.5% of global electricity generation came from PV.

- The United States, despite being a large PV market, is below the global average of other markets in terms of PV generation as a percentage of total country electricity generation, with 9% of total generation represented by PV.
  - If California were a country, its PV contribution (37.5%) would be the highest.



Source: IEA, Snapshot of Global PV Markets: 2026, April 2026.

Chinese Market and Policy Update

Sources: BNEF, 1Q 2026 Global Market Outlook, Feb. 2026; BNEF, China's Five Year Plan Downplays Solar After Rapid Deployment, Mar. 2026; BNEF, China's Solar Power Generation Overtakes Wind for First Time, Feb. 2026; Ember, Chinese Solar Exports Double in a Month To Hit Record High Amid Energy Crisis, Apr. 2026; OPIS, China's Solar Export Rebate Cut Could Lift Prices, Spur Q1 Buying, Jan. 2026; PV Magazine, China's New Five-year Plan Deepens Shift Toward Focus on Renewables System, Mar. 2026; TaiyangNews, China Solar Demand Significantly Down in First 2 Months, Mar. 2026.

Changes in compensation policy are expected to reduce China's solar deployment in 2026.

- Developers raced to complete projects in the first half of 2025, before the country switched new wind and solar capacity from fixed to market-based compensation in June 2025.
- Solar generation exceeded wind generation for the first time in 2025, accounting for 11% of total generation.
- PV investment slowed in the second half of 2025 and in early 2026, as many developers paused to wait for new provincial policies and to formulate investment strategies under the new compensation rules.
- BNEF projects 16% lower deployment in 2026; the China Photovoltaic Industry Association projects a 24%–43% drop.

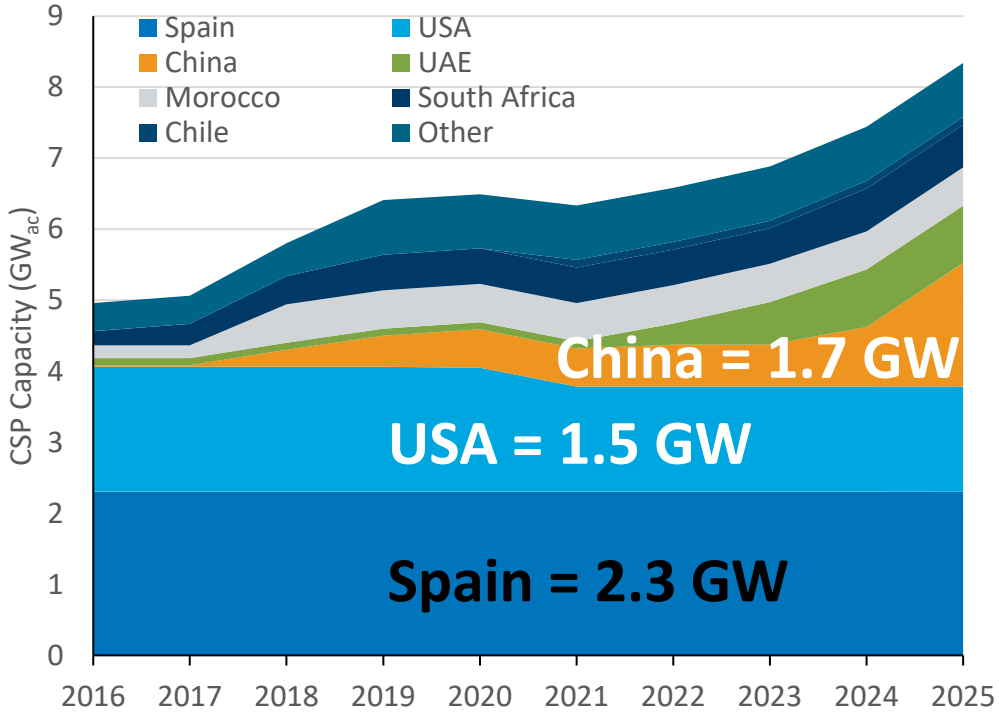
China emphasized system integration rather than solar targets in its most recent 5-year plan (covering 2026–2030).

- The plan set no targets for solar installation by 2030, instead setting targets for technologies including offshore wind, nuclear, pumped hydro, and zero-carbon industrial parks.
- Years of rapid solar expansion have increased curtailment and reduced developer returns, prompting a focus on system integration through strategies such as grid expansion, enhanced flexibility, and energy storage.
- Still, the plan prescribes clean power additions to meet electricity demand growth (e.g., from data centers).

China eliminated export tax rebates for PV products on April 1, which may raise prices paid by importing countries.

- The change is expected to add 9% to Chinese module costs.
- China's PV exports reached a record 68 GW_{dc} (including wafers, cells, and modules) in March owing to the impending rebate change plus other factors such as higher electricity prices in many places.

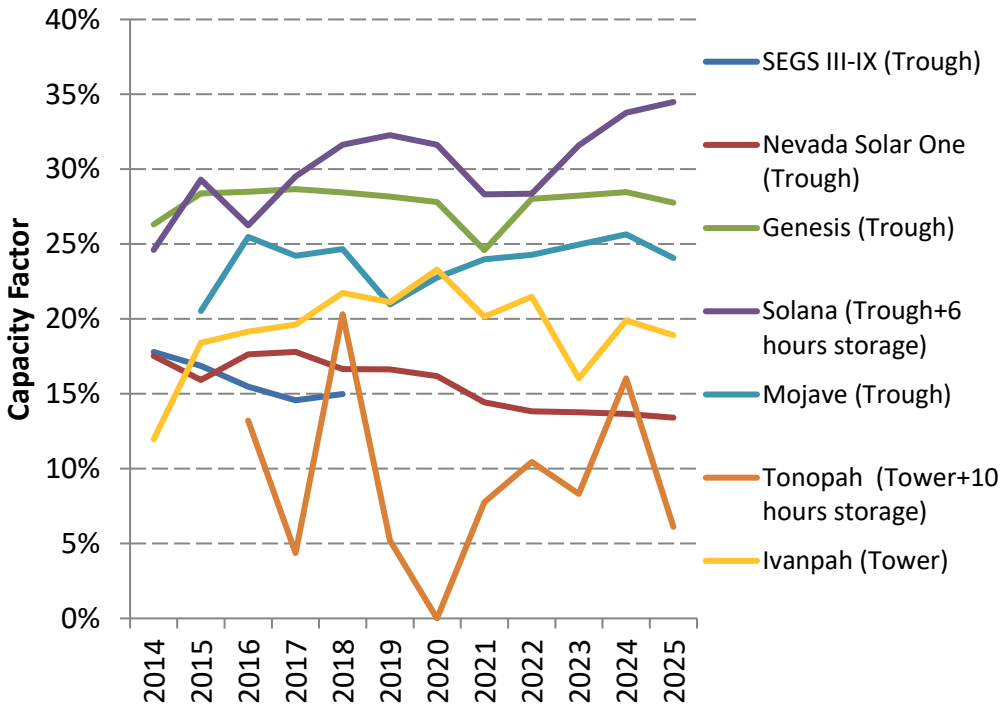
Global CSP Capacity (Operational)



- At the end of 2025, global CSP capacity reached approximately 8.3 GW_{ac}, with all new installed CSP capacity (9 projects, totaling 900 MW_{ac}) located in China.
- Spain continued to have the largest installed CSP capacity, at 2.3 GW_{ac}, with China overtaking the United States in 2025 as the second-largest market, with 1.7 GW_{ac}.
- CSTA reports that there are approximately 22 additional CSP projects under construction in China, totaling 2.8 GW_{ac}, and another 33 projects, totaling 4.2 GW_{ac}, that are planned or proposed.

Sources: International Renewable Energy Agency (IRENA), Renewable Capacity Statistics 2026, March 2026; Chinese Solar Thermal Alliance, Blue Book of China's Concentrating Solar Power Industry (2025), January 2026.

U.S. CSP Project Generation Performance, 2014–2025



- Over the past decade, since the LPO-funded CSP plants came online, performance has generally been more consistent for the trough plants than for those using tower technologies.
  - In 2024, Tonopah generated electricity in each month—a first since 2018. However, in 2025, Tonopah was in standby mode from January to May after a prior PPA expired, resuming under a brief PPA with Switch, before shutting down again in September and October 2025.
    - The owner of the plant filed for bankruptcy in January 2026.
  - Conversely, the trough-designed Solana plant (the other U.S. CSP plant with storage), achieved a record-high capacity factor in 2025.
  - Annual weather variation can cause some of the differences in annual production.
- Absolute capacity factor is not necessarily the best metric for performance, as plants can be designed and operated differently.

Source: EIA, Form 923, April 2026.

CSP Update—Ivanpah

- In 2025, PG&E and other energy offtakers of the Ivanpah CSP direct steam power towers, sought to end their PPAs 13 years early, citing lower-than-expected performance and pricing out-of-line with current market conditions.
- Its operational challenges were attributed to frequent cycling of the thermal power cycle caused by its lack of storage and the prevalence of lower-priced electricity from solar PV during periods of production.
- In December 2025, the CPUC rejected the proposal, citing the need for clean energy, rising electricity demand, and the loss of value in transmission investments.
- A new journal article proposes solving the dispute by replacing the steam-based receivers with molten salt receivers and connecting them to a molten salt thermal energy storage system—standard now for new CSP towers.
    - Most of the recent experience and supply chain in molten salt storage is currently in China. In addition to the dozens of 100-MW Chinese CSP plants installed with storage over the past few years, China is currently constructing a 2-GWht molten salt thermal energy storage system.

Thermal Storage Update

- At the end of 2025, Electrified Thermal Solutions commissioned its first commercial-scale thermal battery at Southwest Research Institute. The 20-MWh system charges with electricity from the grid, with a peak heat of 1,800°C.
- In May, U.S.-headquartered company Antora announced it was commissioning a 5-GWh, multiday thermal energy storage system at a biofuels production plant in South Dakota. The batteries store heat energy in blocks of solid carbon at temperatures up to 2,400°C.
- Solar Thermal World reported the commissioning of several medium-temperature solar collector systems in 2025 for industrial heat purposes. A Heineken brewery in Greece, for example, is currently constructing a 7.3-MW parabolic trough plant. In an oilfield wastewater treatment plant in New Mexico, a 100-kW linear Fresnel plant was constructed in 2025 to desalinate 70 barrels of water a day.

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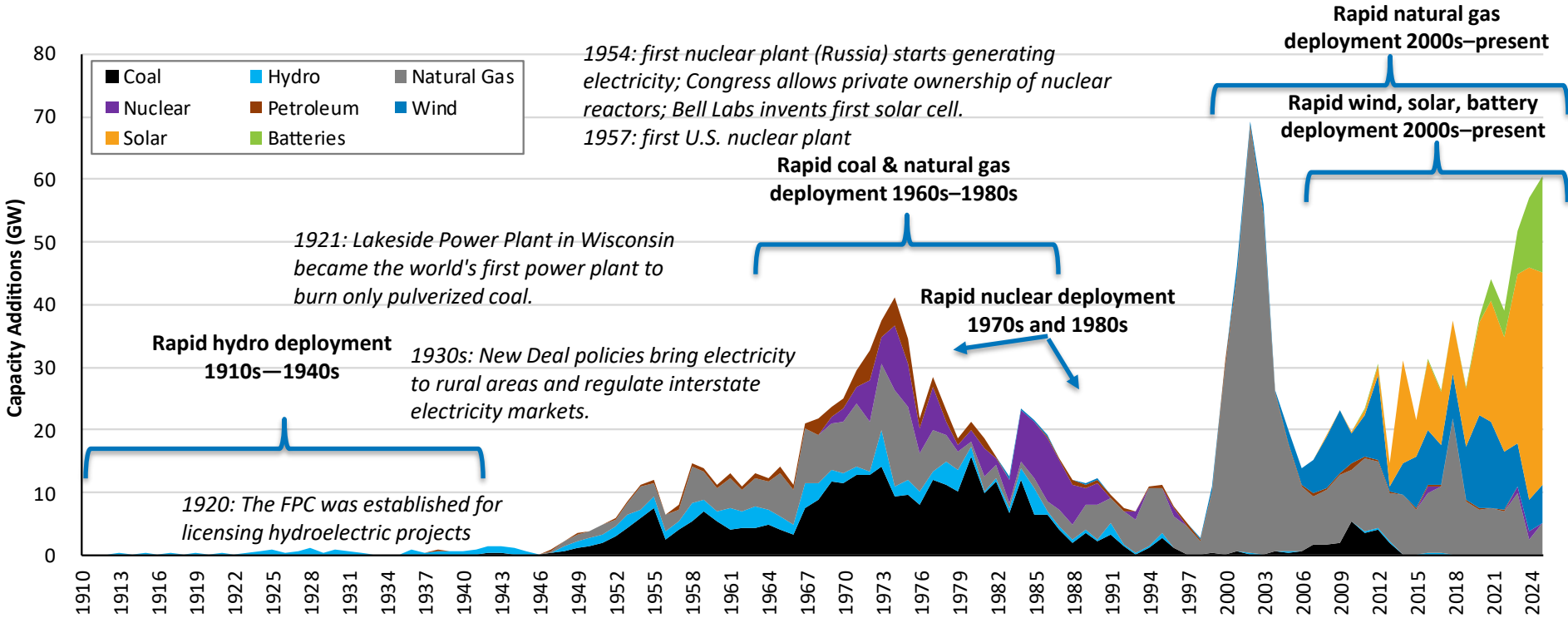
- **EIA reported that the United States installed 6.9 GW_{ac} of PV, 4.1 GW_{ac} of BESS, and 0.6 GW_{ac} of land-based wind capacity in the first quarter of 2026.**
- **At the end of 2025, solar was the second-largest source of U.S. generation capacity and the fourth-largest source of electricity generation.**
  - **In 2025, solar represented 15.7% of net summer capacity and 8.6% of annual generation.**
- **In 2025, 24 states and territories generated more than 15% of their electricity from solar and wind, with Iowa and South Dakota leading the way, with around 60%.**
- **LBNL reports that there were approximately 2,300 GW_{ac} of electric generation capacity actively seeking interconnection at the end of 2025, of which 773 GW_{ac} were solar, 749 GW_{ac} were storage, 253 GW_{ac} were natural gas, and 196 GW_{ac} were wind.**

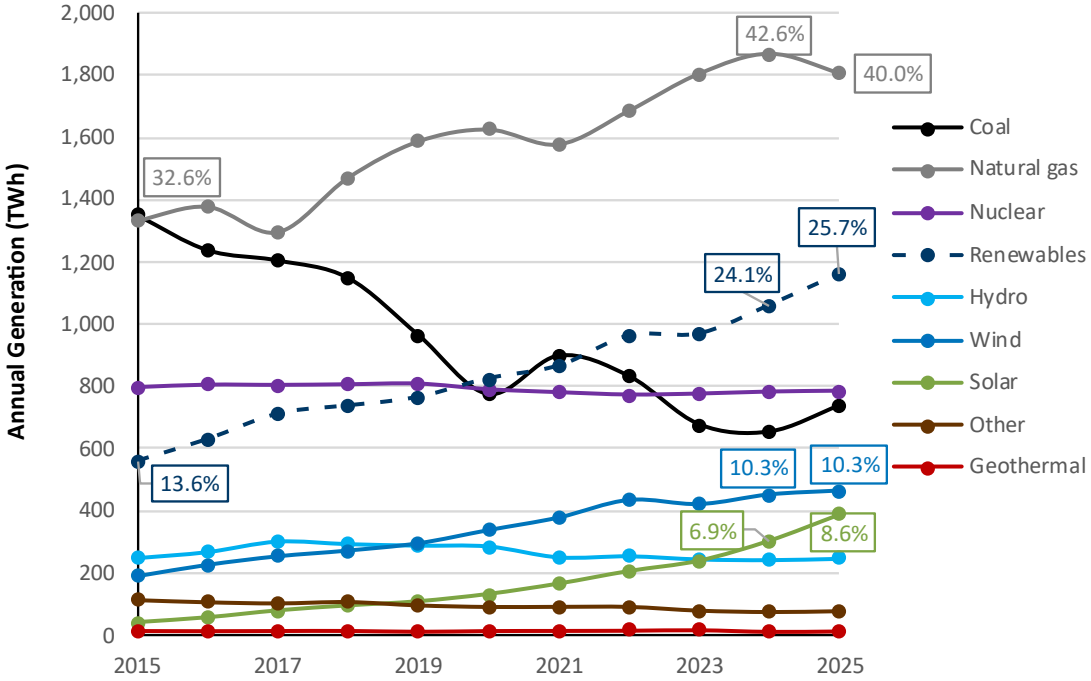
Historical Capacity Additions

The year 2025 had the second-highest level of new electricity generation capacity on record, with solar, batteries, wind, and natural gas leading the way. More U.S. electric generating capacity was installed from 2021 to 2025 than any 5-year period in history.



Sources: EIA,U.S installed capacity, Form 860; Electric Power Monthly (February 2026); EIA, Energy Kids.

U.S. Generation, 2015–2025



- In 2025, the United States generated 4,429 terawatt-hours (or 4.4 petawatt-hours) of electric power.
- Energy generation from renewables steadily increased, mostly because of increases in solar generation.
  - Renewable energy produced more than 1/4 of the electricity generated in the United States in 2025.

The drop in electricity generated by natural gas was made up for by the increase in electricity produced by coal.

  - Coal and natural gas facilities often compete within the electricity marketplace, and the 2025 change in production levels can be attributed to the increase in the price of natural gas.
    - The Henry Hub spot price increased from $2.18/MMBtu in 2024 to $3.52/MMBtu in 2025. A spike also occurred in 2021 and 2022.

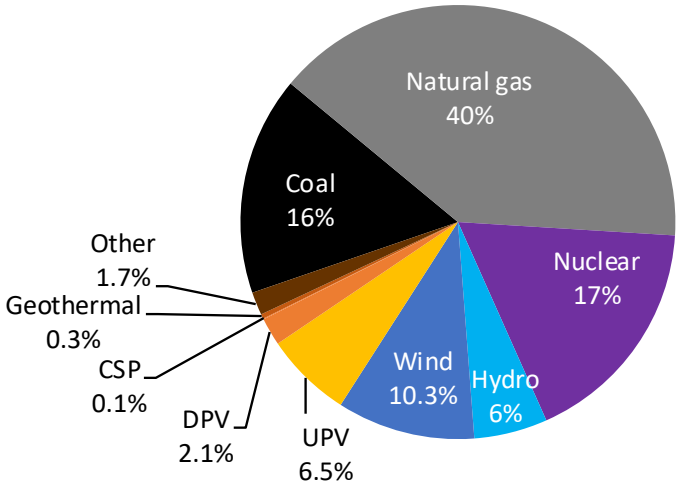
Sources: EIA, Electric Power Monthly, February 2026.

2025 U.S. Generation and Capacity

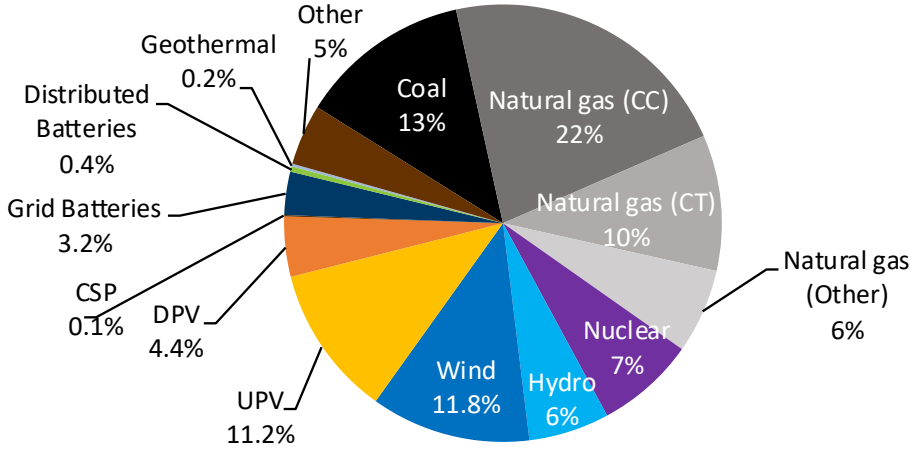
- In 2025, renewables represented 34% of U.S. electric generation capacity and 26% of generation.
  - Batteries represented an additional 4% of electric generation capacity.

- At the end of 2025, solar was the second-largest source of U.S. generation capacity, though the fifth-leading source of U.S. electric generation.
  - In 2025, solar represented 15.7% of net summer capacity and 8.6% of annual generation.
- Wind was the fourth-leading source of U.S. generation capacity and electric generation in 2025.
- Capacity is not proportional to generation, as certain technologies (e.g., natural gas) have lower capacity factors than others (e.g., nuclear).

2025 U.S. Generation (Total 4,523 TWh)



2025 U.S. Generation Capacity (Total 1.3 TW)

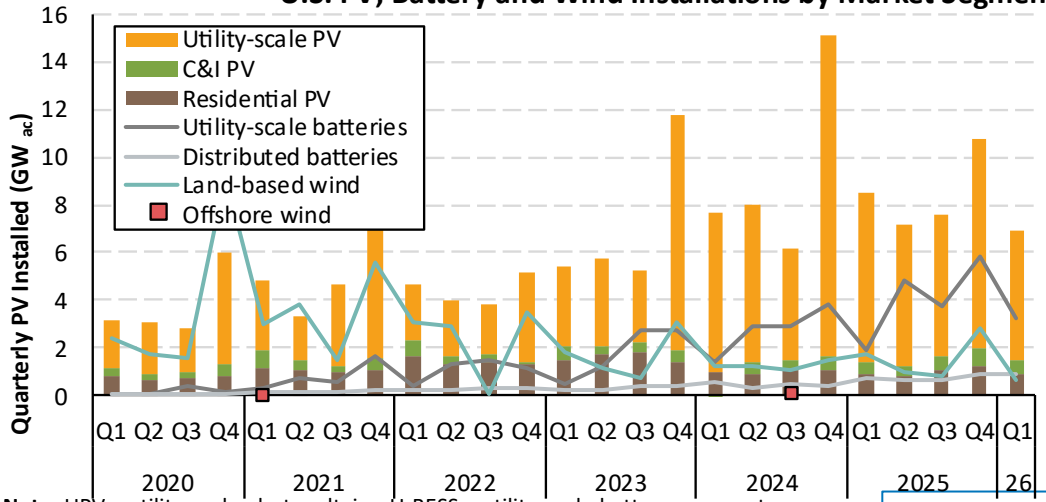


Sources: EIA, Electric Power Monthly, forms EIA-023, EIA-826, and EIA-861, February 2026.

U.S. Installation Breakdown Quarterly: EIA (GW_{ac})

- It is estimated that the United States installed 6.9 GW_{ac} of PV, 4.1 GW_{ac} of BESS, and 0.6 GW_{ac} of land-based wind capacity in first quarter of 2026.
  - Distributed PV and BESS were up 6% and 24%, y/y, respectively.
  - Utility-scale BESS was up 69%, y/y, while utility-scale PV and wind were down 23% and 65%, y/y, respectively. However, most large-scale projects are typically installed later in the year.

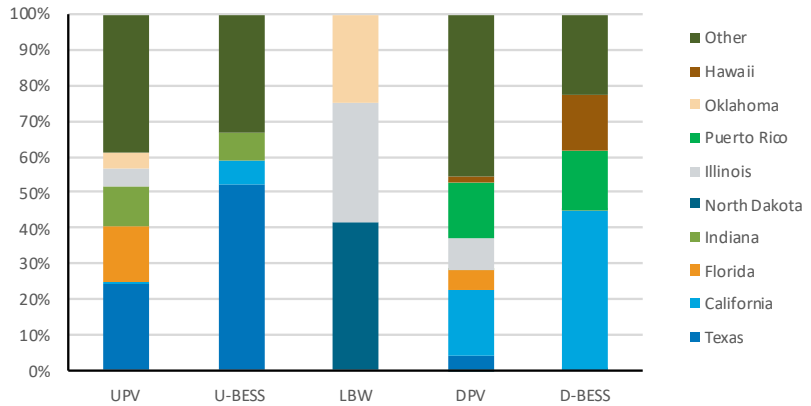
U.S. PV, Battery and Wind Installations by Market Segment



Note: UPV = utility-scale photovoltaics; U-BESS = utility-scale battery energy storage systems; LBW = land-based wind; DPV = distributed PV; U-BESS = utility-scale BESS.
Source: EIA, Electric Power Monthly, form EIA-861M, Feb. 2026.

- In Q1 2026, Texas continued to lead the way for large-scale PV and BESS, while California and Puerto Rico were the largest markets for distributed PV and BESS.
- Land-based wind installs occurred in North Dakota, Illinois, and Oklahoma in Q1 2026.

Percent of Technology Capacity Installed in Q1 2026, by State

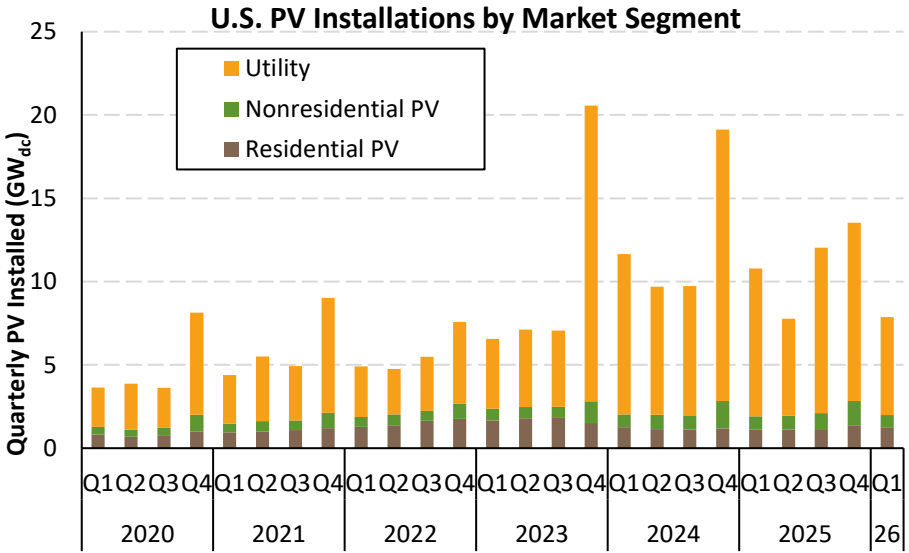


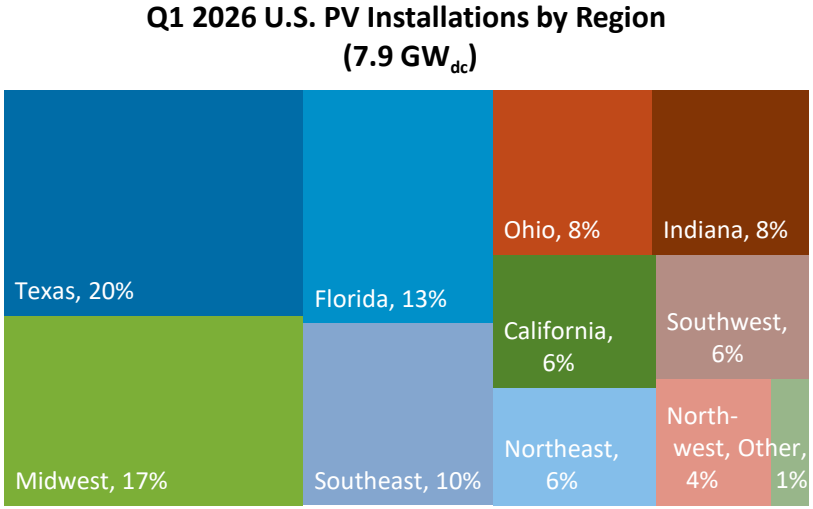
Click here to interactively view these data on Tableau Public.

U.S. Installation Breakdown Quarterly: SEIA (GW_{dc})

Unlike the previous slide, these values are in GW_{dc}—not GW_{ac}.

- Wood Mackenzie/SEIA reports 7.9 GW_{dc} of PV installations in first quarter of 2026—a decrease of 32%, y/y—largely from the 39% drop in utility-scale installations.
  - The distributed PV sector was relatively flat, despite the expiration of the 25D personal tax credit at the end of 2025 (previously available for homeowners installing solar and battery systems).
- SEIA reports that Texas continued to lead in PV deployment in Q1 2026, with California dropping to fifth. The Midwest, including Ohio and Indiana, installed approximately 1/3 of PV capacity over that time.

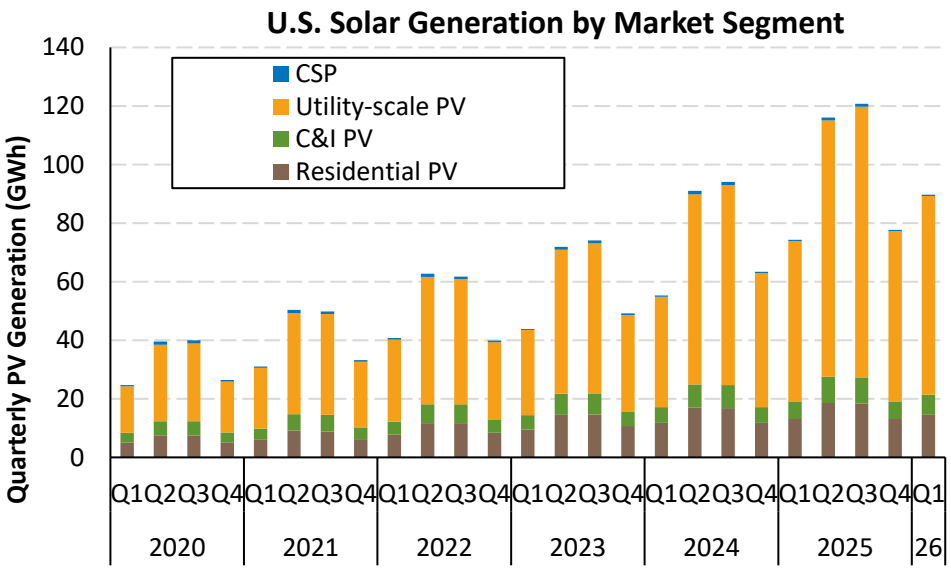




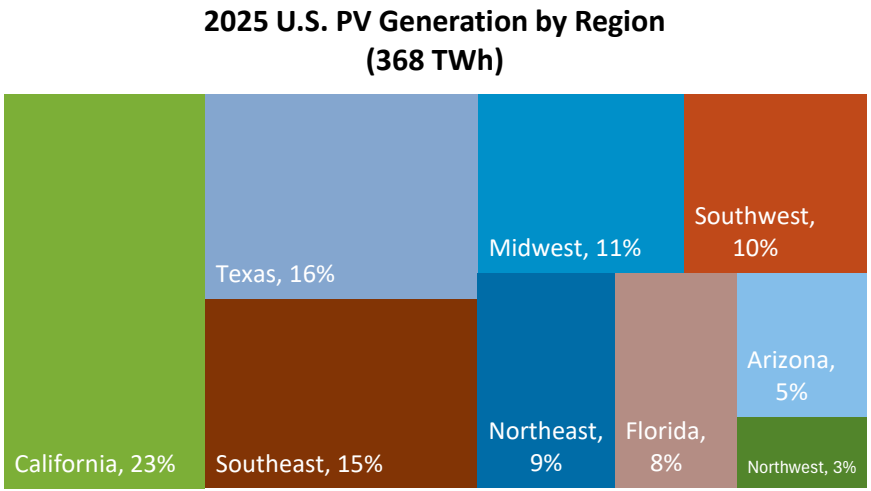
Note: (in chart at lower right) Midwest excludes Indiana; Southeast excludes Florida; Southwest excludes Texas and California.
Source: Wood Mackenzie/SEIA, US Solar PV Capacity: Q2 2026, May 2026.

U.S. Solar Generation Breakdown (Quarterly)

- The United States generated 90 TWh of solar generation in the first quarter of 2026, up 21%, y/y.
  - Utility-scale PV generation grew 24%, followed by C&I (14%), residential PV (11%), and CSP (6%).

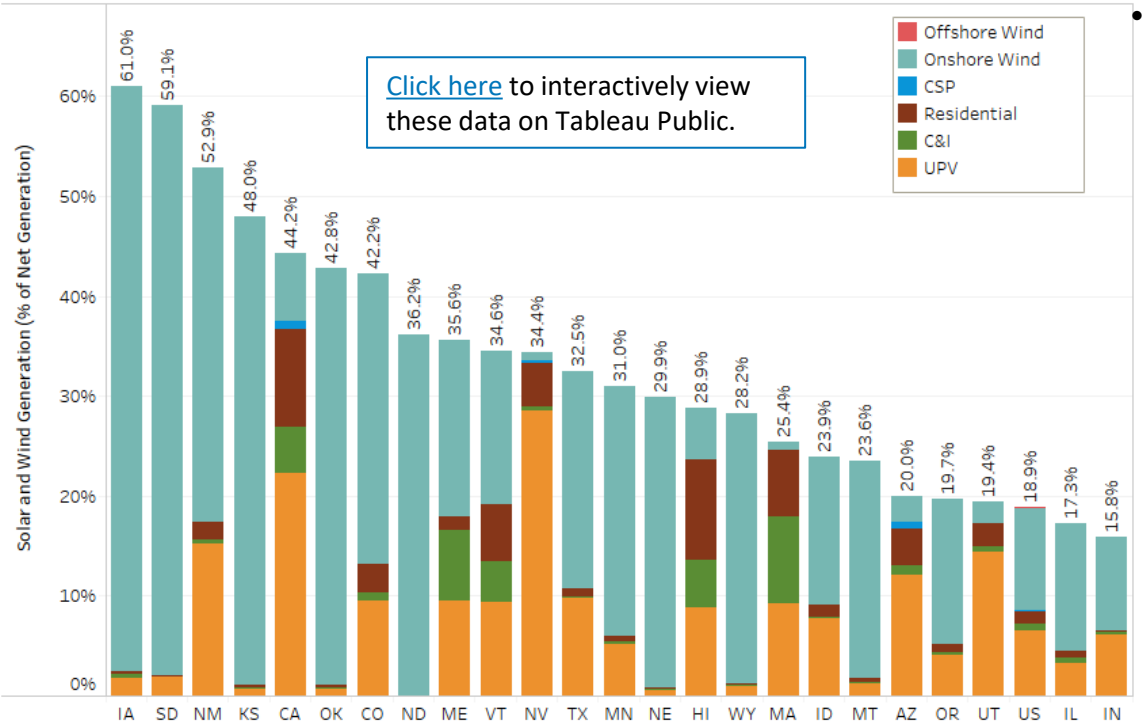


- In Q1 2026, more than half of PV generation occurred in California, Texas, Florida, and Arizona.
  - However, 18 states generated more than 1 TWh of electricity each from solar in Q1 2026.



Note: (in chart at lower right) Northwest includes Hawaii and Alaska.
Sources: EIA, Electric Power Monthly, forms EIA-023, EIA-826, and EIA-861, Apr. 2026.

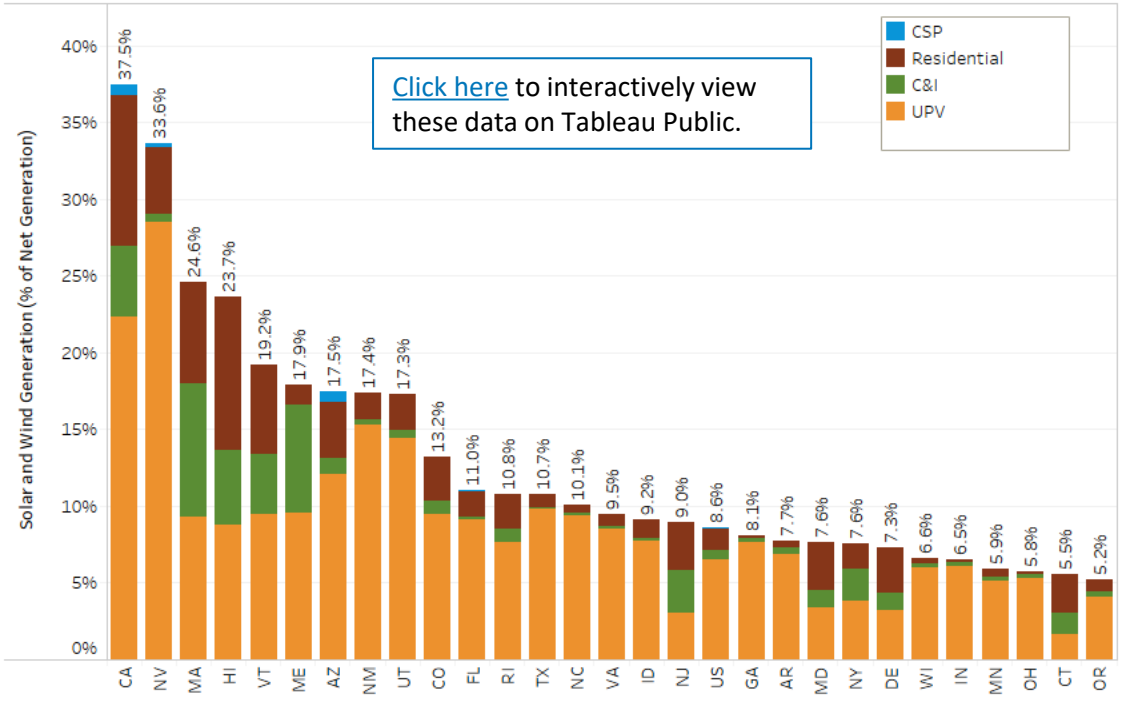
Solar and Wind Generation as a Percentage of Total Generation, 2025



- In 2025, 24 states and territories generated more than 15% of their electricity from solar and wind, with Iowa and South Dakota leading the way with approximately 60%.
  - Seven states (Iowa, South Dakota, New Mexico, Kansas, California, Oklahoma, and Colorado) generated more than 40% of their electricity using wind and solar.
  - Nationally, 18.9% of electricity was generated from solar and wind in 2025—up from 17.2% in 2024.

Sources: EIA, Electric Power Monthly, Short Term Energy Outlook.

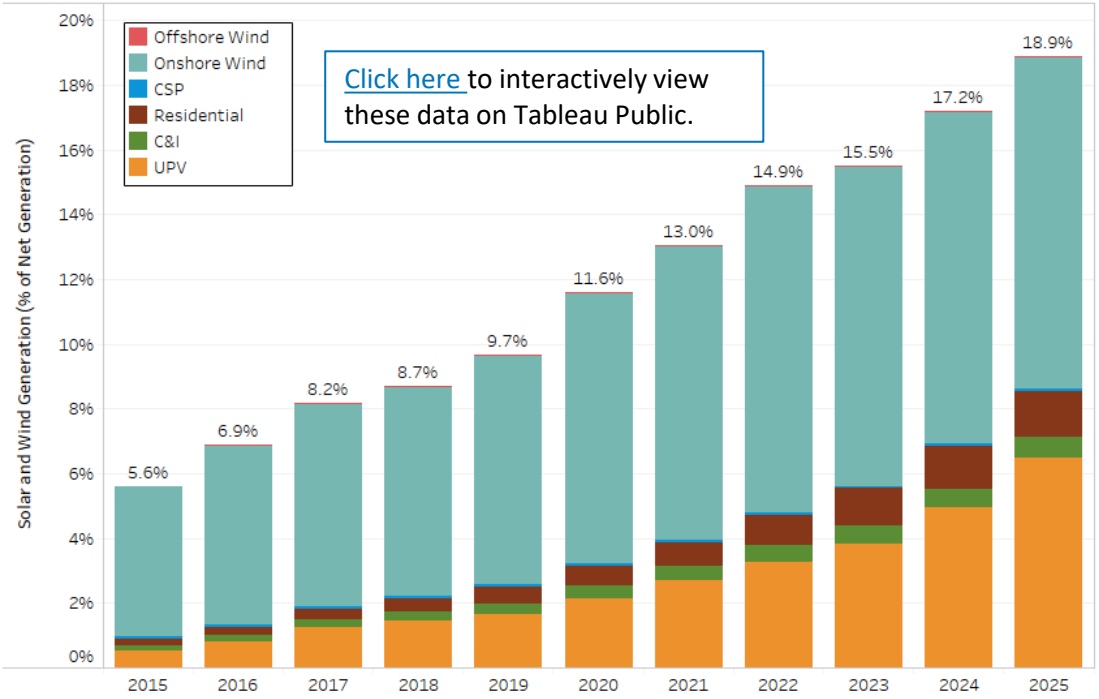
Solar Generation as a Percentage of Total Generation, 2025



- In 2025, 28 states and territories generated more than 5% of their electricity from solar (9 generating more than 15%), with California having the highest, at 37.5%.
  - Nationally, 8.6% of electricity was generated from solar in 2025—up from 6.9% in 2024.

Source: EIA, Electric Power Monthly, Short Term Energy Outlook.

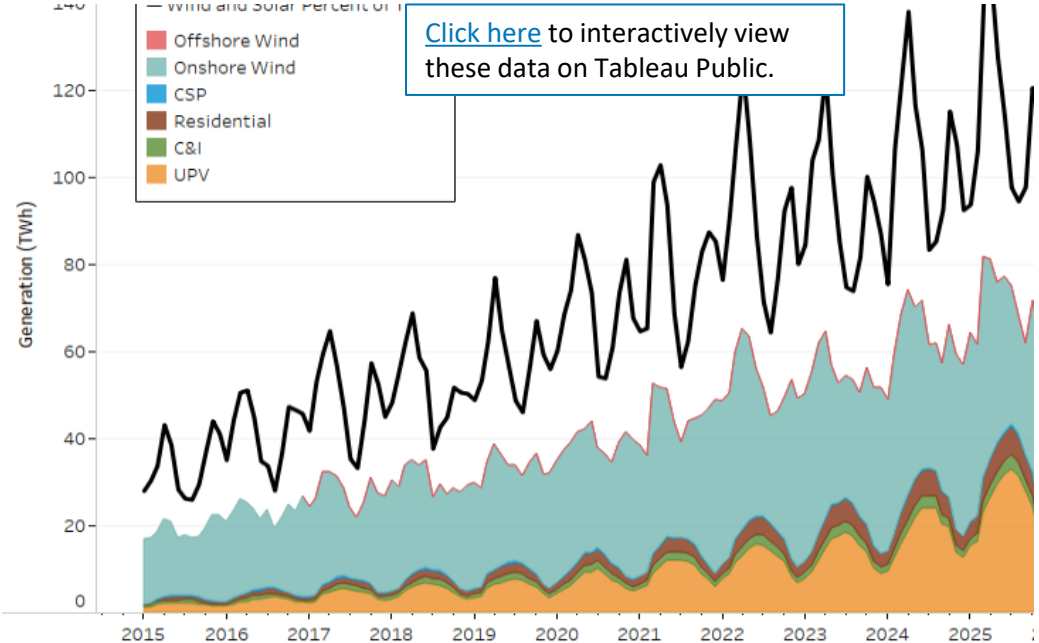
Solar and Wind Generation as a Percentage of Total Generation, 2015–2025



- In 2015, solar and wind energy produced approximately 5.6% of total U.S. electric generation (4.7% from wind and 0.9% from solar).
- By 2025, solar and wind grew to about 18.9% of electric generation.
  - 10.3% from wind, a 2-fold increase
  - 6.5% from utility-scale PV (UPV), a 12-fold increase
  - 2.1% from distributed PV (DPV), a 5-fold increase
  - 0.1% from CSP and 0.01% from offshore wind.

Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis. Therefore, a certain amount of solar and wind data has not yet been reported.
Source: EIA, Electricity Data Browser, accessed March 12, 2026.

Monthly U.S. Solar Generation, 2015–2025

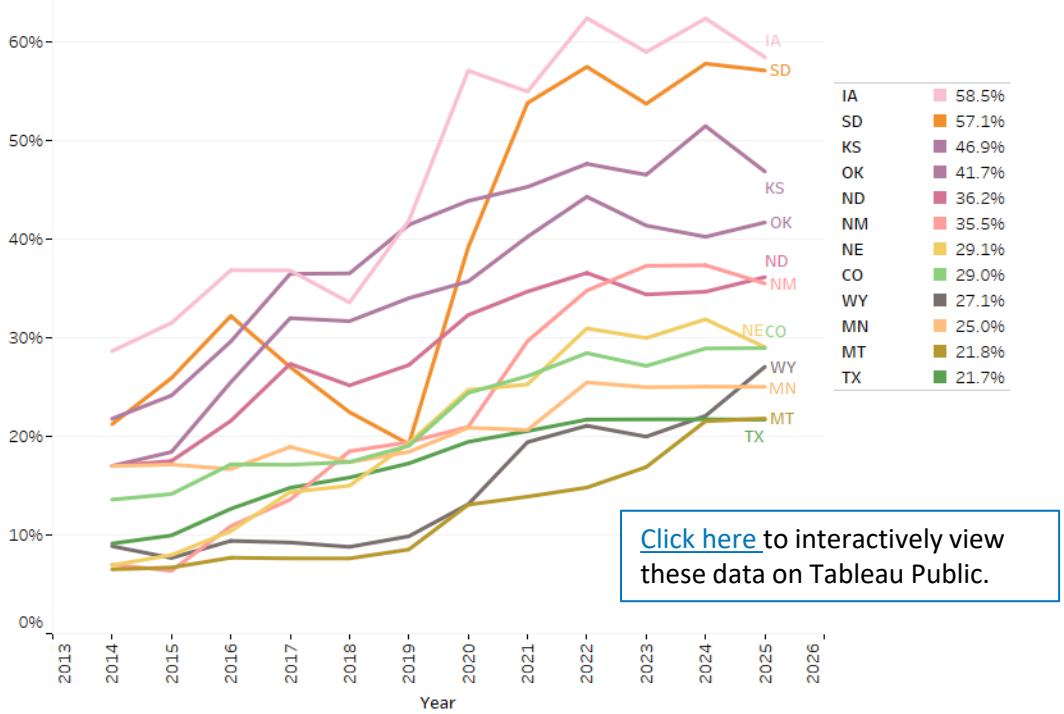


Click here to interactively view these data on Tableau Public.

- Total peak monthly U.S. solar and wind energy generation increased by a factor of 2 from 2015 to 2025.
  - The peak for U.S. solar increased by a factor of 10 between 2015 and 2025.
  - In April 2025, solar and wind energy accounted for 24.7% of all U.S. electricity production, while only representing 15.9% in August 2025.
- In 2025, the low-point in solar production was 51% below its peak; however, the low-point for both solar energy and wind energy was only 24% below their combined peak.

Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis. Therefore, a certain amount of solar data has not yet been reported.
Source: EIA, Electricity Data Browser, accessed March 12, 2026.

Wind Generation as a Percentage of Total Generation, 2014–2025



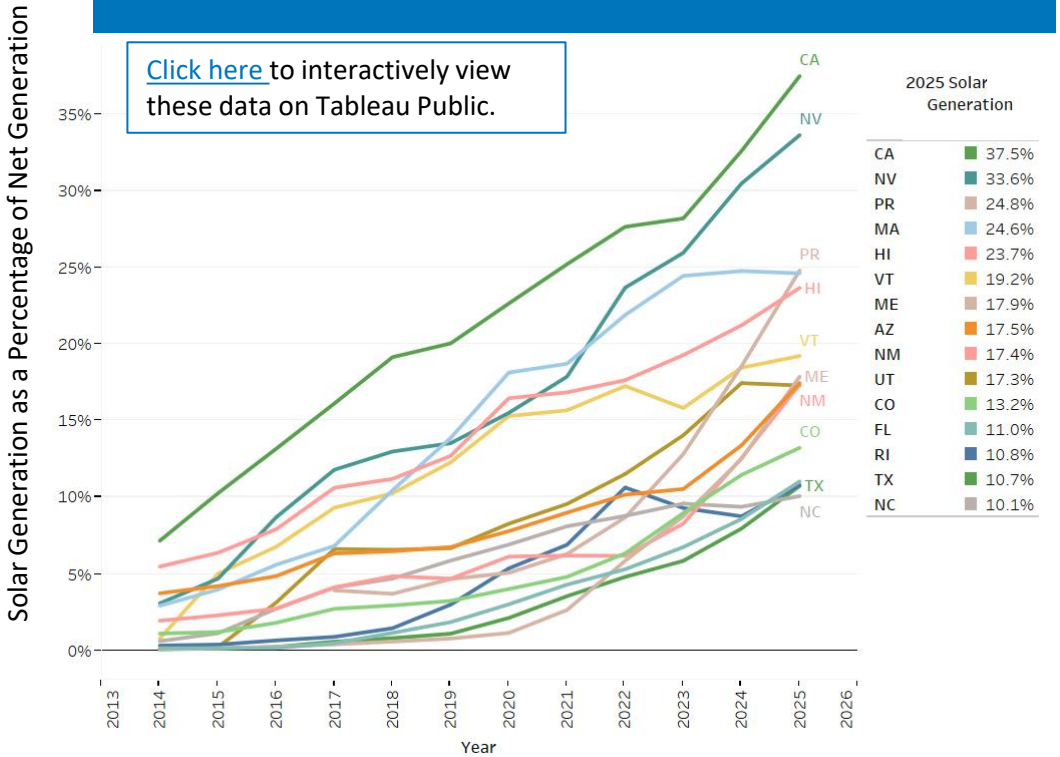
Click here to interactively view these data on Tableau Public.

- As depicted in the graph on the left, 12 states generated more than 20% of their electricity from wind in 2025. An additional five states (not shown) generated more electricity from wind than the United States as a whole (10.3%).
  - Iowa and South Dakota have substantially increased wind energy generation since 2014, going from 20% to 30% of net generation to close to 60%.
  - Texas also more than doubled its percentage of generation coming from wind over that time period, to 21.7%.

Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis, and therefore a certain amount of wind data has not yet been reported. Net generation does not include imports and exports to and from each state. Therefore, the percentage of wind consumed in each state may vary from its percentage of net generation. Some of the increase in some states is due to a reduction in total electricity production in the state.
Source: EIA, Electricity Data Browser, accessed June 6, 2026.

Solar Generation as a Percentage of Total Generation, 2014–2025

Click here to interactively view these data on Tableau Public.



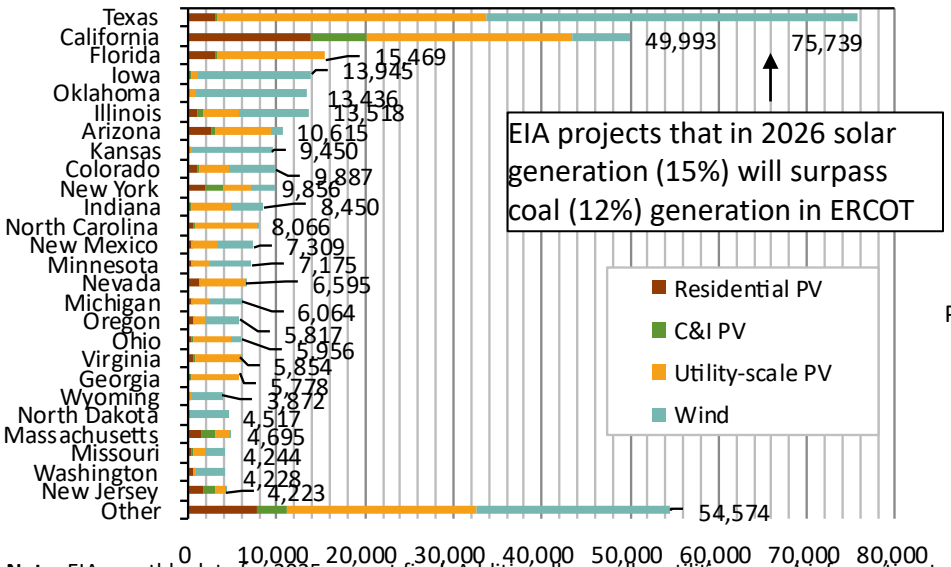
- As depicted in the graph on the left, 15 states and territories generated more than 20% of their electricity from solar in 2025. An additional three states (not shown) generated more electricity from solar than the United States as a whole (8.6%).
  - California and Nevada have substantially increased solar generation since 2014, going from 3% to 7% of net generation to around 35%.
  - Texas and Puerto Rico grew from around 1% and 5% in 2019 to 11% and 25% by 2025, respectively.

Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis, and therefore a certain amount of solar data has not yet been reported. Net generation does not include imports and exports to and from each state. Therefore, the percentage of solar consumed in each state may vary from its percentage of net generation. Some of the increase in some states is due to a reduction in total electricity production in the state.
Source: EIA, Electricity Data Browser, accessed June 6, 2026.

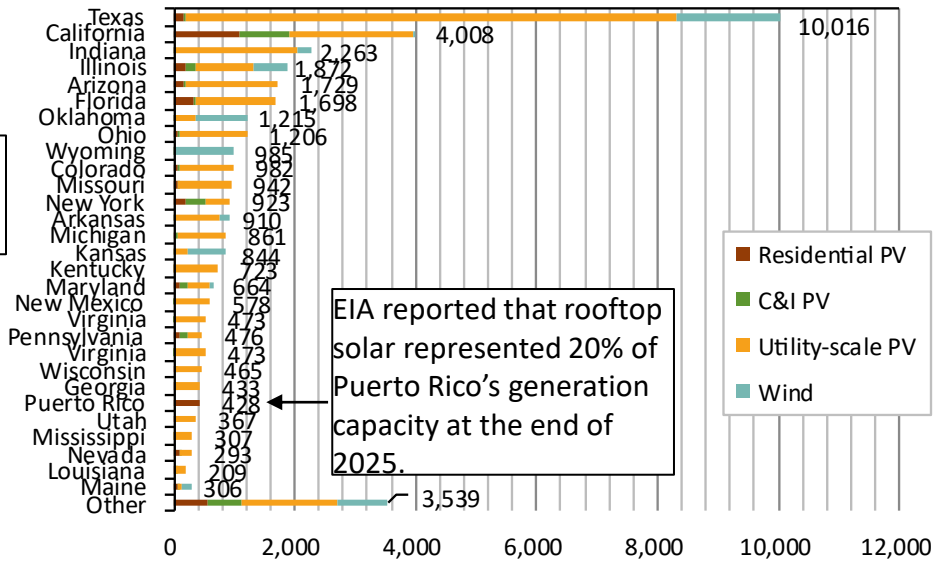
U.S. Installation Breakdown by State

- At the end of 2025, there were 369.3 GW_{ac} of wind and solar PV systems in the United States (including Puerto Rico), of which 158.4 GW_{ac} were wind energy, 150.0 GW_{ac} were utility-scale PV, 41.9 GW_{ac} were residential PV, and 19.0 GW_{ac} were C&I PV.
- In 2025, Texas installed more than 10 GW_{ac} of solar and wind energy systems, and California installed more than 4 GW_{ac}.

Cumulative PV and Wind Capacity Installed as of December 2025 (MW_{ac})



PV and Wind Capacity Installed in 2025 (MW_{ac})

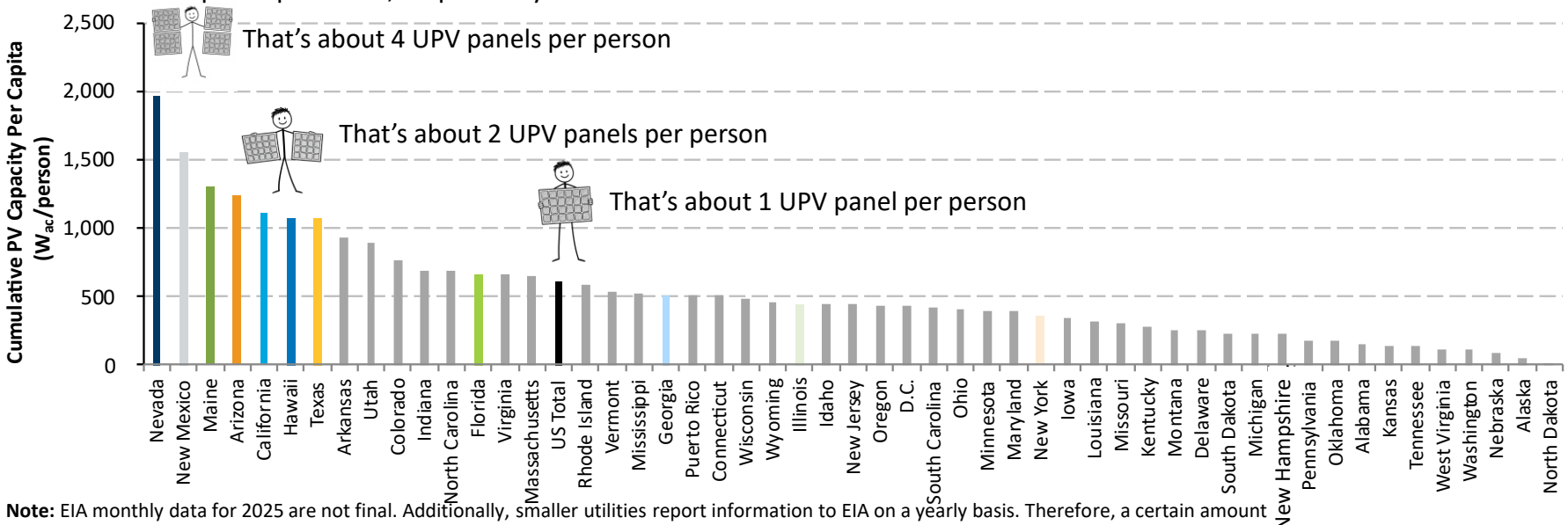


Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis. Therefore, a certain amount of solar data has not yet been reported. Virginia's and New Mexico's C&I installations in 2025 were net negative.

Sources: EIA, Electric Power Monthly, forms EIA-023, EIA-826, and EIA-861, February 2026; LUMA, Transmission and Distribution Quarterly Metrics; EIA, Electricity Generation From Solar Could Exceed Coal in ERCOT for the First Time in 2026, May 2026; Rooftop Solar Photovoltaic Systems Account for 20% of Puerto Rico's Capacity Mix, April 2026.

Cumulative U.S. PV Capacity Per Capita (2025)

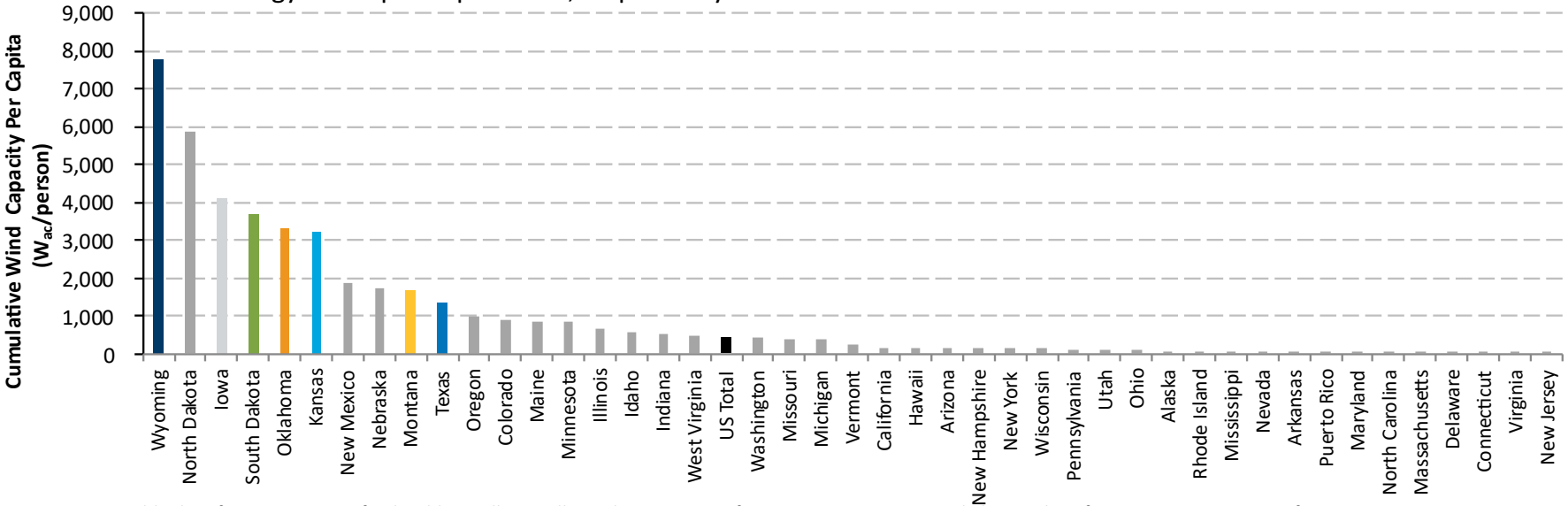
- Some large state PV markets rank high in cumulative capacity and a watts-per-capita basis, such as Nevada, Arizona, California, Texas, and Florida. Other large state PV markets that rank high in cumulative capacity, such as New York (#7), Georgia (#8), and Illinois (#10), are lower in the rankings when looking on a watts-per-capita basis (New York drops to #32, Georgia to #18, and Illinois to #23).
  - Conversely, New Mexico, Maine, and Hawaii, which ranked at #16, #24, and #31 in cumulative PV capacity, are #2, #3, and #6 on a PV watts-per-capita basis, respectively.



Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis. Therefore, a certain amount of solar data has not yet been reported. **Sources**: EIA, Electric Power Monthly, forms EIA-023, EIA-826, and EIA-861, February 2026; U.S. Census Bureau, State Population Totals and Components of Change: 2020-2025, December 2025.

Cumulative U.S. Wind Capacity Per Capita (2025)

- Iowa, Oklahoma, Kansas, and Texas are all in the top ten in terms of cumulative wind capacity and watts per capita. Illinois (#5) and California (#6) rank high in terms of cumulative wind energy capacity but fall to #15 and #23, respectively, in terms of watts of wind energy per capita.
  - Conversely, Wyoming, South Dakota, and Montana, which ranked #10, #16, and #20 in cumulative PV capacity, are #1, #4, and #9 on a wind energy watts-per-capita basis, respectively.



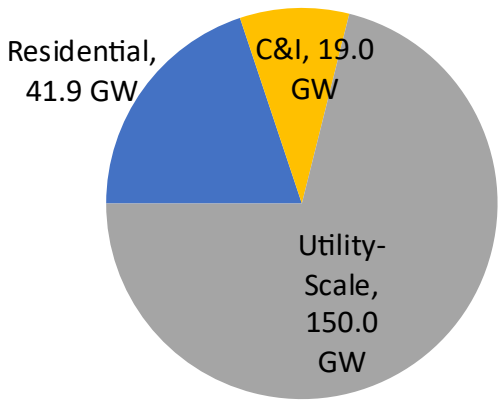
Note: EIA monthly data for 2025 are not final. Additionally, smaller utilities report information to EIA on a yearly basis. Therefore, a certain amount of solar data has not yet been reported. **Sources**: EIA, Electric Power Monthly, forms EIA-023, EIA-826, and EIA-861, February 2026; U.S. Census Bureau, State Population Totals and Components of Change: 2020-2025, December 2025.

U.S. PV Installation Breakdown Annual: EIA (GW_{ac})

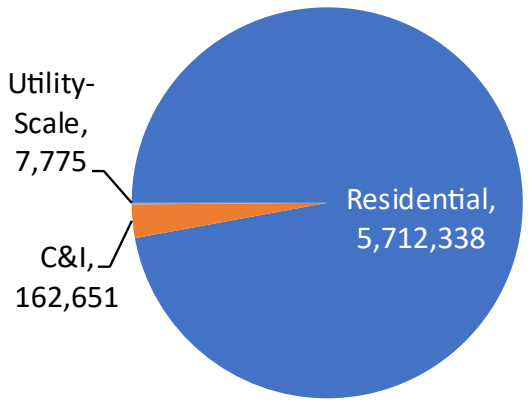
- At the end of 2025, there were 210.9 GW_{ac} of cumulative U.S. PV installations (including Puerto Rico).
- EIA reports that at the end of 2025, 71% of U.S. installed PV capacity was from utility-scale PV systems.

- Despite representing only 20% of installed U.S. PV capacity at the end of 2025, 97% of PV systems—more than 5.9 million systems—were residential applications.
  - In 2025, the United States installed 479,000 PV systems, of which 467,000 were residential (−15%, y/y), 11,000 were C&I (−15% y/y), and 595 were utility-scale (−19%, y/y).

Cumulative U.S. PV Installations as of December 2025 (210.9 GW $_{ac}$)



Cumulative U.S. PV Installations as of December 2025 (5.9 million systems)

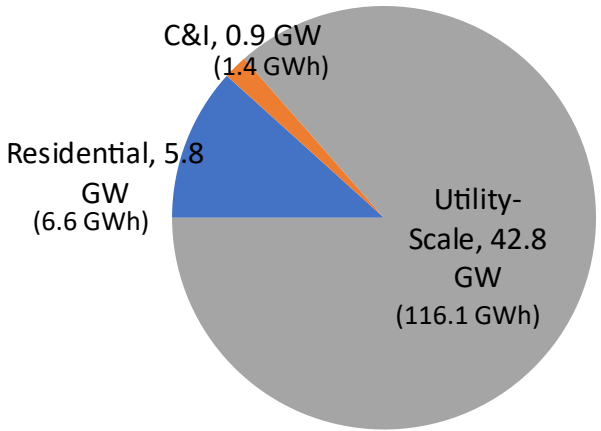


Sources: EIA, Electric Power Monthly, forms EIA-860, and EIA-861, April 2026; LUMA, Transmission and Distribution Quarterly Metrics.

U.S. BESS Installation Breakdown Annual: EIA (GW_{ac})

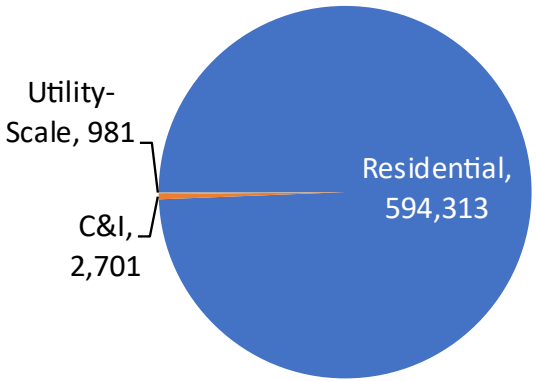
- EIA reports that, at the end of 2025, there were 49.5 GW_{ac} (124.0 GWh) of cumulative U.S. battery energy storage installations.
- EIA reports that, at the end of 2025, 86% of U.S. installed battery energy storage capacity was from utility-scale BESS systems.

Cumulative U.S. BESS Installed Capacity as of December 2025 (49.5 GW $_{ac}$/124.0 GWh)



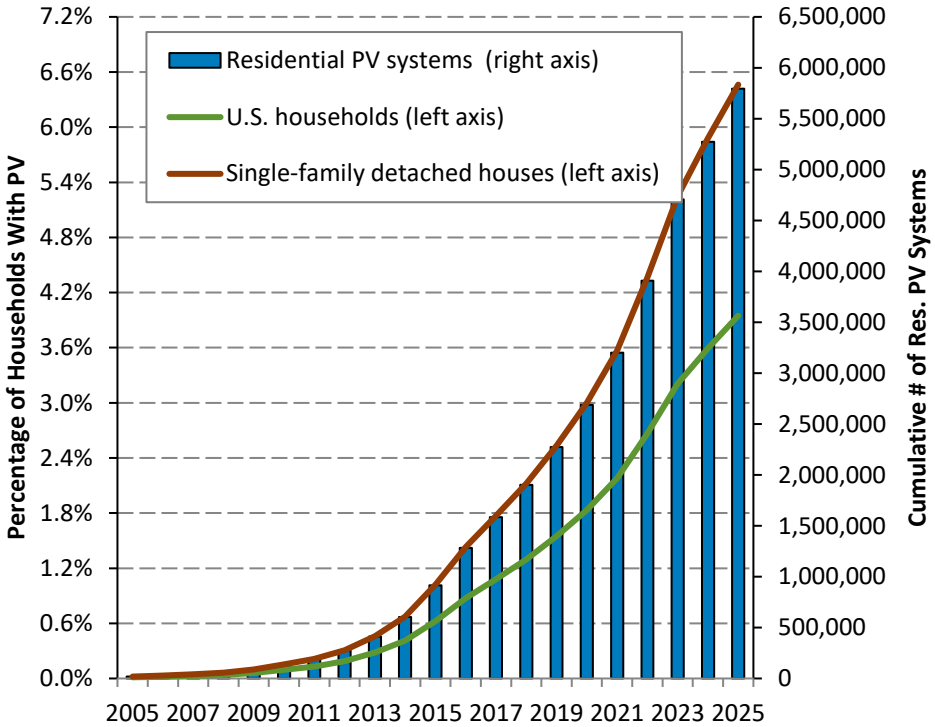
- Despite representing only 12% of installed U.S. battery energy storage capacity at the end of 2025, 99% of battery systems—almost 600,000 systems—were residential applications.
  - Virtually all distributed BESS systems and most utility-scale BESS are co-located with PV.
  - EIA reports that in 2025, the United States installed 181,000 BESS systems (+26%, y/y), of which 180,000 were residential, 600 were C&I (+16%, y/y), and 200 were utility-scale (−18% by number of systems, but +35% by capacity).

Cumulative U.S. BESS Installations as of December 2025 (~598,000 systems)



Sources: EIA, Electric Power Monthly, forms EIA-860, and EIA-861, April 2026; LUMA, Transmission and Distribution Quarterly Metrics.

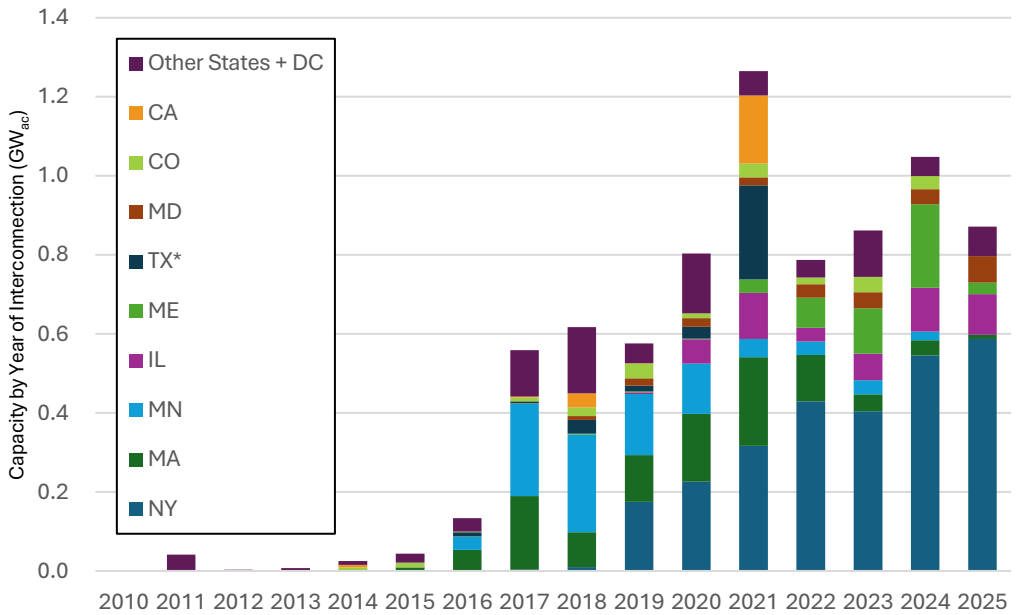
U.S. Residential PV Levels



- From 2005, when Congress passed the investment tax credit, to 2025, when the tax credit expired, the number of annually installed residential PV systems grew by approximately 24% per year, or more than 77 times.
  - 2025 U.S. residential PV installations were 35% less than 2023 installs.
- SEIA estimates that at the end of 2025, there were approximately 5.8 million residential PV systems in the United States.
  - Only 3.9% of households own or lease a PV system (or 6.5% of households living in single-family detached structures).
  - However, solar penetration varies by location. Hawaii, California, and Arizona have residential systems on an estimated 40%, 27%, and 15% single-family detached homes, respectively.

Sources: SEIA/Wood Mackenzie, Solar Market Insight 2025 Year in Review, March 2026; U.S. Census Bureau, U.S. Households, accessed date May 12, 2026; IREC, U.S. Solar Market Trends 2009, July 2010.

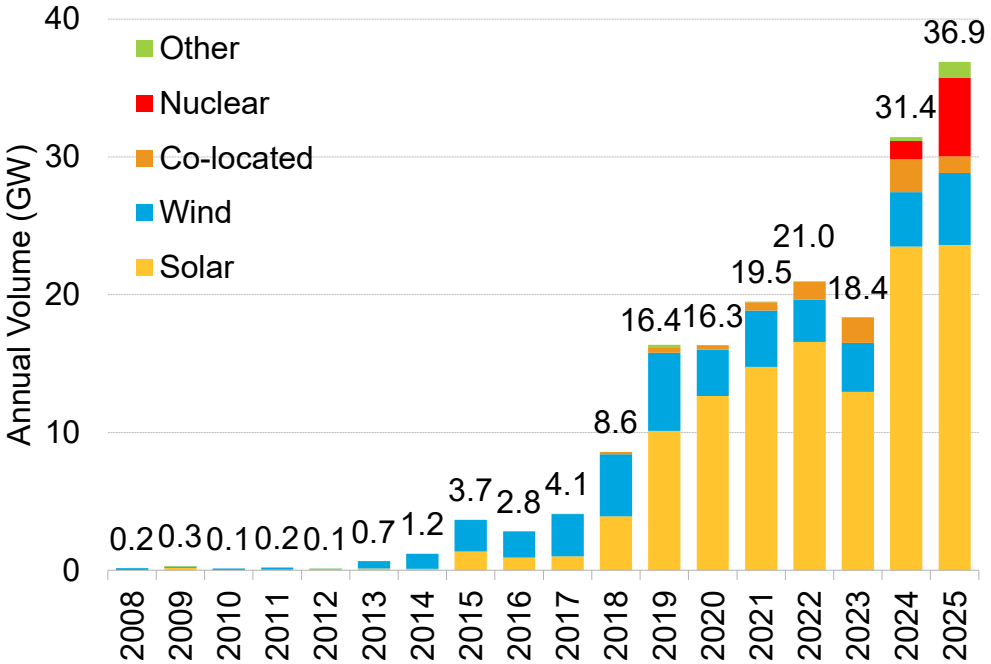
Community Solar



- Cumulative community solar capacity topped 7.6 GW_{ac} in 2025, with 0.9 GW_{ac} interconnected in 2025.
  - NLR's "Sharing the Sun" tracks an additional 3.9 GW_{ac} of large-scale PV projects in Florida in which utilities offer voluntary subscriptions. There were 1.3 GW_{ac} of these projects reported in 2024 but none in 2025.
  - Maine, the third-leading market in 2024 shrunk 86% as December 31, 2024, was the deadline for mid-sized projects to be grandfathered into previous net-metering program. In June 2025, Maine enacted a law that prohibits front-of-the-meter solar from net billing and introduced new fees on existing community solar facilities.
  - Other markets collectively shrunk 17% between 2024 and 2025, though New York, which represented 67% of 2025 U.S. community solar installations, increased 8%, y/y.
- NLR has tracked an additional 1.1 GW_{ac} of community solar projects under development, with most of it in New York, Maryland, and New Jersey.

Note: Community solar refers to any solar project or purchasing program, within a geographic area, in which the benefits flow to multiple customers, such as individuals, businesses, nonprofits, and other groups. In most cases, customers benefit from energy generated by solar panels at an off-site array.
Source: NLR, Sharing the Sun Solar Project Data (January 2026), accessed May 2026.

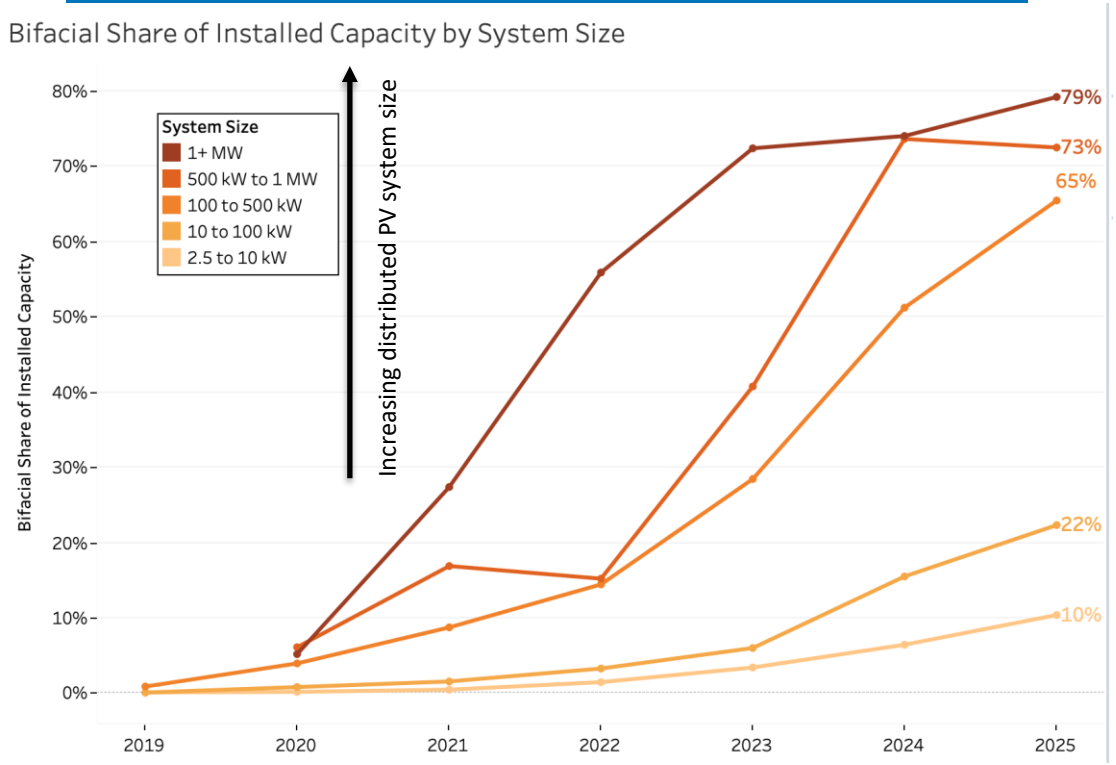
U.S. Corporate Solar PPAs



- U.S. corporate solar contracts were up 17% in 2025, y/y, due to peak levels of wind, solar, and nuclear.
  - The United States represented approximately 58% of the global corporate PPA market in 2025, followed by Spain, Australia, and India.
  - Meta was the largest contractor of PPAs in 2025, with 10.1 GW, followed by Amazon, which contracted half its supply from an existing nuclear plant (Susquehanna Nuclear power plant).
    - Amazon's agreement also included future deployment of small modular nuclear reactors for additional power supply.
  - BNEF attributes data center demand with being the driver of increases in corporate PPA volume as well as the impetus for contracts with an expanded set of technologies.

Source: BNEF, Corporate PPA Deal Tracker, accessed April 2026.

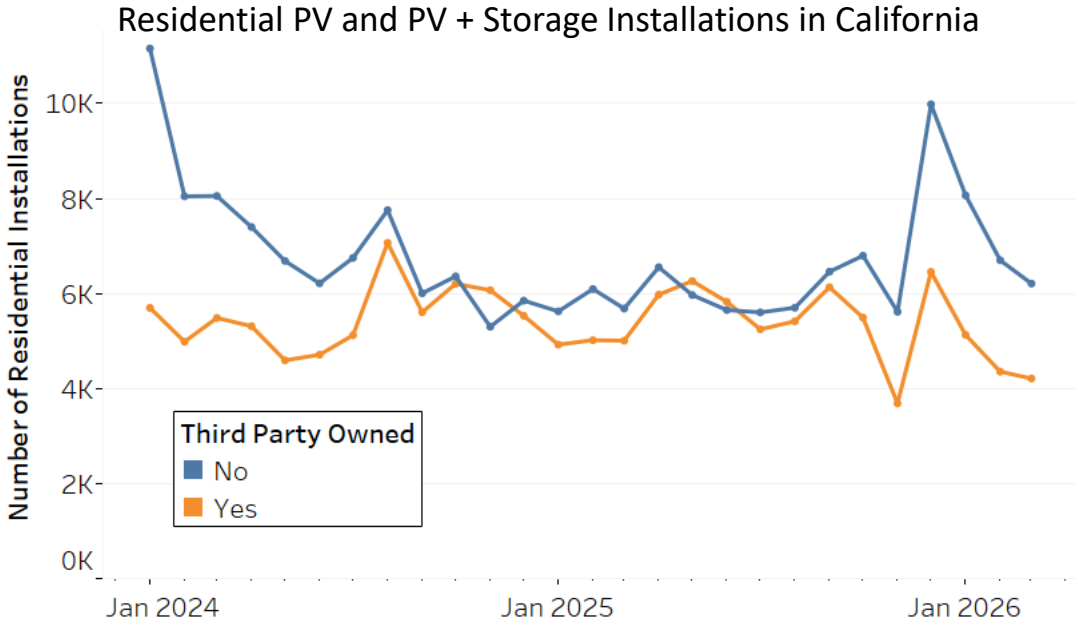
Bifacial Module Surge in Large Distributed PV Systems



- The share of bifacial modules grew in California and New York's distributed PV systems from 2020 to 2025:
  - From 0% of capacity in 2020 to 10% of capacity in 2025 for systems 2.5–10 kW_{dc}
  - From 1% to 22% for systems 10–100 kW_{dc}
  - From 4% to 65% for systems 100–500 kW_{dc}
  - From 6% to 73% for systems 500 kW_{dc} to 1 MW_{dc}
  - From 5% to 79% for systems 1–5 MW_{dc}.
- Ground-mount and flat-roof nonresidential PV installations can provide bifacial energy gain, but typical sloped residential rooftop installations do not provide bifacial gain.
- Installers may have used bifacial modules to avoid tariff-related module costs. Bifacial modules were exempted from Section 201 tariffs starting in June 2019 and ending in June 2024.
- These distributed PV data do not include utility-scale PV projects, which are the primary application for bifacial modules.

Note: Bifacial modules are defined as having the term "bifacial" in the description field in the California Energy Commission's PV Module List.
Sources: California Distributed Generation Statistics, CA NEM database, April 2026; Data.NY.gov, Solar Electric Programs Reported by NYSERDA: Beginning 2000, April 2026; Solar Power World, Bifacial Solar Panels Are Once Again Exempt From Section 201 Tariffs, November 2021; DOE, Solar Futures Study, September 2021.

Residential PV Market Reacts to Tax Credit Expiration



Data are for residential PV and PV-plus-storage systems in California between 2.5 and 10 kW_{dc}.

Sources: California Distributed Generation Statistics, Distributed Generation Interconnection Program Data, Interconnected Project Sites Data Set, Apr. 2026; PV Magazine, Aurora Solar Releases 2026 Solar Snapshot Report Detailing Shift Toward Third-Party Ownership, Mar. 2026; PV Magazine, US Residential Solar Set for 33% Decline in 2026, Says Roth Capital Partners, Mar. 2026; PV Magazine, Prepaid Rooftop Solar Model Targets 40% Tax Credits, Mar. 2026; PV Tech, US Residential Solar Enters Post-incentive Era After ITC Expiry Surge, Mar. 2026; Utility Dive, Sunrun Saw Steep Sales Drop in Q1 With End of Solar Tax Credit, Tariffs, May 2026.

Residential PV installations surged in late 2025 as homeowners sought to claim the 30% investment tax credit (ITC) before it expired on December 31.

- EnergySage reported a 205% increase in homeowners working with PV installers in the second half of 2025.
- California installations in December 2025 were up 71%, y/y, for host-owned systems and 17% for third-party-owned (TPO) systems.

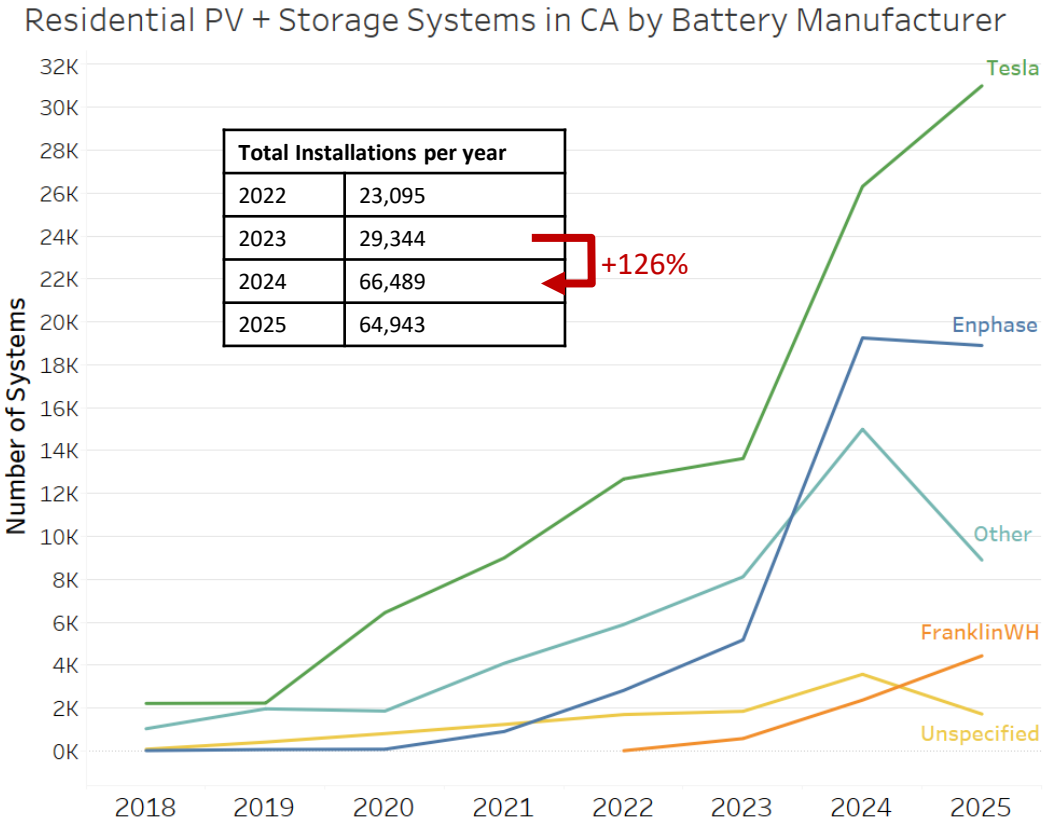
Residential PV installations are likely to fall in 2026.

- Roth Capital expects residential PV to drop 33% in 2026 due to tax credit changes and financing constraints from foreign entity of concern rules.
- Subscriptions dropped 25%, y/y, in the first quarter of 2026 for Sunrun, the largest U.S. residential installer.

The ITC remains for TPO systems until 2028, and PV markets are adapting accordingly.

- From industry survey results, 2/3 of installers expect most sales will be TPO in 2026.
- Prepaid TPO financing is becoming prevalent.

California Residential PV+BESS Deployment



Total Installations per year	
2022	23,095
2023	29,344
2024	66,489
2025	64,943

Note: 'Unspecified' category includes installations not linked with specific manufacturer or product

The surge in new PV+BESS installations in 2024 was driven primarily by a massive backlog of legacy NEM 2.0 applications, alongside a pivot incentivizing more battery installations under the new NEM 3.0 export rules. By 2025, installations have leveled off, but market shares are changing.

- **Tesla** remained the dominant supplier of residential storage products in 2025 (Powerwall 2 & Powerwall 3).
- **Enphase** system installations remained level in 2025, though some of the "Other" companies use Enphase's microinverters and system control components in their products.
- **FranklinWH** began full-scale manufacturing of it's "aPower 2" and "aPower S" residential storage units in early 2025, with an annual delivery capacity of several thousand units. Expansion plans for 2026 aim to quadruple that output as they aim to grow their market share.

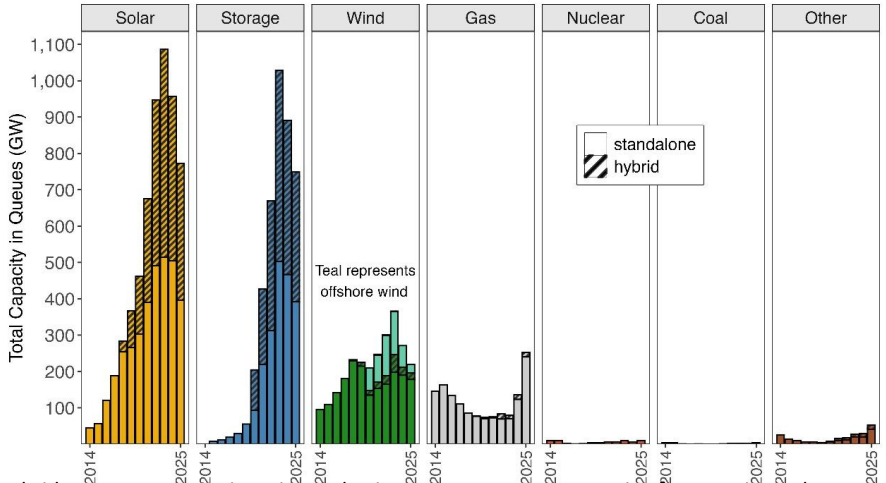
As of January 1, 2026, Section 150.0(s) of California's updated 2025 Energy Code will require all newly constructed single-family homes to be "BESS-ready."

Sources: California DG Statistics, May 13, 2026; FranklinWH; Enphase Energy; Clean Energy Alliance; California Energy Commission.

U.S. Transmission Interconnection Queues

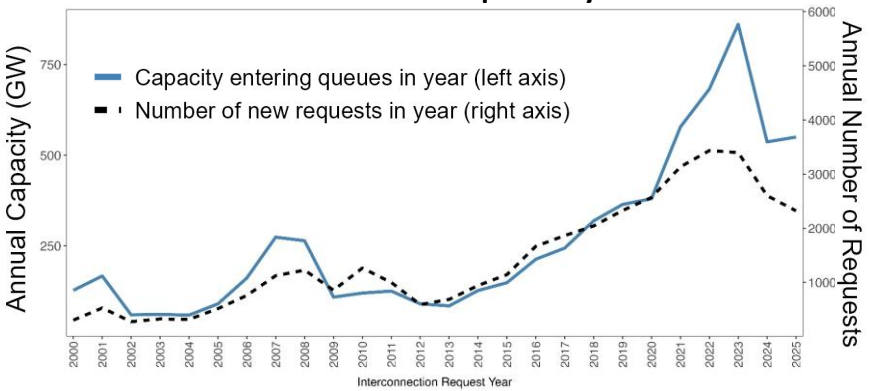
- LBNL reports there are approximately 2,300 GW_{ac} of electric generation capacity actively seeking interconnection, of which 773 GW_{ac} are solar, 749 GW_{ac} are storage, 253 GW_{ac} are natural gas, and 196 GW_{ac} are wind.
  - Natural gas capacity in the queues increased 72%, y/y, while solar (−12%), storage (−13%), and wind (−26%) all decreased.
  - The percentage of active capacity in hybrid configurations within the queues was highest for solar, at 47%, though this varied from 22% in MISO and SPP to 93% in CAISO.

Capacity of Active Interconnection Requests by Generator Type, 2014–2025



- LBNL reports that major interconnection process reforms resulted in more than 700 GW_{ac} of withdrawals in 2024, though 500 GW_{ac} submitted new requests.
- Only 9% of proposed solar projects (including those with storage) entering queues from 2000 to 2019 reached commercial operation by the end of 2025 (compared to 15% for wind and 17% for gas).
- The average time spent in queues has increased over time, particularly for solar and wind. Solar and wind projects that executed an agreement in 2025 submitted an interconnection request an average of 4 years previously, compared to 2 years for natural gas.
  - Solar-plus-storage received an interconnection agreement around 8 months quicker.
- It also took solar and wind longer to place these projects in service after receiving an interconnection agreement, with projects placed in service in 2025 taking over 3 years for solar and 5 years for wind, compared to under a year for natural gas and 2 years for stand-alone storage projects.

Interconnection Requests by Year



*Hybrid storage capacity is estimated using storage: generator ratios from projects that provide separate capacity data.

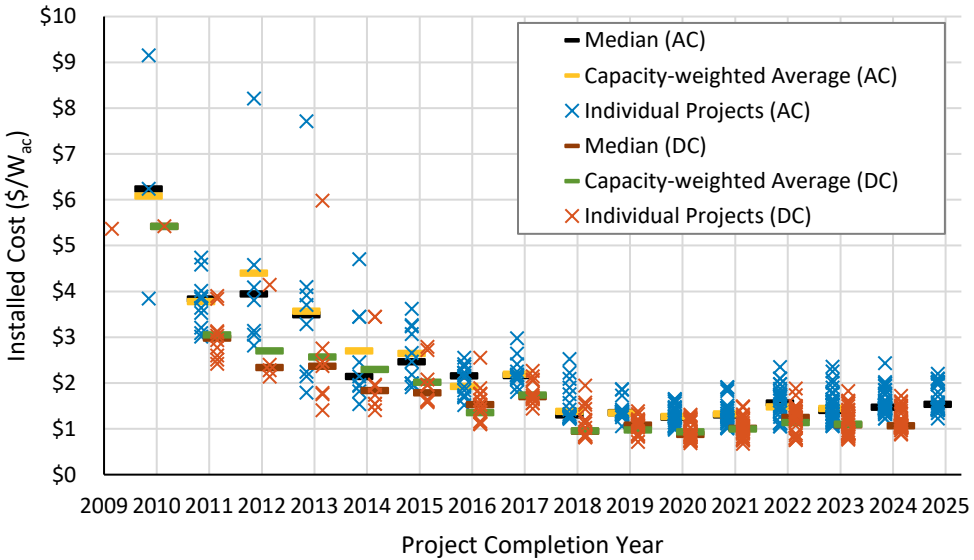
Source: LBNL, Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection, 2025.

Agenda

1. Global Solar Deployment
2. U.S. PV and BESS Deployment
3. **PV System and BESS Pricing**
4. Global Manufacturing
5. Component Pricing
6. Market and Policy
7. U.S. PV Imports

- **The median system price of large-scale, utility-owned PV systems in 2025 was \$1.55/W_{ac}—increasing about 4%, y/y, and 22% since 2020.**
- **EnergySage reported that the median price for residential PV systems in the second half of 2025 remained relatively flat, y/y, for both PV-only systems (\$2.62/W_{dc}) and those installed with batteries (\$2.43/W_{dc}).**
- **In early 2026, residential PV-plus-storage systems in California had a median system price of \$2,510/kWh of battery, \$3,178/kW_{ac} of battery, and \$4,611/kW_{dc} of PV.**
- **LevelTen reports that, in Q1 2026, U.S. utility-scale photovoltaic PPA prices increased for the sixth quarter in a row, up 13%, y/y.**

Utility-Owned PV Pricing (>5 MW)



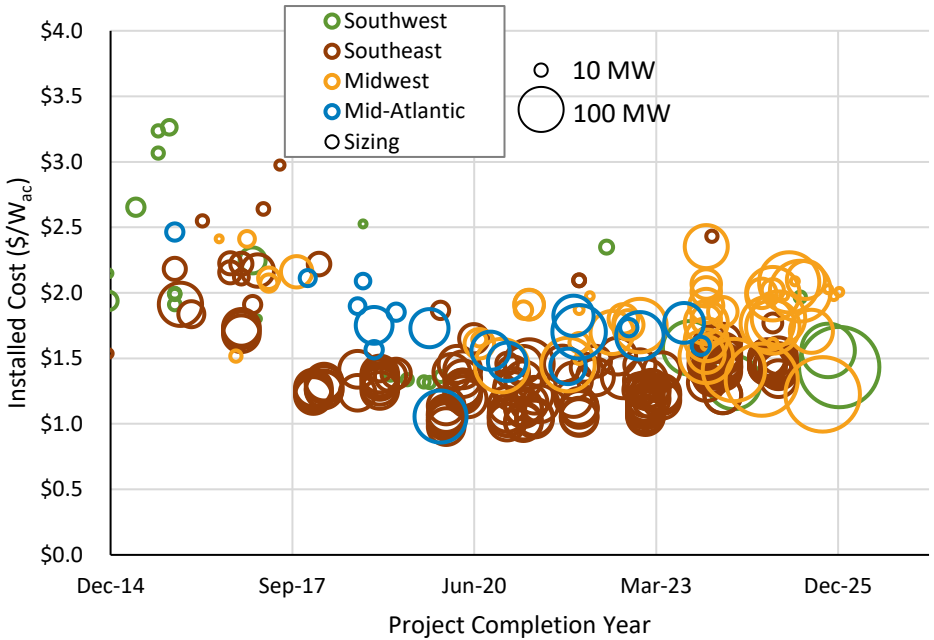
The median system price of large-scale, utility-owned PV systems in 2025 was \$1.54/W_{ac}—increasing about 4%, y/y, and 22% since 2020.

- The lowest and highest reported prices in 2025 were \$1.23/W_{ac} and \$2.30/W_{ac}, respectively.
- 2024 systems also reported capacity in W_{dc}, with a median cost of \$1.07/W_{dc}.

Note: Values represent a select dataset of utility-scale PV systems owned by 37 regulated utilities for 323 projects totaling 18.6 GW_{ac} installed from 2010 to 2025.

Sources: FERC Form 1 filings from the following utilities: Alabama Power, Allete, Ameren, Arizona Public Service, Dominion, DTE, Duke Energy (Carolinas, Florida, Indiana, and Progressive), El Paso Electric, Entergy (Arkansas, Mississippi, and New Orleans), Florida Power and Light, Georgia Power, Indiana Michigan Power, Kentucky Utilities, Madison Gas and Electric, MidAmerican, Nevada Power, Northern States Power Co, Pacific Gas and Electric, Public Service of Colorado, Public Service of New Mexico, Southern California Edison, Sierra Pacific, Southern Indiana Gas and Electric, Tampa Electric, Tucson Electric, United Illuminating, Union Electric, UNS Electric, Virginia Electric, Wisconsin Electric Power Company, and Wisconsin Public Service.

Utility-Owned PV Pricing (>5 MW)



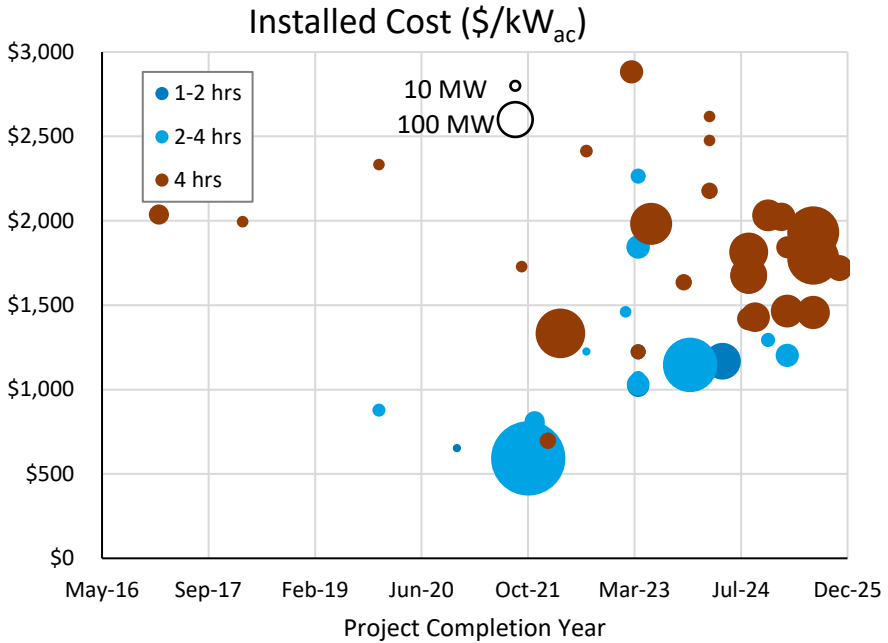
- Project prices in the Southeast and Southwest were, on average, lower than the rest of the country, with a capacity-weighted average of \$1.4/W_{ac} to \$1.5/W_{ac} in 2025, compared to \$1.8/W_{ac} to \$1.9/W_{ac} in the Midwest and Mid-Atlantic.

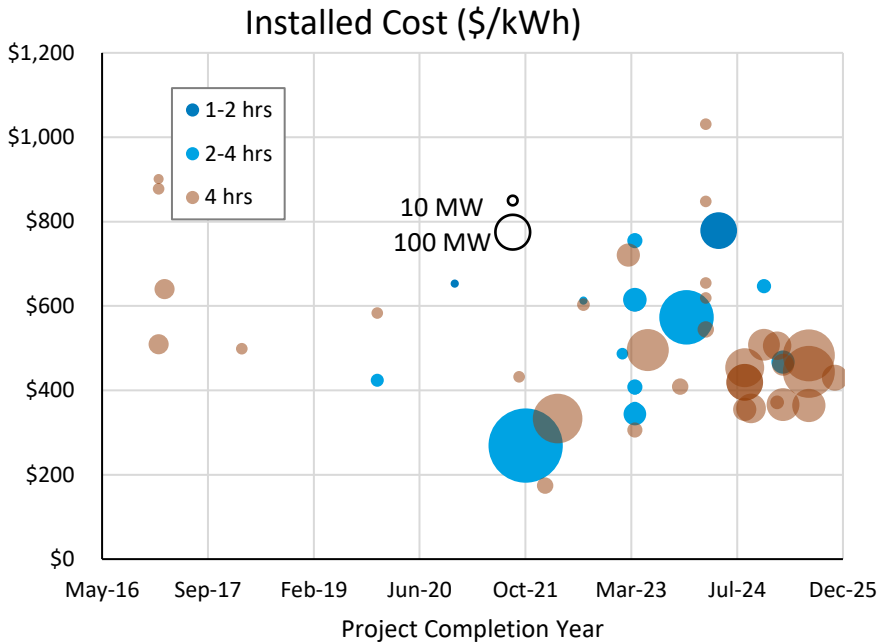
Note: Values represent a select dataset of utility-scale PV systems owned by 37 regulated utilities for 323 projects totaling 18.6 GW_{ac} installed from 2010 to 2025.

Sources: FERC Form 1 filings from the following utilities: Alabama Power, Allete, Ameren, Arizona Public Service, Dominion, DTE, Duke Energy (Carolinas, Florida, Indiana, and Progressive), El Paso Electric, Entergy (Arkansas, Mississippi, and New Orleans), Florida Power and Light, Georgia Power, Indiana Michigan Power, Kentucky Utilities, Madison Gas and Electric, MidAmerican, Nevada Power, Northern States Power Co, Pacific Gas and Electric, Public Service of Colorado, Public Service of New Mexico, Southern California Edison, Sierra Pacific, Southern Indiana Gas and Electric, Tampa Electric, Tucson Electric, United Illuminating, Union Electric, UNS Electric, Virginia Electric, Wisconsin Electric Power Company, and Wisconsin Public Service.

Utility-Owned BESS Pricing (>5 MW)

- There is a wide variety of reported prices for utility-owned battery storage systems, even accounting for differences in the hours of storage.
- In 2024 and 2025, the price of a 4-hour battery system was around $450/kWh (or between $370/kWh and $545/kWh).

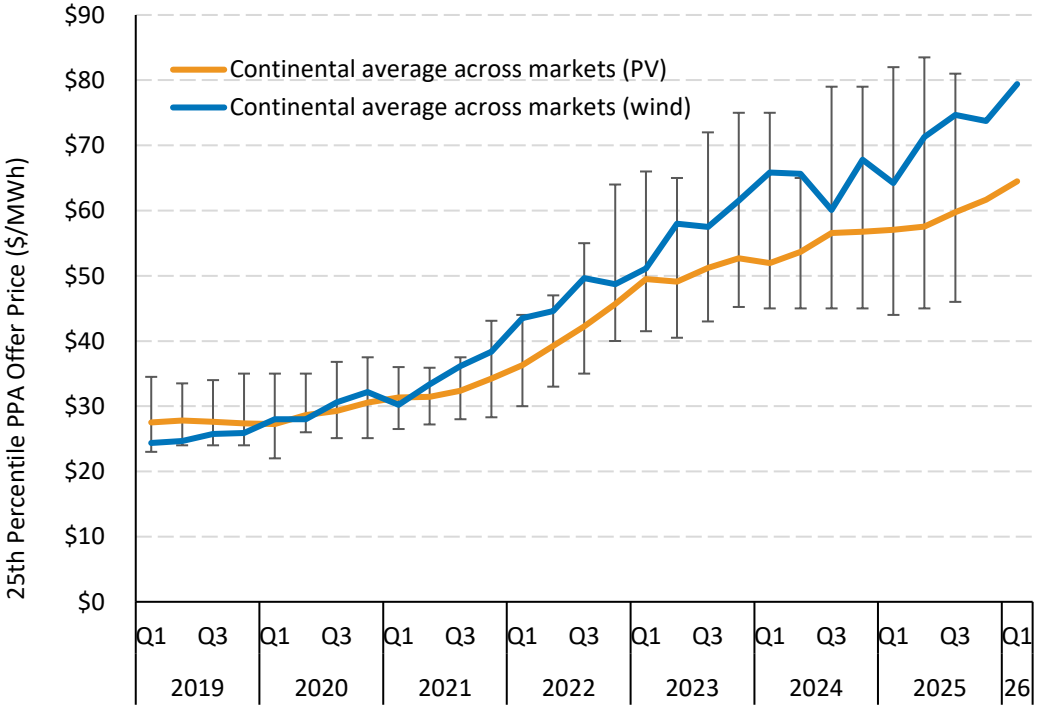




Note: Values represent a select dataset of utility-scale PV systems owned by eight regulated utilities for 60 projects totaling 3.4 GW$_{ac}$ installed from 2010 to 2025.

Sources: FERC Form 1 filings from the from the following utilities: Arizona Public Service, Duke Energy Progress, Florida Power and Light, Georgia Power, Idaho Power, Nevada Power, Pacific Gas and Electric, Portland Electric, San Diego Gas and Electric, Southern California Edison, Sierra Pacific, Tampa Electric, Tucson Electric, Virginia Electric, and Wisconsin Public Service.

U.S. Solar PPA Pricing (LevelTen)

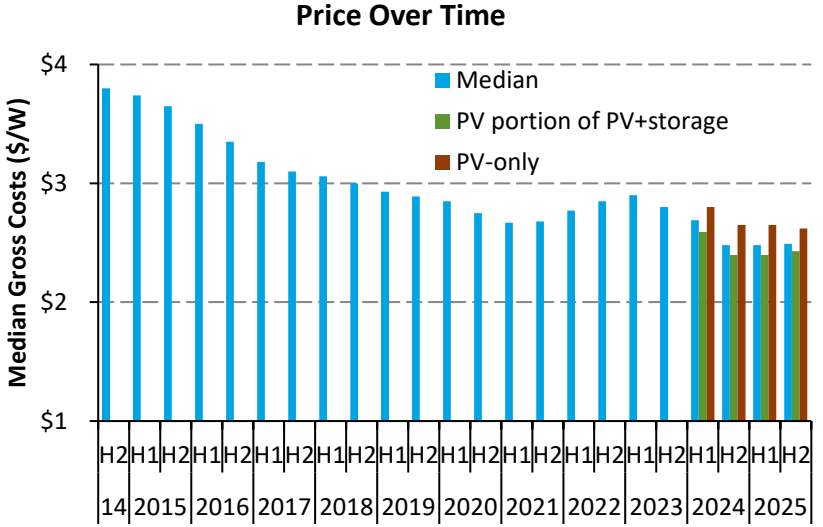


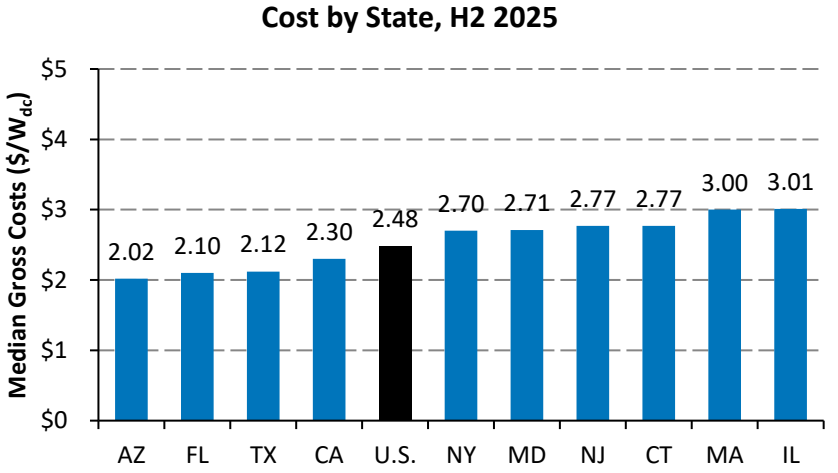
- LevelTen reports that, in Q1 2026, U.S. utility-scale photovoltaic PPA prices increased for the sixth quarter in a row, up 13%, y/y.
  - LevelTen attributed the average PV price increase to high demand from data centers.
- LevelTen reported development challenges related to tariffs, rising insurance costs, labor shortages, and federal permitting issues.
- Wind PPAs increased 24%, y/y, as the industry manages permitting issues, particularly related to FAA approvals.
  - LevelTen reports that the restrictions are causing projects to lower turbine height and other projects to be canceled.

Note: In addition to U.S. wholesale markets (California Independent System Operator [CAISO], Electric Reliability Council of Texas [ERCOT], Southwest Power Pool [SPP], Midcontinent Independent System Operator [MISO], PJM, New York Independent System Operator [NYISO]; ISO New England), LevelTen also tracks pricing in Alberta, Canada (Alberta Electric System Operator [AESO]). **Source:** LevelTen, Q1 2026 PPA Price Index Executive Summary North America, Apr. 2026.

Residential System Price Reported by EnergySage

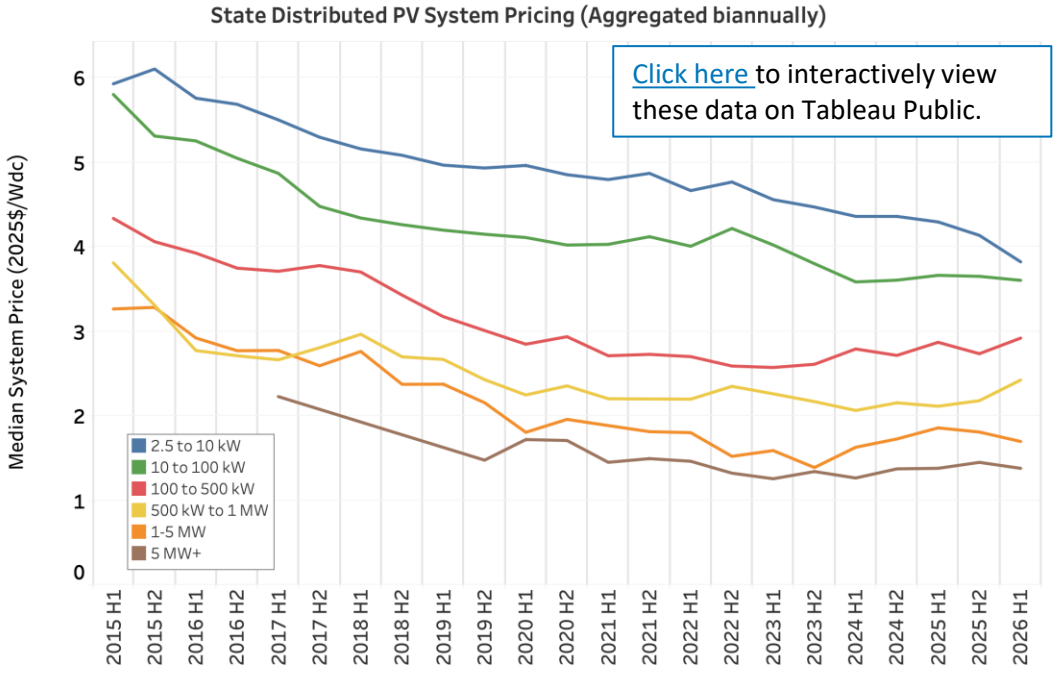
- The median price for residential PV systems reported by EnergySage remained relatively flat, y/y, for both PV-only systems ($2.62/$W_{dc}$) and those installed with batteries ($2.43/$W_{dc}$).
  - In addition to economies of scale, PV systems installed with BESS often do not have a separate inverter (instead using the one from the BESS).
- Residential system price varied by state. In H2 2025, the median price of a residential system in Illinois was 49% higher than the median price of a residential system in Arizona.
  - EnergySage attributed the difference in price to higher labor costs, more complex permitting and inspection, and less competition.





Note: Price based on winning quoted price.
Source: EnergySage, Solar and Storage Marketplace Report, Spring 2025.

Distributed PV System Pricing From Select States



From H1 2025 to H1 2026 (partial), the median reported, inflation-adjusted distributed PV system price (no storage) across Arizona, California, and New York fell for smaller systems, rose for systems between 100 kW_{dc} and 1 MW_{dc}, fell for systems of 1–5 MW_{dc}, and remained constant for the largest systems—see table.

System Size (dc)	Median Price H1 2026 ($/Wdc)	H1 2025 – H1 2026
2.5 to 10 kW	$3.82	-11.0%
10 to 100 kW	$3.60	-1.6%
100 to 500 kW	$2.92	1.7%
500 kW to 1 MW	$2.42	14.7%
1-5 MW	$1.70	-8.6%
5 MW+	$1.38	0.0%

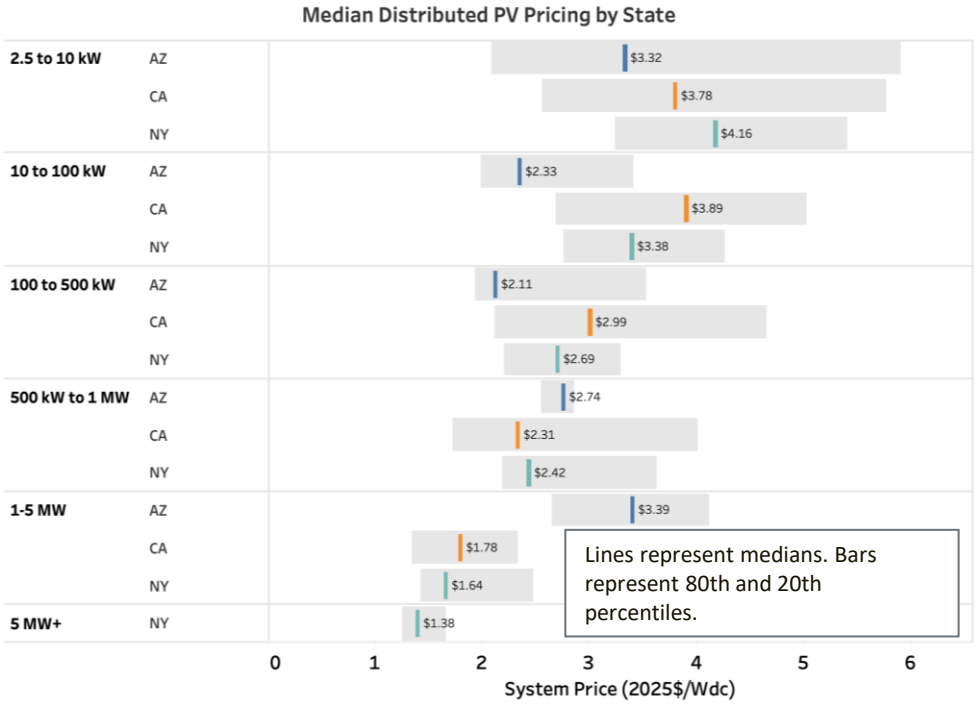
Data for H1 2026 are incomplete.

2026 MW_{dc}, year to date: Arizona (27.6), California (296), New York (252).

Note: System prices above $10/W and below $0.75/W were removed from the dataset. The volatility in median system price among the largest systems is because of the relatively small number of systems deployed each year. **Sources:** Arizona Goes Solar, Utility Programs, May 2026; California Distributed Generation Statistics, Distributed Generation Interconnection Program Data, Interconnected Project Sites Data Set, April 2026; Data.NY.gov, Solar Electric Programs Reported by NYSERDA, April 2026.

Distributed PV System Pricing, Select States, 2026 Year to Date

Click here to interactively view these data on Tableau Public.



In addition to price differences based on system size, there is variation in the price of stand-alone (no energy storage) distributed PV systems between states and within individual markets.

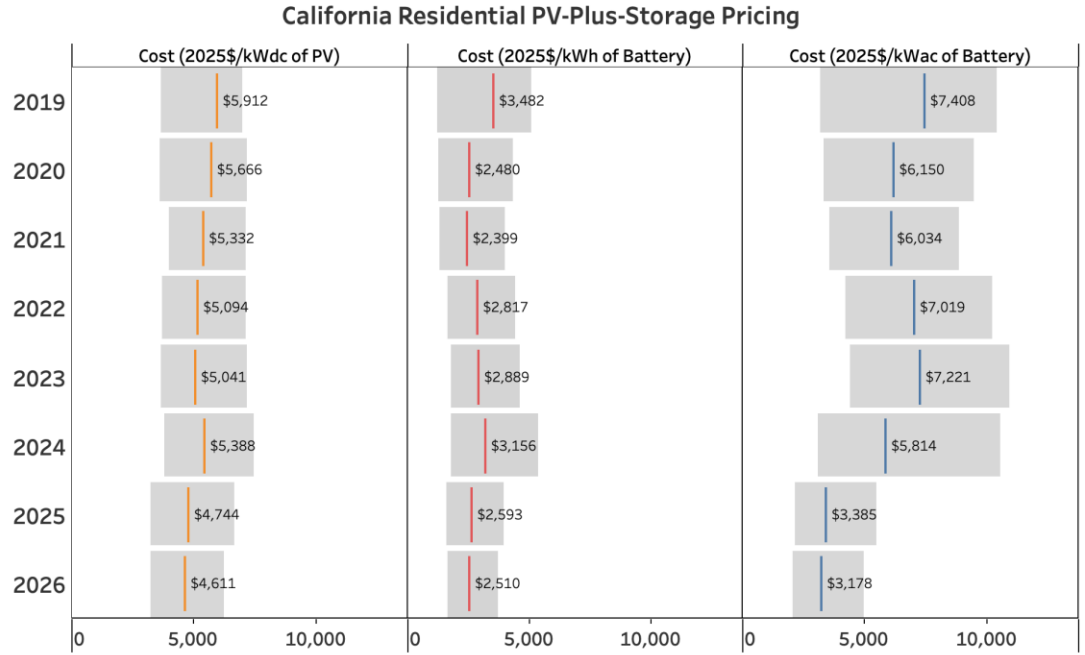
Dollar-per-watt prices generally decrease as system size increases.

For systems 2.5–10 kW_{dc}, median price changes varied between H1 2025 and H1 2026 (partial):

- –20% in Arizona
- –12% in California
- –2% in New York.

2026 MW_{dc}, year to date: Arizona (27.6), California (296), New York (252).
Note: System prices above $10/W and below $0.75/W were removed from the dataset. **Sources:** Arizona Goes Solar, Utility Programs, May 2026; California Distributed Generation Statistics, Distributed Generation Interconnection Program Data, Interconnected Project Sites Data Set, April 2026; Data.NY.gov, Solar Electric Programs Reported by NYSERDA, April 2026.

Residential PV-Plus-Storage System Pricing in California



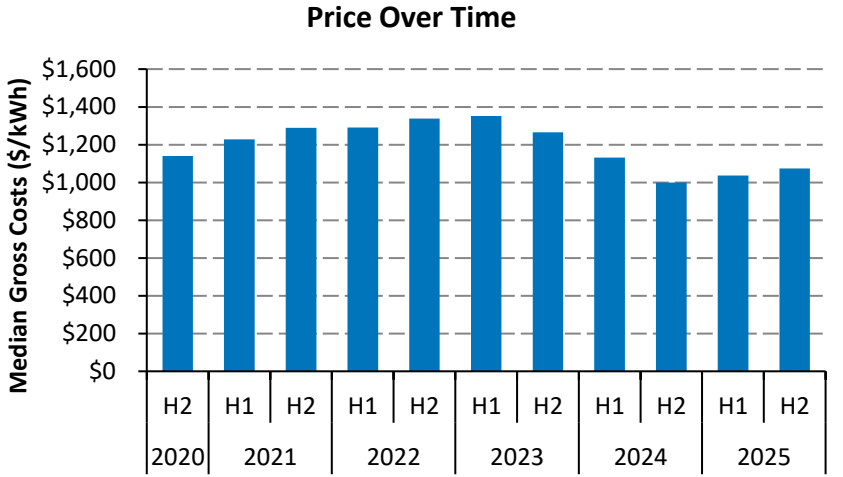
- In early 2026, residential PV-plus-storage systems in California had a median system price of \$2,510/kWh of battery, \$3,178/kW_{ac} of battery, and \$4,611/kW_{dc} of PV.
  - The cost per kW_{ac} of battery fell 6% between 2025 and early 2026, while the cost per kWh of battery and per kW_{dc} of PV fell 3%.
- The increasing market share of Tesla's Powerwall 3 likely contributed to the significant drop in PV-plus-storage price since 2024, especially in terms of kW_{ac} of battery.
  - Powerwall 3—which became available in 2024—provides the same energy as previous models (13.5 kWh) but provides 130% more continuous power (11.5 kW_{ac} vs. 5 kW_{ac}).
  - Tesla supplied 44% of California's PV-plus-storage systems in 2024, rising to 55% in 2025.
  - The integrated inverter in Powerwall 3 serves the PV and battery components of a PV-plus-storage system, which eliminates the need for a separate PV inverter.

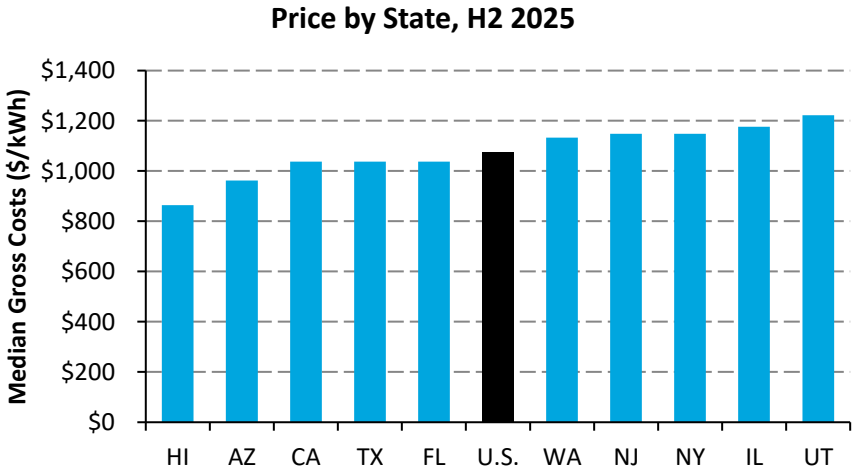
The data are filtered to residential rooftop PV systems between 3 kW_{dc} and 30 kW_{dc} with a cost between \$0.75/kW_{dc} and \$20/kW_{dc} (2025 dollars). Lines represent medians. Bars represent 80th to 20th percentiles.

Sources: California Distributed Generation Statistics, Distributed Generation Interconnection Program Data, Interconnected Project Sites Data Set, April 2026; EnergySage, Tesla Dominated the Home Battery Market—Will Its Reign Last? May 2025; Tesla, Powerwall, Sept. 2025; Wood Mackenzie, US Distributed Solar-Plus Storage 2025 Outlook, April 2025; Wood Mackenzie, US Distributed Solar-Plus-Storage Leaderboard, Dec. 2025.

Residential Storage Price Reported by EnergySage

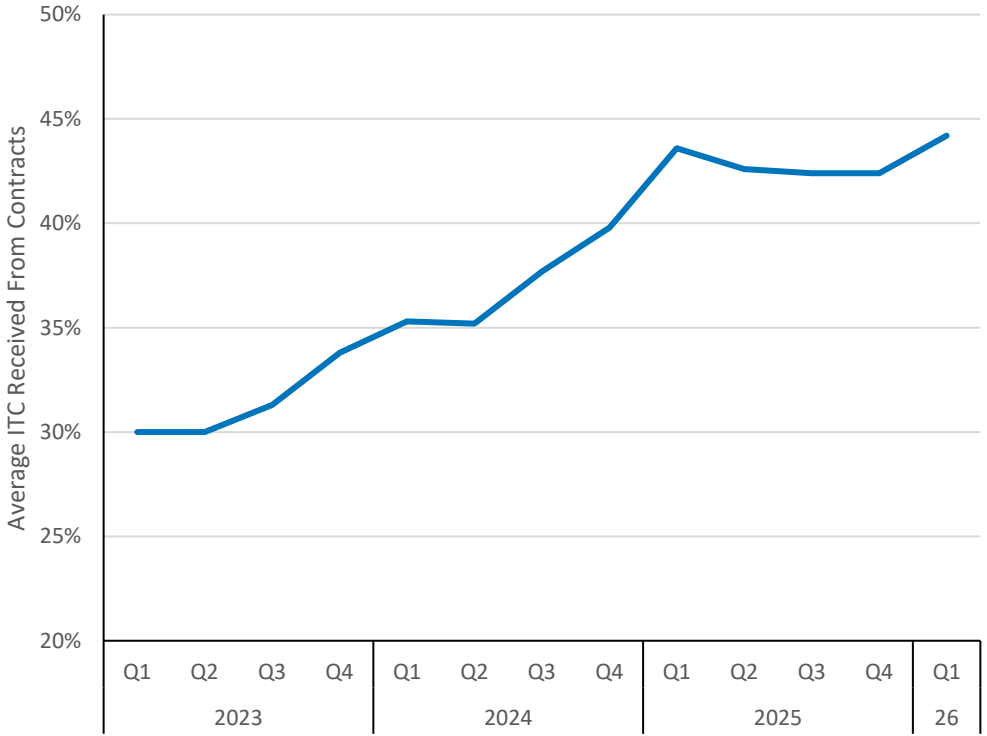
- The median price for residential energy storage reported by EnergySage increased 7.5%, y/y.
  - EnergySage attributed the increase in price to reciprocal tariffs on imported components and preliminary AD/CVD on Chinese anode materials.
- EnergySage also noted the emergence of a new manufacturer, FranklinWH, which launched its residential BESS product in 2025. It was the third-most used BESS product in 2025 on the EnergySage platform, behind Tesla and Enphase.
- Residential storage system price varied by state. In H2 2025, the median price of a residential storage system in Hawaii was 29% less than the median price of a residential storage system in Utah.





Note: Price based on winning quoted price.
Source: EnergySage, Solar and Storage Marketplace Report, Spring 2026.

Sunrun Average ITC Percentage



- Since the bonus credits were created for the investment tax credit, Sunrun reported that the average ITC it receives from its contracted solar and/or BESS customers, per quarter, has increased from the base rate of 30% to above 40%—indicating the average project is receiving more than one 10% bonus credit.

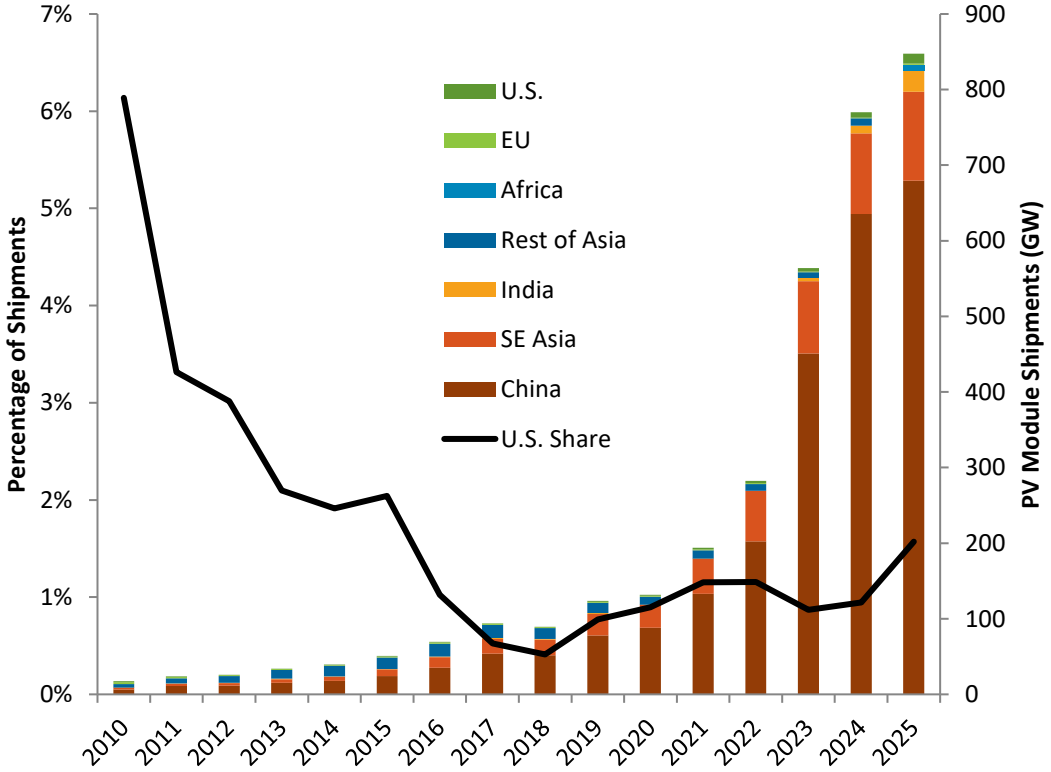
Source: Sunrun Investor Relations, Sunrun Q42025 External Model, March 2026.

Agenda

1. Global Solar Deployment
2. U.S. PV and BESS Deployment
3. PV System and BESS Pricing
4. **Global Manufacturing**
5. Component Pricing
6. Market and Policy
7. U.S. PV Imports

- **SPV Market Research reported that 2025 global PV shipments totaled approximately 856 GW—an increase of 11% from 2024, with half of the increase coming from China.**
  - **98% of PV shipments were mono c-Si technology, with 60% TOPCon.**
- **Though margins rebounded in Q1 2026, most module, cell, and wafer manufacturers continued to operate at a loss due to oversupply and low global pricing.**
- **The United States manufactured approximately 31.3 GW_{dc} of PV panels in 2025 (+59%, y/y).**
  - **At the end of Q4 2025, the United States had a c-Si cell manufacturing capacity of 2 GW_{dc}.**

Global Annual PV Shipments by Region*



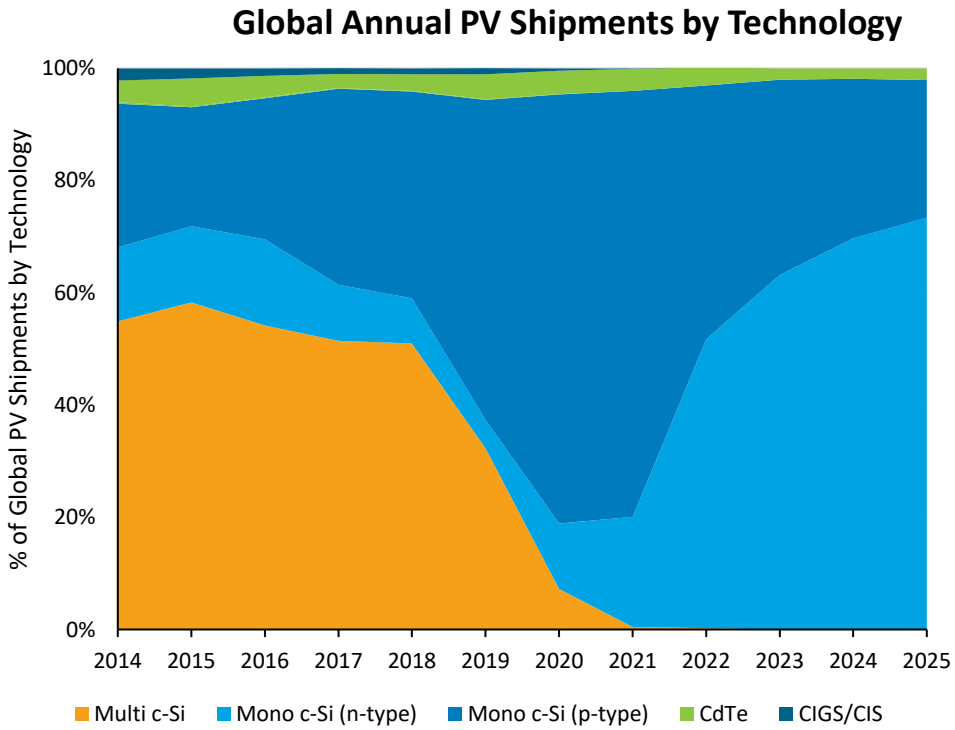
- SPV Market Research reported that 2025 global PV shipments were approximately 856 GW—an increase of 11% from 2024.
  - Of the increase, 51% came from China, with the remainder mostly coming from India, Southeast Asia, the United States, Oman, and Ethiopia.
- As global manufacturing scaled, the United States lost market share until 2018. Its 2025 global market share was the highest in 10 years, while U.S. shipments increased 12x over the same period.
- Cambodia, Ethiopia, and Oman began shipping cells in 2025, previously only engaging in module assembly. Laos also grew shipments by 50% after its first cell manufacturing began in 2024.
- China lost market share for the first time since 2008, though 79% of PV shipments came from China in 2025.
- India moved to fourth place for global shipments in 2025, behind China, Malaysia, and Vietnam.

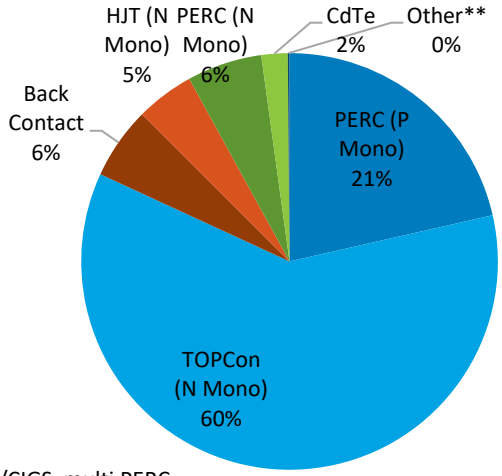
*** Note:** Excludes inventory sales and outsourcing.

Source: SPV Market Research, Photovoltaic Manufacturer Capacity, Shipments, Price & Revenues 2025/20256, April 2026.

Global Annual PV Shipments by Technology*

- In 2025, 98% of PV shipments were mono c-Si technology, compared to 35% in 2015.
  - N-type mono c-Si grew to 73%—up from 70% in 2024 (and 5% in 2019).
- TOPCon was the leading cell type in 2025, followed by mono P PERC, mono N PERC, and HJT.
  - Perovskite shipments grew 130% from their initial 2024 shipments, to shipping 157 MW from China and Europe (Si tandem).





***Note:** Excludes inventory sales and outsourcing.
Source: SPV Market Research, Photovoltaic Manufacturer Capacity, Shipments, Price & Revenues 2025/2026, April 2026.

** Includes a-Si, CIS/CIGS, multi PERC, perovskite, and TOPCon (P mono).

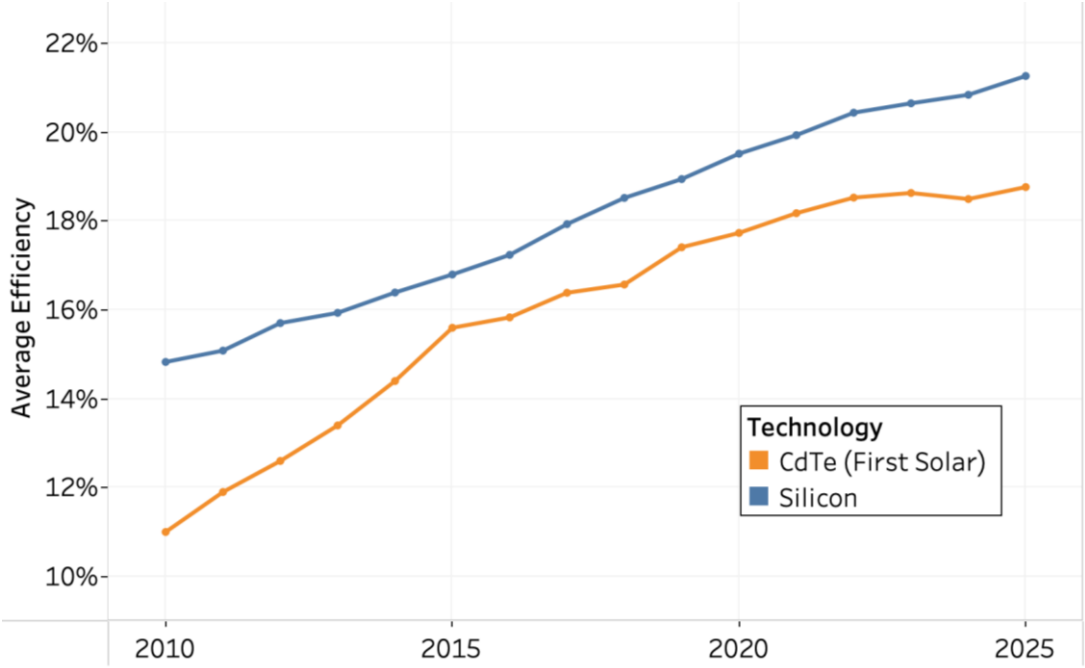
Global Leading PV Manufacturers by Shipments

Ranking	2020	GW_{dc}	2024	GW_{dc}	2025	GW_{dc}
1	LONGi	14.7	Jinko Solar	78.9	LONGi	87.3
2	Tongwei	12.1	JA Solar	66.5	Jinko Solar	82.6
3	JA Solar	10.8	Trina Solar	63.3	Tongwei	77.5
4	Aiko Solar	10.5	Tongwei	59.6	JA Solar	67.2
5	Trina Solar	9.0	LONGi	59.3	Trina Solar	57.4
6	Jinko Solar	8.7	Aiko Solar	53.9	SolarSpace	48.3
7	Canadian Solar	8.3	Runergy	50.9	Runergy	46.9
8	Zhongli	7.4	SolarSpace	37.0	Aiko Solar	43.8
9	Suntech	6.3	Astronergy	32.8	Astronergy	37.0
10	First Solar	5.5	Canadian Solar	31.1	Hainan Drinda	33.4
Total Above		**93.3**		**533.2**		**581.3**
Total Shipped		**131.7**		**770.0**		**885.5**

- From 2020 to 2025, shipments from the top 10 PV manufacturers grew from 93 GW to 581 GW, with some companies shipping more than 80 GW annually.
- In 2025, LONGi shipped approximately the same amount of PV as the entire industry did in 2018.

***Note:** Excludes inventory sales and outsourcing.
Source: SPV Market Research, Photovoltaic Manufacturer Capacity, Shipments, Price & Revenues 2024/2025, April 2025.

PV Module Efficiency Improvements



From 2010 to 2025, the weighted average efficiency of installed modules increased:

- From 14.8% to 21.3% for c-Si technologies (in California and New York distributed PV systems).
- From 11.0% to 18.8% for CdTe (in U.S. utility-scale PV systems).

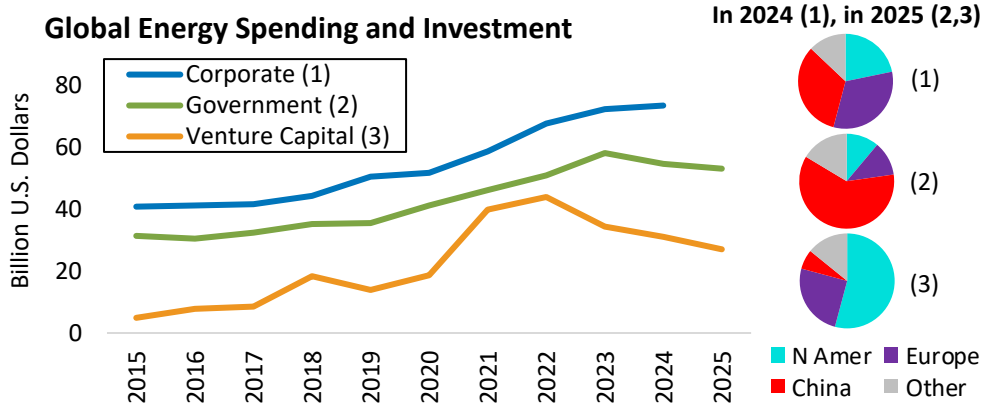
Efficiency changes occur through incremental improvements in given technologies and changes in technology market share (e.g., PERC to TOPCon).

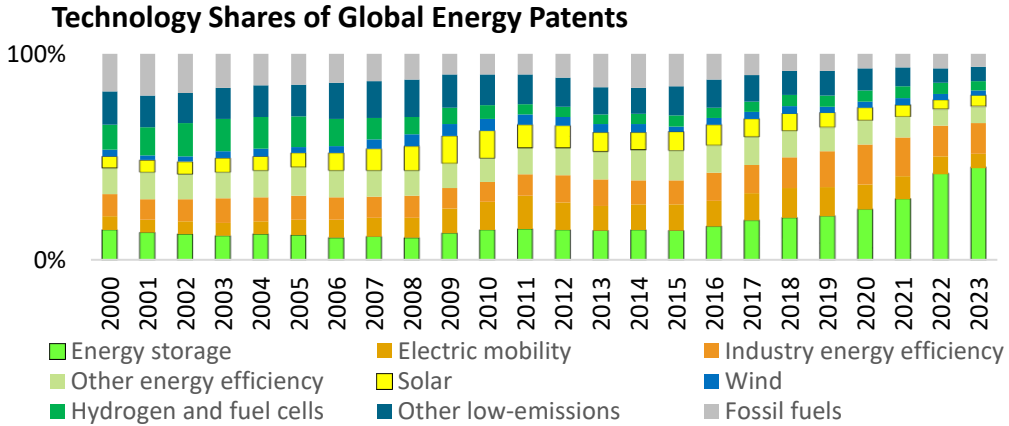
Efficiency improvements resumed for First Solar CdTe products, as average efficiency rose from 18.5% in 2024 to 18.8% in 2025.

- Efficiency increased slightly for both lower-efficiency Series 6 modules and higher-efficiency Series 7 modules.
- However, average efficiency increased mostly because the share of Series 7 modules produced rose from 38% in 2024 to 58% in 2025.

Sources: First Solar Investor Relations, accessed May 2026; California Distributed Generation Statistics, c-Si: Distributed Generation Interconnection Program Data, Interconnected Project Sites Data Set, May 2026; Data.NY.gov, Solar Electric Programs Reported by NYSERDA, May 2026.

Global Energy Innovation





Global funding of energy innovation has declined.

- Compared with recent peaks, government spending on energy R&D fell 9% by 2025, and venture capital investments in energy startups fell 38%.
- Corporate spending on energy supply and infrastructure R&D rose only 2% in 2024.

Batteries are dominating energy innovation.

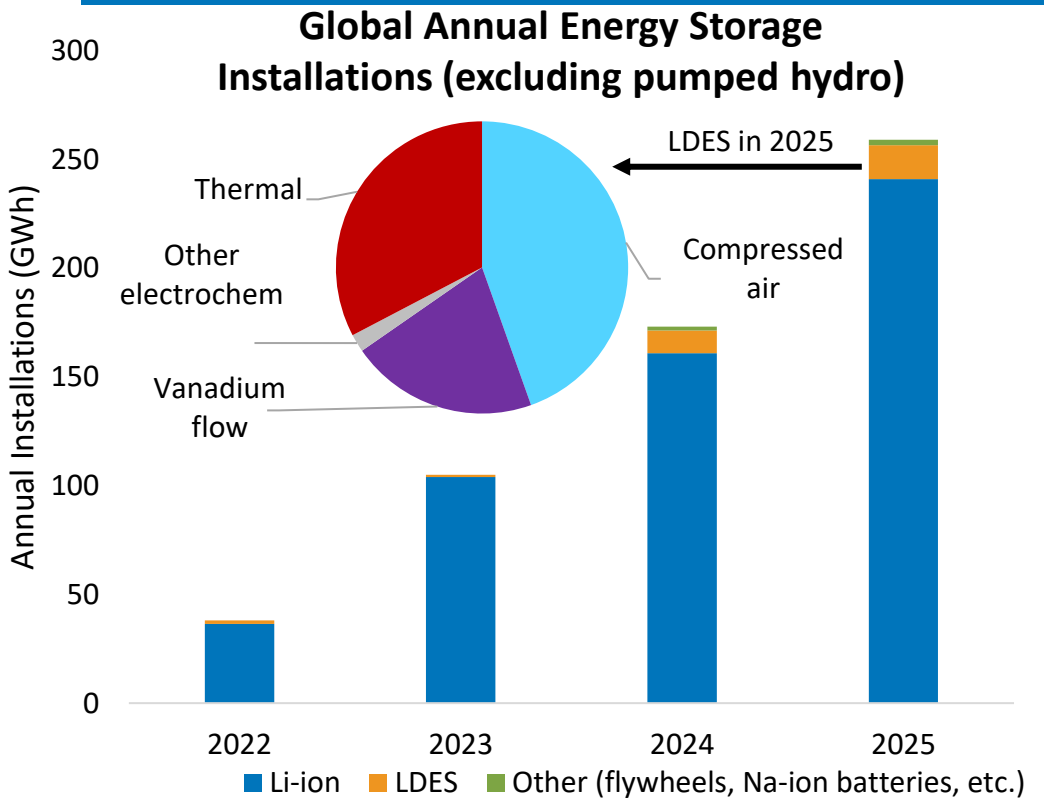
- The share of battery patents reached 40% in 2023—higher than any other energy technology has attained—and IEA estimated that it likely grew in 2024 and 2025.
- Lithium-ion chemistries and designs have constituted 50%–60% of all battery patents since 2000, and lithium-ion manufacturing patents have made up a large portion of the remaining patents.

PV competitiveness is now driven by scale and manufacturing quality, but innovation continues.

- PV patents peaked in 2011 as the global industry consolidated around crystalline-silicon designs.
- As patents for crystalline-silicon and most thin-film PV fell, perovskite patents rose—accounting for 70% of all PV cell patents in 2023.
- China, Korea, and Japan lead in perovskite patents.

Source: IEA, The State of Energy Innovation 2026, Feb. 2026.

Alternatives to Lithium-Ion Batteries for Energy Storage



Several storage technologies exist beyond Li-ion.

- Pumped hydro accounts for the most global capacity.
- Other long-duration energy storage (LDES) that targets 8+ hours of storage includes metal-air and flow batteries plus thermal and mechanical technologies.
- Sodium-ion batteries occupy a niche similar to Li-ion, typically providing about 2–4 hours of storage.
- Flywheels and ultracapacitors provide short durations.

Non-Li tech made up 7% of storage installed in 2025.

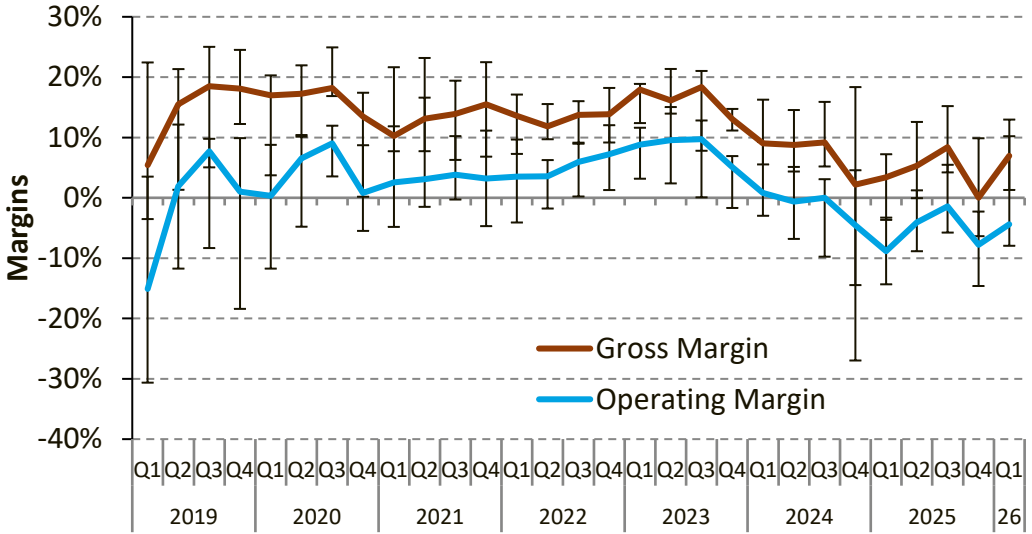
- Mostly LDES (thermal, compressed air, flow battery).
- China installed 93% of global LDES in 2022–2025.
- Li-ion is more mature and lower cost than LDES (except pumped hydro) up to 8 hours.
- Wood Mackenzie stated that LDES can be competitive at longer durations, but it is hindered by lack of demand and pricing mechanisms.
- Wood Mackenzie expects Li-ion to retain 85%–91% of the global storage market through 2034.

Example non-Li U.S. storage projects include:

- A planned 300-MW/30-GWh (100-hour) iron-air battery to support a data center in Minnesota.
- A planned sodium-ion battery pilot (capacity unspecified) in Wisconsin to test a low-cost design.

Source: ESS News, Peak Energy, RWE to Deploy First Sodium-ion Battery in MISO, Mar. 2026; Utility Dive, World's 'Largest' Grid Battery Part of Google-Xcel Energy Agreement, Mar. 2026; Wood Mackenzie, Long Duration Energy Storage Trends Report 2025, Jan. 2026.

PV Wafer/Cell/Module Manufacturers' Margins



- Though margins rebounded in Q1 2026, most module, cell, and wafer manufacturers continued to operate at a loss due to oversupply and low global pricing.

– First Solar remained an outlier due to its competitive position in its leading market, the United States. Its net sales exceeded $1B for the fourth straight quarter, with a gross margin of 47%.

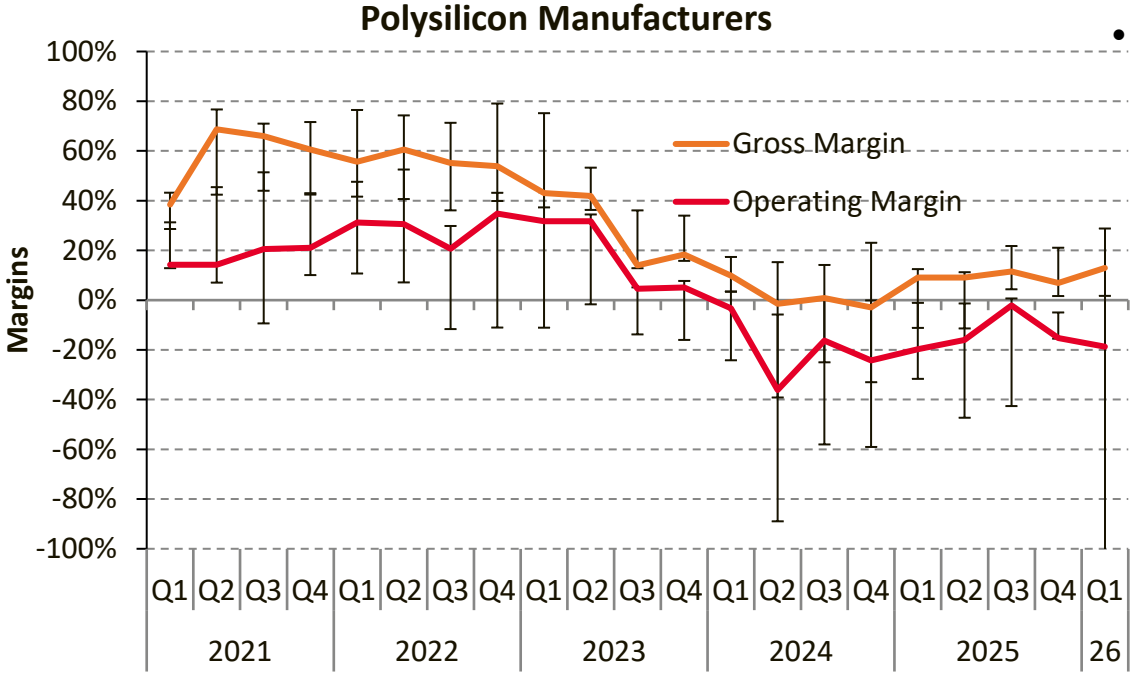
  – The company announced in Q1 2026 that it launched its CuRe technology in its Perrysburg facility and would replicate it across its fleet by the first half of 2028. It is also planning a 1-GW perovskite line in 2027 in Perrysburg as well.

Lines represent the median, with error bars representing the 80th and 20th percentiles for the following companies through Q1 2026: Canadian Solar, First Solar, GCL-Poly, Hainan Drinda New Energy Technologies, JA Solar, Jinko Solar, LONGi, Risen, Shanghai Aiko Solar, Shanghai Aerospace, Tongwei, and Trina Solar. Q1 2026 data are not available for Motech and United Renewables; however, the chart incorporates previous financial performance.

Note: Gross margin = revenue minus cost of goods sold (i.e., the money a company retains after incurring the direct costs associated with producing the goods or services it sells); operating margin = gross margin minus overhead and operating expenses (i.e., the money a company retains before taxes and financing expenses).

Sources: Company figures based on public filings and finance.yahoo.com and google.com/finance.

PV Polysilicon Manufacturers' Margins



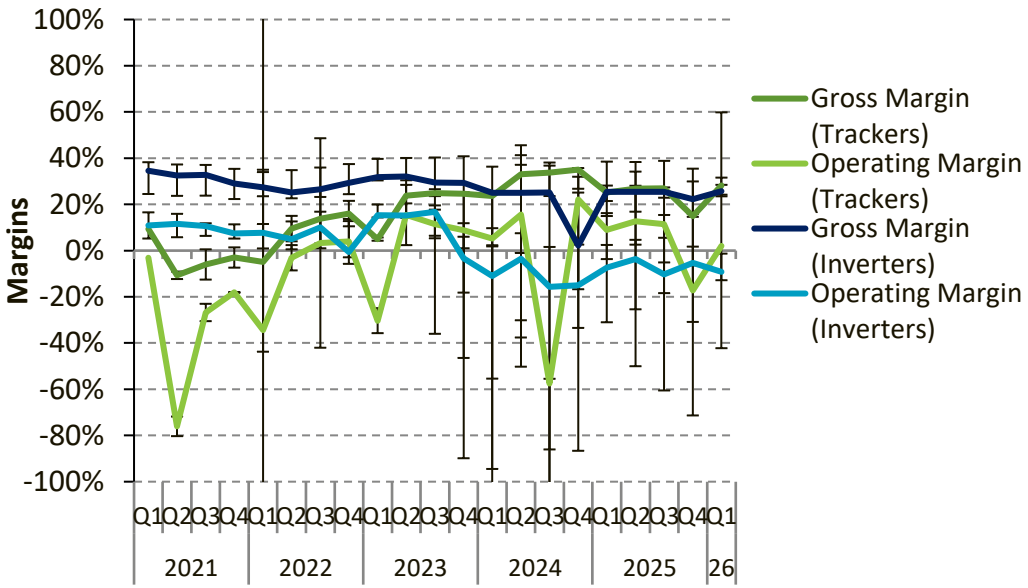
- Gross margins for polysilicon manufacturers continued to recover in Q1 2026; however, most manufacturers' operating margins fell for the second quarter and are operating at a loss.
  - Companies reported lower sales volumes in Q1 2026, while prices remained at historically low levels.

Lines represent the median, with error bars representing the 80th and 20th percentiles for the following companies in Q1 2026: Daqo, OCI Holdings, REC Silicon, TCL Zhonghuan, and Wacker. GCL Poly and Xinte data only go through Q4 2025 because they report semi-annually.

Note: Gross margin = revenue minus cost of goods sold (i.e., the money a company retains after incurring the direct costs associated with producing the goods or services it sells); operating margin = gross margin minus overhead and operating expenses (i.e., the money a company retains before taxes and financing expenses).

Sources: Company figures based on public filings and finance.yahoo.com.

Inverter and Tracker Manufacturers' Margins



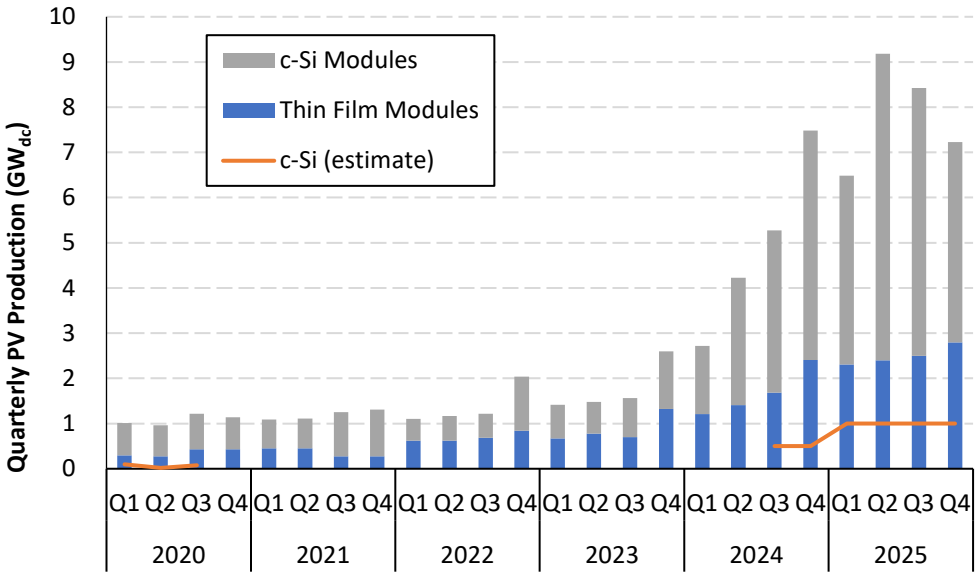
- Residential inverter companies continued to operate at a loss in Q1 2026 due to lower demand relative to 2023.
  - Enphase and SolarEdge have shifted to a domestic supply chain to stabilize pricing and grow margins. SolarEdge reported that 90% of its products are manufactured in the United States.
- Tracker companies' margins increased in Q1 2026; however, they are still managing supply chain issues due to regulatory and demand uncertainty.

Lines represent the median, with error bars representing the 80th and 20th percentiles for the following companies in Q1 2026: (trackers) Array Technologies, FTC Solar, NexPower; (inverters) Enphase, SMA, SolarEdge.

Note: Gross margin = revenue minus cost of goods sold (i.e., the money a company retains after incurring the direct costs associated with producing the goods or services it sells); operating margin = gross margin minus overhead and operating expenses (i.e., the money a company retains before taxes and financing expenses).

Sources: Company figures based on public filings and finance.yahoo.com.

U.S. PV Manufacturing



- Wood Mackenzie reported the United States manufactured approximately 31.3 GW_{dc} of PV panels in 2025, up 59%, y/y, though c-Si module manufacturing fell, q/q, in Q3 and Q4.
  - Domestic c-Si PV cell production has begun to ramp, with Q4 2025 manufacturing capacity reaching an estimated 2 GW_{dc} of annual production.

Note: c-Si assumes capacity utilization of 50%.

Source: Wood Mackenzie/SEIA, U.S. Solar Market Insight: Q4 2025, Dec. 2025.

Domestic Manufacturing Updates

Some notable recent activities include:

- **American Steel and Aluminum** debuted a domestic steel ground screw.
- **US Modules** commenced production in College Station, Texas, of 400 MW/yr of PERC modules, with plans to eventually scale to 1.4 GW.
- **Qcells** brought back its furloughed workers and still plans to bring its cell and wafer manufacturing online by the end of 2026.
- Similar to T1, Toyo**,** and Canadian Solar in previous quarters, **Ningbo Boway Alloy** sold its U.S. manufacturing assets (both the active module plant and under-construction cell plant) to Inox, an Indian manufacturer, to comply with the foreign ownership rules of OBBBA. And FH Capital acquired a 75.1% stake in **JinkoSolar's** U.S. manufacturing assets, with plans to eventually double the facility's module manufacturing capacity and add BESS.

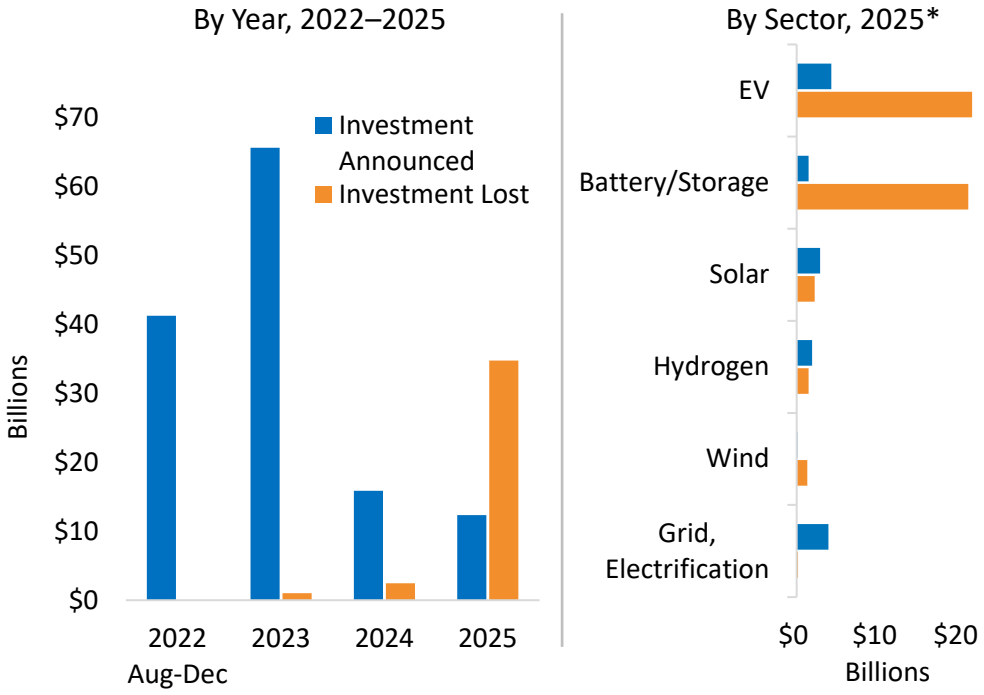
Some notable recent announcements include:

- **Canadian Solar** announced ambitious plans:
  - Trial production at its HJT cell manufacturing facility in Indiana was scheduled to begin in April, with a full ramp-up expected by the end of June. Phase 1 will have a capacity of 2.1 GW/yr, eventually scaling to 6.3 GW/yr.
  - Capacity at its currently operational module manufacturing facility in Texas was also planned to double from 5 GW/yr to 10 GW/yr by the end of the year.
- **Suniva** announced plans for a second cell manufacturing facility in Laurens, South Carolina, with a 4.5 GW/yr capacity. **SEG Solar** also announced plans to open a second facility, this time a 4-GW/yr module manufacturing facility in Houston by Q3 2026.
- **Swift Solar** also acquired Meyer Burger's HJT IP with the intention of opening a U.S. facility for domestic HJT cell and module facility, with an eventual expansion to include perovskites.
- **Waaree** has been advertising job positions at Meyer Burger's module facility in Arizona, which may herald a reopening, and announced a supply deal for traceable, UFLPA-compliant polysilicon with a company in Oman.

Source: Internal U.S. Department of Energy (DOE) tracking of public announcements as of May 8, 2026.

Reversal in U.S. Energy Investment and Job Trends

U.S. Private-Sector Investments Announced and Lost Since August 2022, Large-Scale Non-Fossil/Nuclear Energy Projects



* Sector totals do not sum to annual total because of sector overlap.

U.S. non-fossil/nuclear energy investments began declining in 2025.

- E2 shows canceled, closed, downsized large-scale clean energy investments surpassing newly announced investments for the first time since IRA passage in August 2022: $35 billion canceled, closed, and downsized vs. $12 billion newly announced.
- Rhodium Group shows actual investments in broader clean energy technologies growing only 5% from 2024 to 2025, vs. 26% annual growth during 2019–2024, and declining 11%, y/y, in Q4 2025—the first y/y decline shown in Rhodium's data.

Non-fossil/nuclear energy jobs also showed signs of decline in 2025.

- E2 equates 2025 changes in investment to 23,000 announced jobs vs. 38,000 jobs lost.
- Rhodium calculates 18,000 manufacturing jobs lost in 2025, mostly related to the EV supply chain.
- Bankruptcies, closures, and layoffs in the solar and wind industries impacted thousands of jobs in 2025.

Factors hindering clean energy growth include accelerated tax credit expiration, high interest rates, tariffs, and policy and market uncertainty, according to industry analysts.

Sources: CNBC, Orsted To Cut 2,000 Jobs as Trump's Offshore Wind Battle Continues, Oct. 2025; E2, Clean Economy Works: December and 2025 Year End Analysis, Feb. 2026; Renewables Now, RWE To Cut US Offshore Wind Jobs Amid Trump Policy Challenges, Mar. 2025; Rhodium Group, Clean Investment Monitor: US Q4 2025 Update, Feb. 2026; Solar Power World, Solar Layoffs and Closures Run Rampant in Trump's First Year Back, Jan. 2026.

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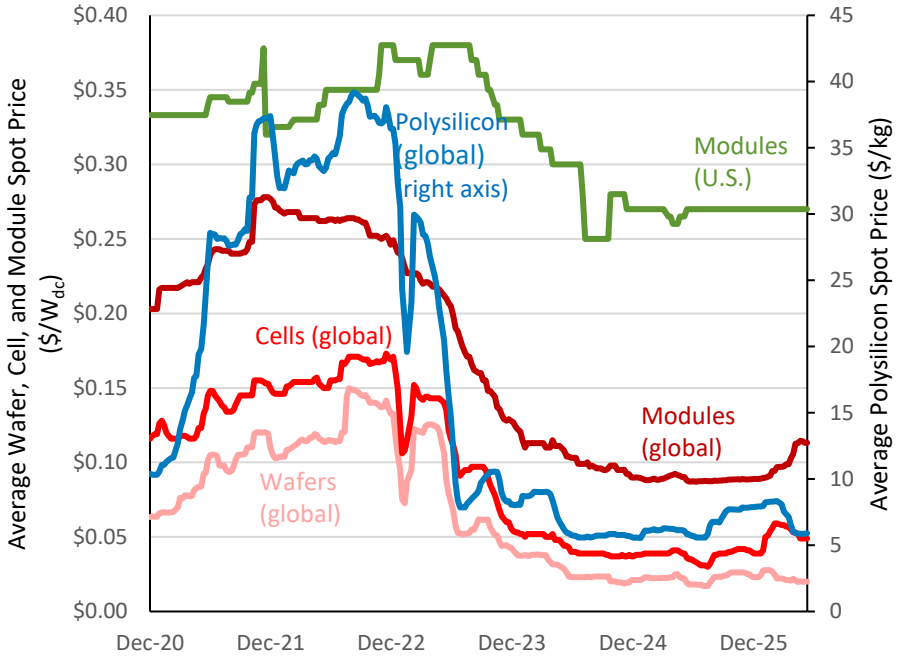
5. **Component Pricing**
6. Market and Policy
7. U.S. PV Imports

- **Global PV polysilicon and wafer pricing dropped ~26% in the first 5 months of 2026, though pricing was flat y/y.**
- **Global PV cell pricing increased 20% in the first 5 months of 2026 (36%, y/y) and global PV module pricing increased 26% (29%, y/y) to $0.11/$W_{dc}$.**
- **The U.S. solar supply chain, however, is only indirectly impacted by Chinese market conditions due to tariffs and other trade restrictions; module prices in the United States remained around $0.27/$W_{dc}$ at the end of May 2026.**
  - **Anza reported a price premium on PV modules that have a higher degree of domestic production.**
  - **Import value of PV modules decreased to $0.18/W in Q1 2026; however, tariffs are likely keeping the price-to-consumer at relatively steady levels.**

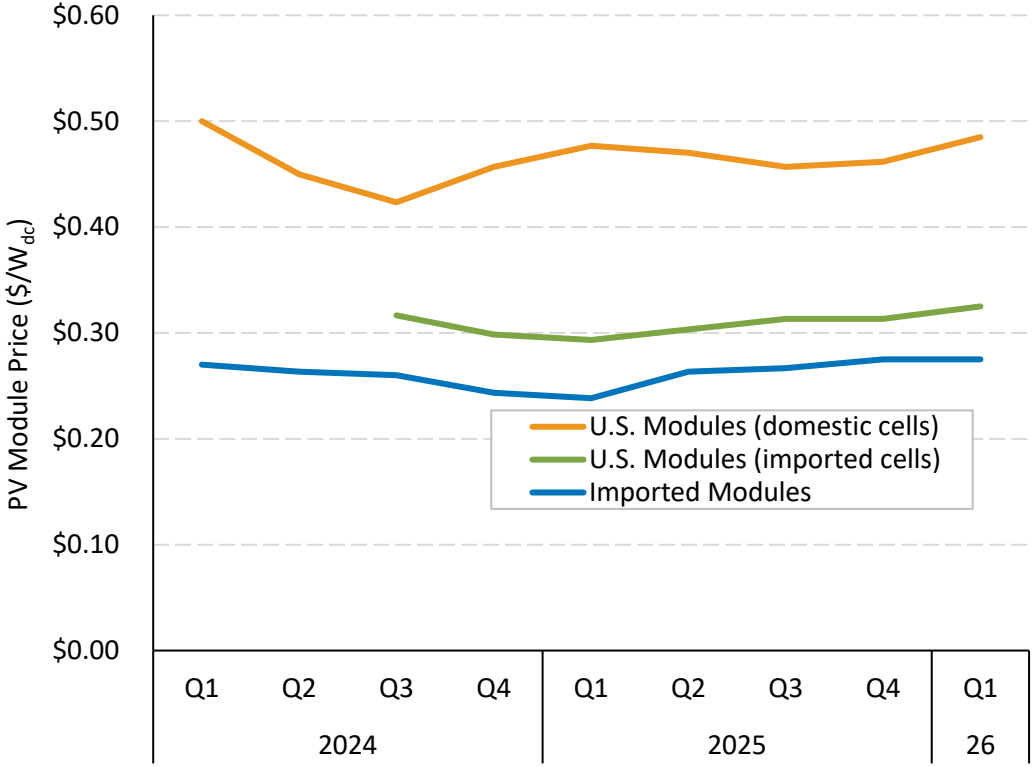
Recent Global PV Component Price Changes



- Global PV polysilicon and wafer pricing dropped ~26% in the first 5 months of 2026, though was flat y/y.
  - PV Magazine attributed the historically low pricing to oversupply and weakening demand caused by China's cancellations of the export tax rebate.
  - Additionally, the Chinese government's efforts to stabilize the solar market, which caused the previous bump in pricing, have thus far lacked clarity on implementation.
- Global PV cell pricing increased 20% in the first 5 months of 2026 (36%, y/y), and global PV module pricing increased 26% (29%, y/y).
  - Despite poly/wafer price cuts, PV Magazine reported that PV module pricing increased for the first 4 months of 2026, which they attributed to:
    - Strong demand for energy independence.
    - Tightened Chinese supply caused by manufacturers reducing capacity to avoid competition, including shutting down older lines or ones operating at lower utilization rates.
    - Reduced European stockpiles as deliveries shift to a just-in-time approach.
  - Additionally, despite a price-drop from the January peak, in May 2026 silver was still trading 1.25x higher than it was the year before.
    - BNEF estimates that silver now accounts for 20% to 30% of PV module costs.

Sources: BNEF, Solar Spot Index, accessed May 2026 ; finance.yahoo.com (silver); PV Magazine, Polysilicon Prices Sliding Toward Historical Lows, April 2026; PV Magazine, PV Module Prices Continue To Rise Unabated, April 2026.

U.S. Distributed PV Module Prices by Origin



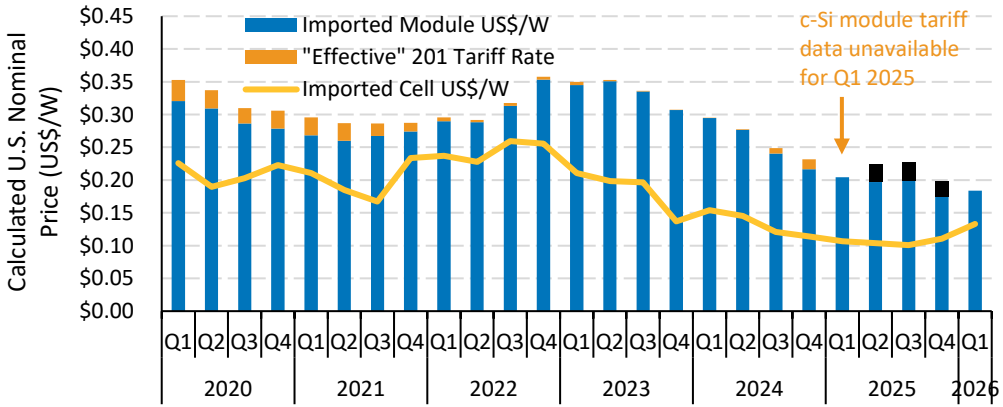
- The U.S. solar supply chain is only indirectly impacted by Chinese market conditions due to tariffs and other trade restrictions.
- Anza reported increased pricing for PV modules for distributed applications, driven by developers purchasing equipment to safe harbor their projects ahead of the July 3, 2026, ITC deadline.
  - Anza said this was particularly true for domestic Mono PERC modules, which increased in price by 20% between November 2025 and February 2026 and as of Q1 2026 was more expensive than TOPCon modules.
- Anza reported a price premium on PV modules that have a higher degree of domestic production.

Source: Anza, U.S. Distributed Generation Q1 2026 Solar Module Pricing Insights Report, Apr. 2026.

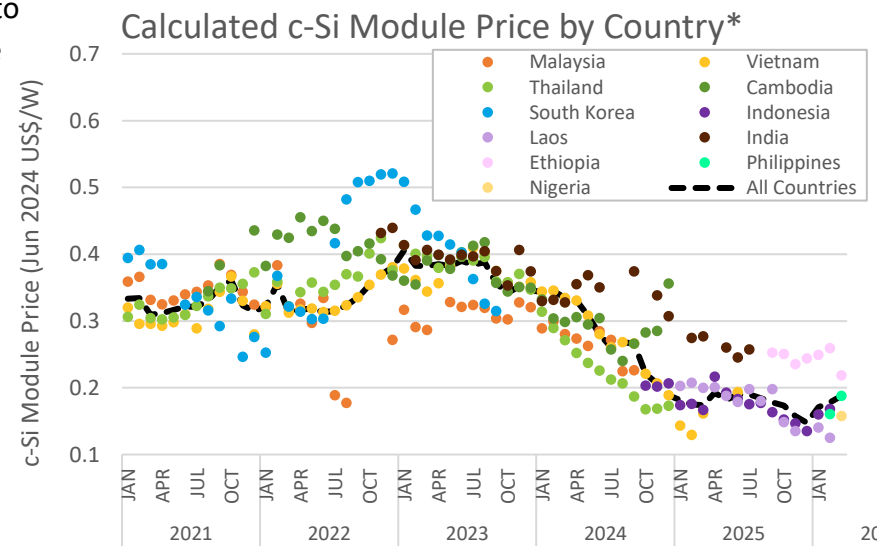
Calculated U.S. Module and Cell Import Pricing

Based on the reported value and capacity of imported PV modules and cells, in Q1 2026, the average price of a U.S. module rose slightly to $0.18/$W_{dc}$, while cell prices rose significantly to $0.13/$W_{dc}$.

- The imposition of reciprocal tariffs in Q2 2025 rendered it impossible to measure the "effective" 201 tariff rate as all imports paid tariffs and the Section 201 tariffs also ended in February 2026.

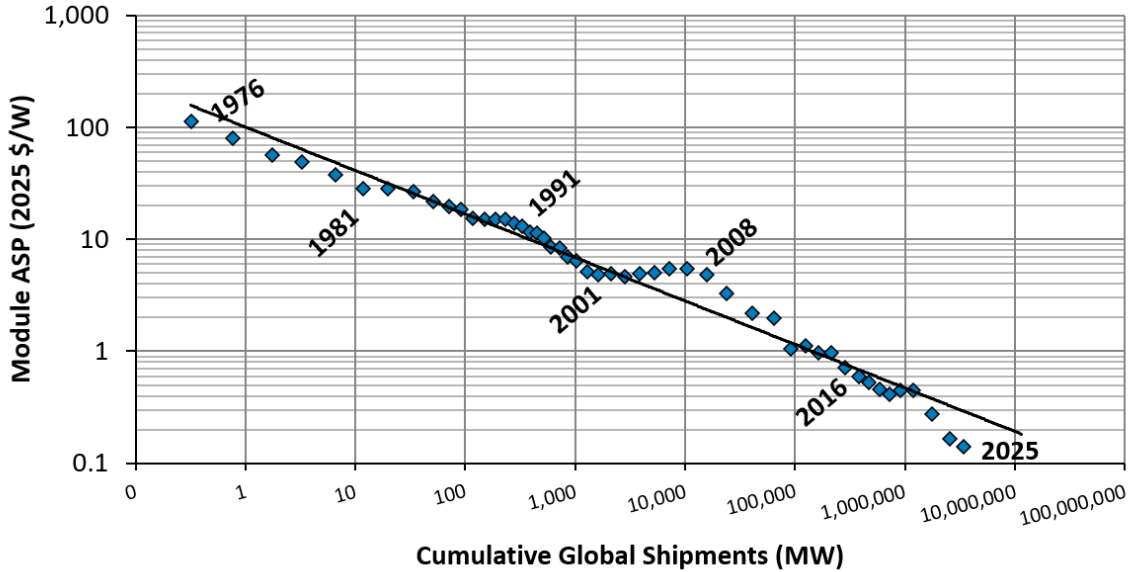


After over 3 years of declining prices, module prices have increased across all 3 months of Q1 2026. Indonesia and Laos continue to drive the major trends in module pricing; however, Ethiopia, the Philippines, and Nigeria appear to be partially responsible for price increases. However, current prices remain quite low, when adjusted for inflation, and are approaching global values, not accounting for tariffs.



Note: The tariff rate was adjusted by the capacity subject to the tariffs. Manual corrections were made to three values because of suspected data entry errors for HTS code 8541430010: Cambodia (February 2022), Malaysia (June 2020), and Vietnam (July 2019). Several gigawatts of imports from India in 2022–2024 and Indonesia in 2025 entered under the HTS code for thin-film modules, but classifications may be erroneous, as the volumes exceed known manufacturing capacities for thin-film panels in India and Indonesia, based on news reports. *Module price by country data plotted for select countries when import volumes >5% of total volumes. **Sources:** Imports by HTS code: 8541406015 (2018–2021)/8541430010 (2022–), 8541406035 (2018–2021)/8541430080 (2022–), and 8541406025 (2018–2021)/8541420010 (2022–). Second quantity (watts) is from the U.S. Census Bureau USA Trade Online Tool and Statistical Corrections as of May 8, 2026.

PV Experience Curve



- This solar PV experience curve, known as Swanson's Law, displays the relationship, in logarithmic form, between the average selling price of a PV module and the cumulative global shipments of PV modules.
- For every doubling of cumulative PV shipments from 1976 to 2024, there has been, on average, a ~23% reduction in PV module price.
- Historically, due in large part to undersupply and oversupply conditions, pricing has deviated from the experience curve.

Source: SPV Market Research, Photovoltaic Manufacturer Capacity, Shipments, Price & Revenues 2024/2025, April 2025.

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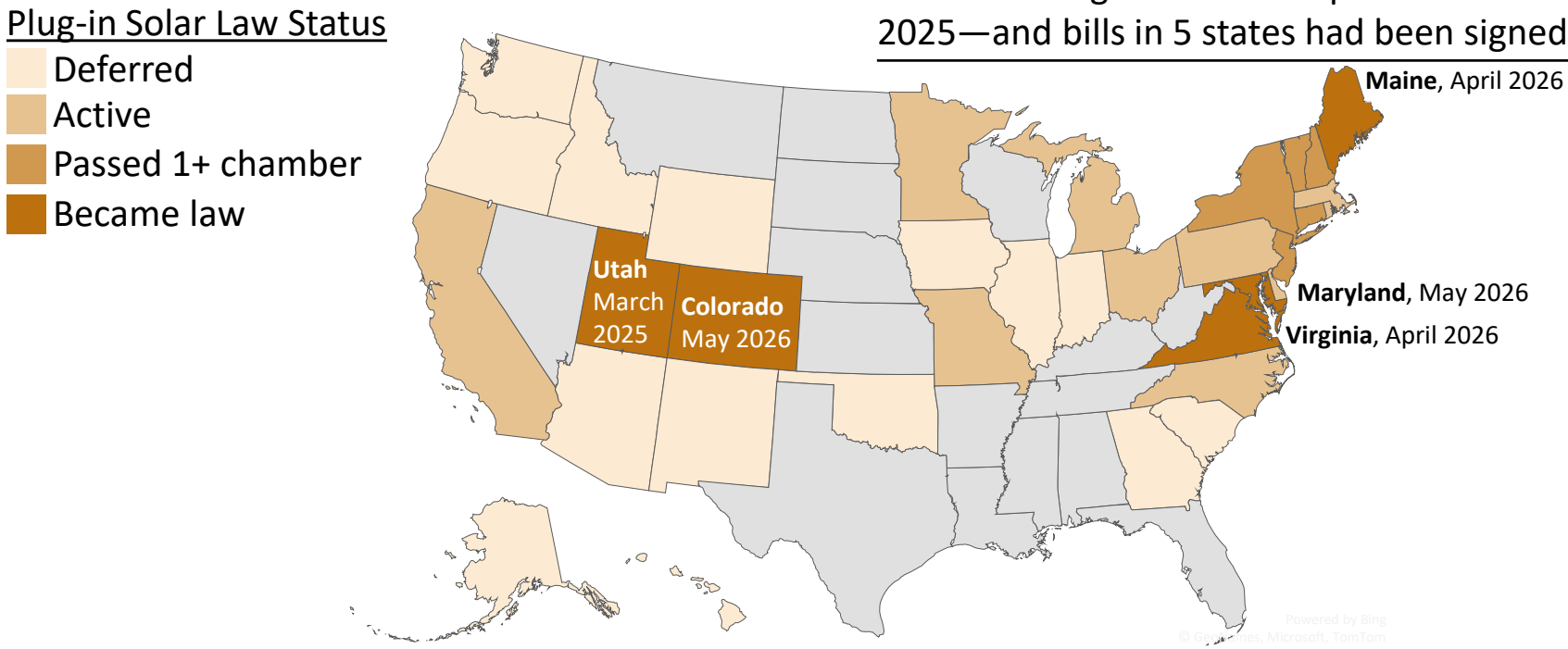
- **As of May 12, 2026, 34 states and Washington, D.C., had introduced plug-in solar legislation—compared with 3 as of fall 2025—and bills in 5 states had been signed into law.**
- **The Invesco Solar exchange-traded fund (ETF; TAN) rose 8% in Q1 2026, compared with a 5% decline for the S&P 500 and a steady Russell 2000. TAN also outperformed the broader market in the first 5 months of 2026 (up 45%) and since its low point in April 2025 (up 170%).**
- **In February and April 2026, the Department of Commerce announced preliminary affirmative decisions for CVD and AD investigations, respectively, for c-Si PV modules and cells manufactured in Laos, Indonesia, and India. Final decisions are due July 6, 2026.**

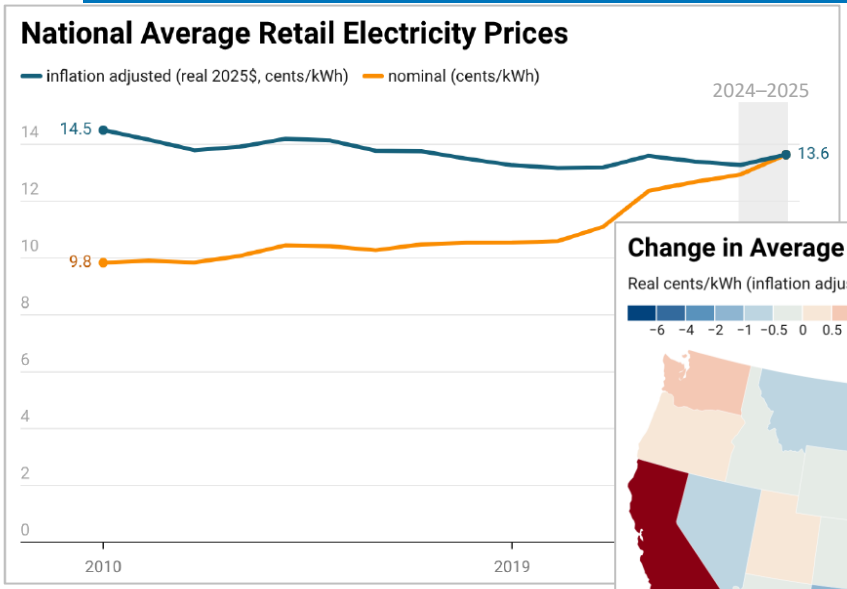
States that Have Introduced Plug-In Solar Legislation

The map shows states that have introduced or enacted legislation to allow utility customers to install plug-in solar systems without utility permission. As of May 12, 2026, 34 states and Washington, D.C., had introduced legislation—compared with 3 as of fall 2025—and bills in 5 states had been signed into law.

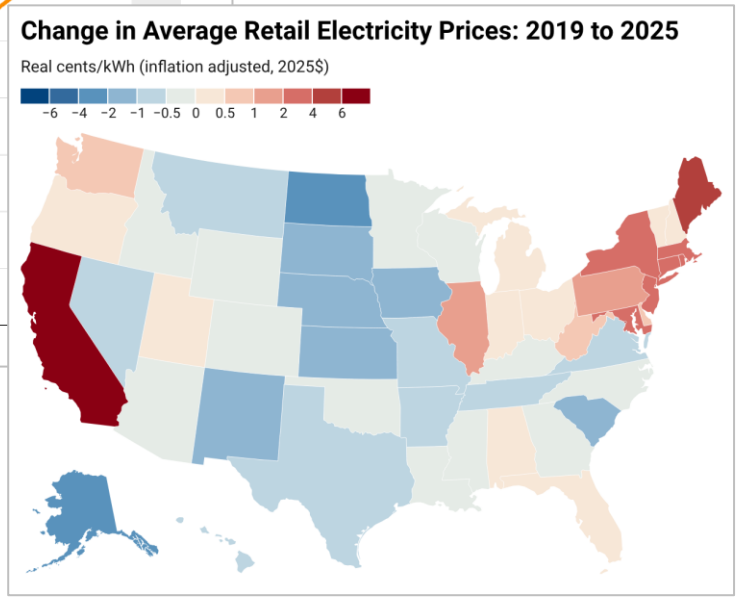


Sources: Bright Saver, Plug-in Solar States at a Glance, accessed May 11, 2026; state legislative websites.

Retail Electricity Price Trends and Drivers



High levels of utility rate increase requests and approvals indicate continued near-term price increases in the absence of policy or market interventions.



Average U.S. electricity prices increased during 2019–2025, largely in line with inflation:

- Up 29% in nominal terms
- Up 3% in real terms.

Price changes varied by state.

- Real prices fell in 29 states.
- Largest real price increases were in California, the Northeast, and the Mid-Atlantic.

Transmission, distribution, and business operations were the main drivers of real increases.

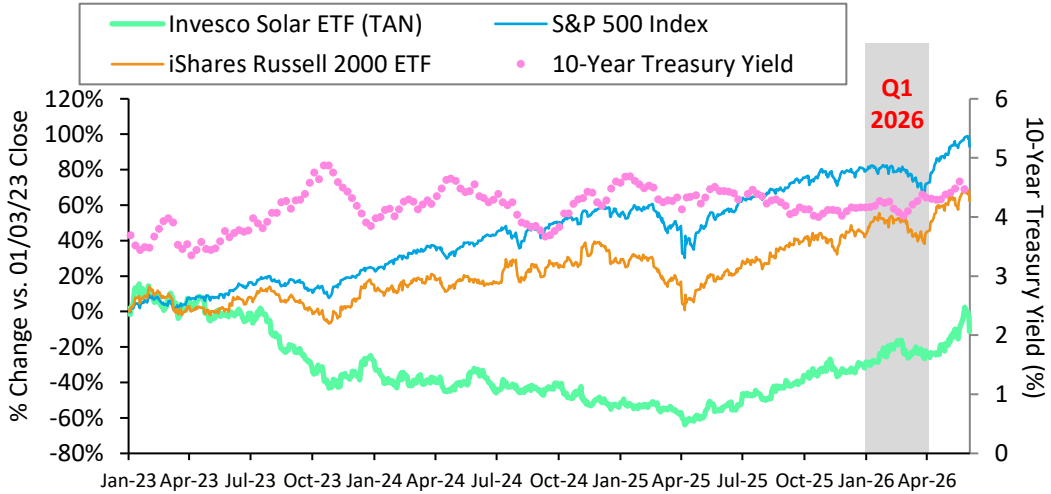
- Included impacts of replacing old equipment, system hardening, expansion, storm cost recovery, and wildfire mitigation.

Renewable portfolio standards (RPS), net metering, and carbon cap-and-trade policies raised prices in some states, but wind and solar deployed outside RPS likely did not.

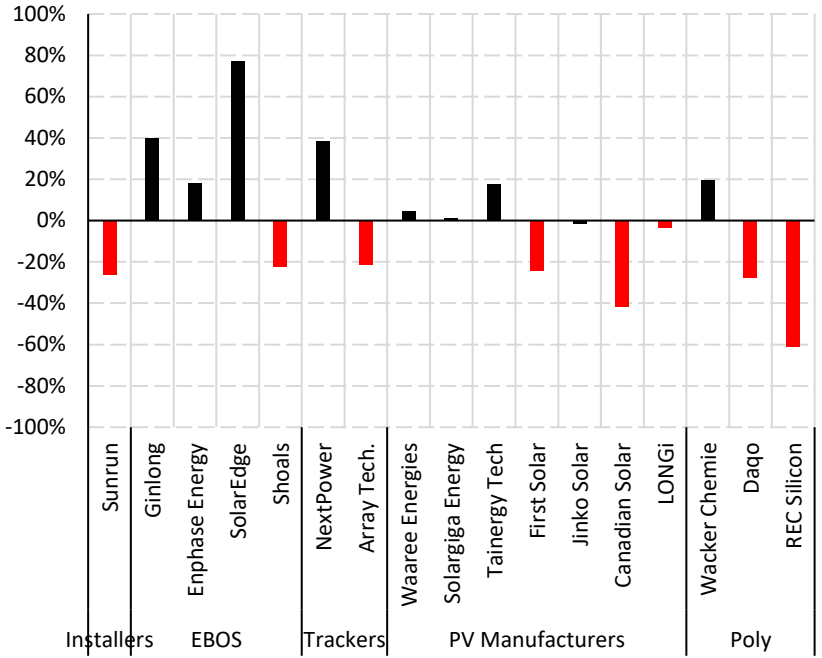
Source: LBNL, Retail Electricity Price Trends and Drivers: Data Update–2026 Edition, April 2026.

Stock Market Activity

The Invesco Solar exchange-traded fund (ETF; TAN) rose 8% in Q1 2026, compared with a 5% decline for the S&P 500 and a steady Russell 2000. TAN also outperformed the broader market in the first 5 months of 2026 (up 45%) and since its low point in April 2025 (up 170%). Since early 2025, investor sentiment about solar energy recovered as U.S. electricity demand and prices continued rising, demand for solar energy remained strong, and the worst-case policy scenario investors had priced in failed to materialize.



Individual Stocks (Jan. 1, 2026–March 31, 2026)

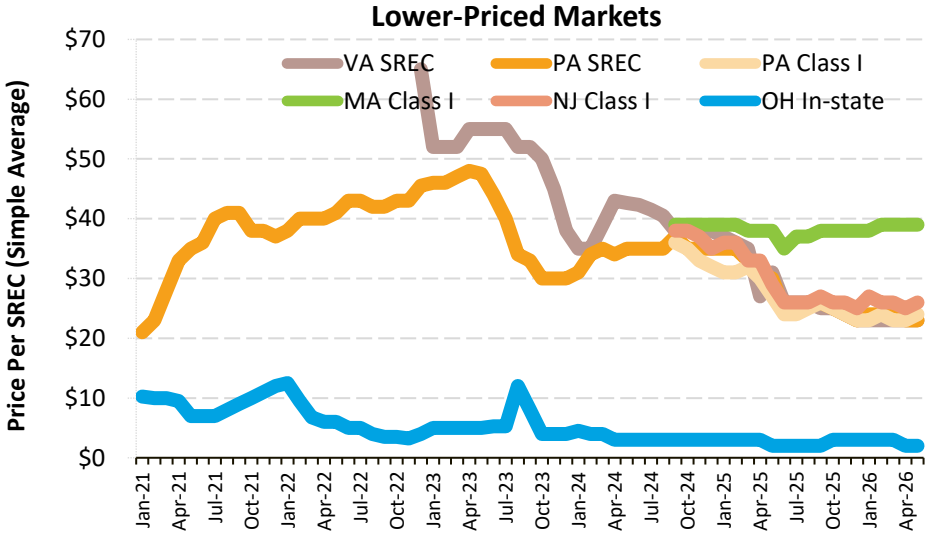


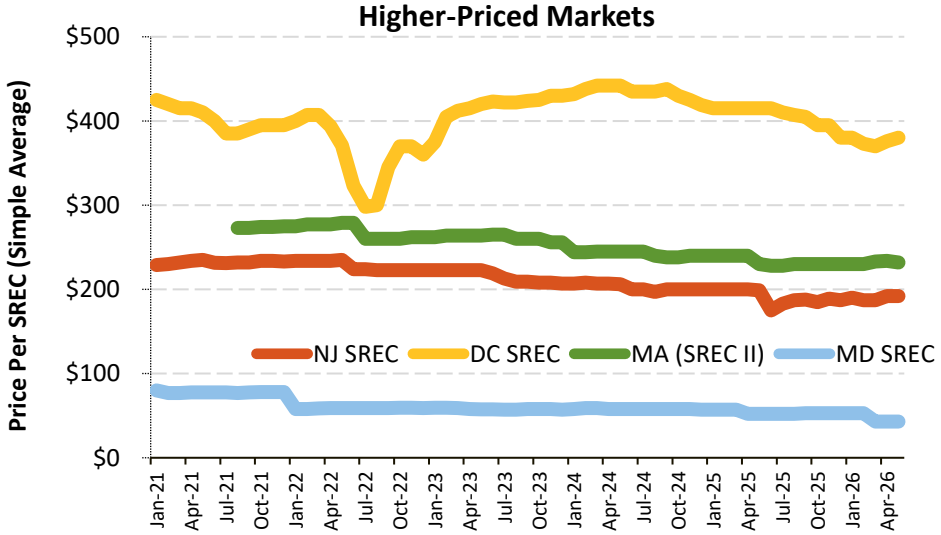
Note: The TAN index is weighted toward particular countries and sectors. As of June 2026, 53% of its funds were in U.S. companies, and 9% were in Chinese companies. Its top 10 holdings, representing 64% of its value, were First Solar, NextPower, Enphase, Enlight, SolarEdge, Sunrun, Doral Group, OY Nofar Energy, HA Sustainable Infrastructure, and Solaria.

Sources: Federal Reserve Bank of St. Louis, Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity, June 2026; Invesco, Invesco Solar ETF, June 2026; MarketWatch, Invesco Solar ETF, iShares Russell 2000 ETF, and S&P 500, accessed June 2026; Yahoo Finance, Solar's Most Hated Year Became Its Best Five Months. The Setup That Explains the 120% Gain, June 2026; Yahoo Finance, Zacks Industry Outlook Highlights First Solar, Enphase Energy and Canadian Solar, May 2026.

SREC and REC Pricing

- Solar renewable energy certificate (SREC) pricing was relatively stable in the first 5 months of 2026.
- Class I renewable energy certificate (REC) pricing, which is open to technologies beyond solar, tends to be significantly lower than SREC pricing, though it varies by state.





Source: SRECTrade, accessed May 2026.

Trade News

In December 2025, the U.S. Trade Representative (USTR) extended **Section 301 tariff exclusions for solar manufacturing equipment** through November 10, 2026. Also in December, Maxeon filed a complaint with the U.S. Court of International Trade (CIT) about the continued detention of their panels under UFLPA.

In February, the U.S. government withdrew from the appeal of the CIT's determination that the moratorium on collecting AD/CVD from June 2022–June 2024 (a.k.a. the "solar bridge") was illegal. The appeal will now be pursued solely by a coalition of trade associations, U.S. developers, and select manufacturers, with potentially billions of dollars of **retroactive AD/CVD duties** at stake.

In March, the USTR initiated a **new Section 301 investigation** into imports from China, the European Union, Singapore, Switzerland, Norway, Indonesia, Malaysia, Cambodia, Thailand, Korea, Vietnam, Taiwan, Bangladesh, Mexico, Japan, and India.

Also in March, the U.S. International Trade Commission opened a **new Section 337 investigation** into TOPCon solar cells and modules following a complaint from First Solar, naming 47 entities across 11 countries for alleged patent infringement. First Solar has requested a general exclusion order, which could block disputed TOPCon products from entering the U.S. market.

Reciprocal tariffs—many of which had fluctuated significantly since their announcement in April 2025—were struck down by the Supreme Court, also in February, 2026. CBP established a portal in April 2026 for importers to request refunds with a 180-day deadline for some types of imports.

Section 232 determinations for solar and wind cases initiated in July 2025 remain a mystery, although the deadline for the Department of Commerce (DOC) to provide a report to the President has likely* passed.

Sources: Shanshan Liu, Until 2026! U.S. Extends Tariff Exemptions for 178 Solar Manufacturing Equipment Items, Solarbe Global, Dec. 9, 2025; Kelly Pickerel, Government Decides To Not Appeal CIT Ruling on Retroactive Solar Panel Tariffs, Solar Power World, Feb. 5, 2026; Federal Register : Initiation of Section 301 Investigations: Acts, Policies, and Practices of Certain Economies Relating to Structural Excess Capacity and Production in Manufacturing Sectors; Vincent Shaw, US ITC Opens Section 337 Probe Into Global TOPCon Supply Chain, pv magazine, March 30, 2026; Pete Mento and Tosca Derrick, IEEPA FAQ: Tariff Refund Rules, Eligibility and Filing Steps, Baker Tilly, May 18, 2025; Lindsay Whitehurst, Supreme Court Strikes Down Trump's Sweeping Tariffs, AP News, Feb. 21, 2026.

Note: *Given potential shutdown-related delays, it is unknown how or whether this deadline was adjusted.

AD/CVD Rates Issued for Laos, Indonesia, and India

On February 24, the DOC issued a preliminary decision to impose countervailing duties (CVD) on c-Si panels and cells produced in Laos, Indonesia, and India.

Countervailable subsidy is when foreign governments provide financial assistance to foreign producers that is deemed unfair. CVD are imposed to level the playing field for domestic manufacturers. U.S. Customs and Border Protection began collecting these duties immediately.

Companies listed in **boldface** are the top 1–2 companies by volume in each country in July 2024–July 2025 according to DOC.

Country	Finding	Company Investigated	Duty Rate
Laos (20%)	Positive	**Solarspace, VSUN**	80.67%
		All others	80.67%
Indonesia (41%)	Positive	✓ **PT Blue Sky Solar**	143.30%
		PT REC Solar Energy	85.99%
		✓ All others	104.38%
India (3%)	Positive	✓ **Mundra Solar, Kowa Company, Premier Energies**	125.87%
		All others	125.87%

Percentages under country names are the % of c-Si module and cell capacity imported into the United States from that country in 2025.

✓ Check marks indicate companies for which "critical circumstances" (i.e., a surge of imports during the investigation attempting to avoid duties) were found, meaning that duties could be applied up to 90 days retroactively.

AD/CVD Rates Issued for Laos, Indonesia, and India

Country	Finding	Company Investigated	Duty Rate
Laos (20%)	Positive	**Solarspace**, VSUN	33.17%*
		All others	33.17%*
Indonesia (41%)	Positive	**PT Blue Sky Solar**	94.36%*
		PT REC Solar Energy	35.17%
		All others	35.17%
India (3%)	Positive	**Mundra Solar, Kowa Company, Premier Energies**	107.77%
		All others	107.77%

Percentages under country names are the % of c-Si module and cell capacity imported into the United States from that country in 2025.

✓ Check marks indicate companies for which "critical circumstances" (i.e., a surge of imports during the investigation attempting to avoid duties) were found, meaning that duties could be applied up to 90 days retroactively.

On April 28, the DOC issued a preliminary decision to impose antidumping duties (ADD) on c-Si panels and cells produced in Laos, Indonesia, and India.

Dumping is when foreign companies sell products for less than it costs them to produce (a.k.a. less than fair value). ADD are imposed to level the playing field for domestic manufacturers. U.S. Customs and Border Protection began collecting these duties immediately.

Companies in **boldface** are the top 1–2 companies by volume in each country in July 2024–July 2025, according to DOC.

*Rates for certain companies in Laos and Indonesia were updated.

AD/CVD Rates Issued for Laos, Indonesia, and India

Country	Finding	Company Investigated	Duty Rate
Laos (20%)	Positive	**Solarspace**, VSUN	113.84%*
		All others	113.84%*
Indonesia (41%)	Positive	**PT Blue Sky Solar**	237.66%*
		PT REC Solar Energy	121.16%
		All others	139.55%
India (3%)	Positive	**Mundra Solar, Kowa Company, Premier Energies**	233.64%
		All others	233.64%

Percentages under country names are the % of c-Si module and cell capacity imported into the United States from that country in 2025.

These duties are preliminary and subject to change. Final determinations are due July 6. Rates will also be adjusted annually.

Country	AD/CVD Rate
Laos (20%)	~115%
Indonesia (41%)	~120%–240%
India (3%)	~230%

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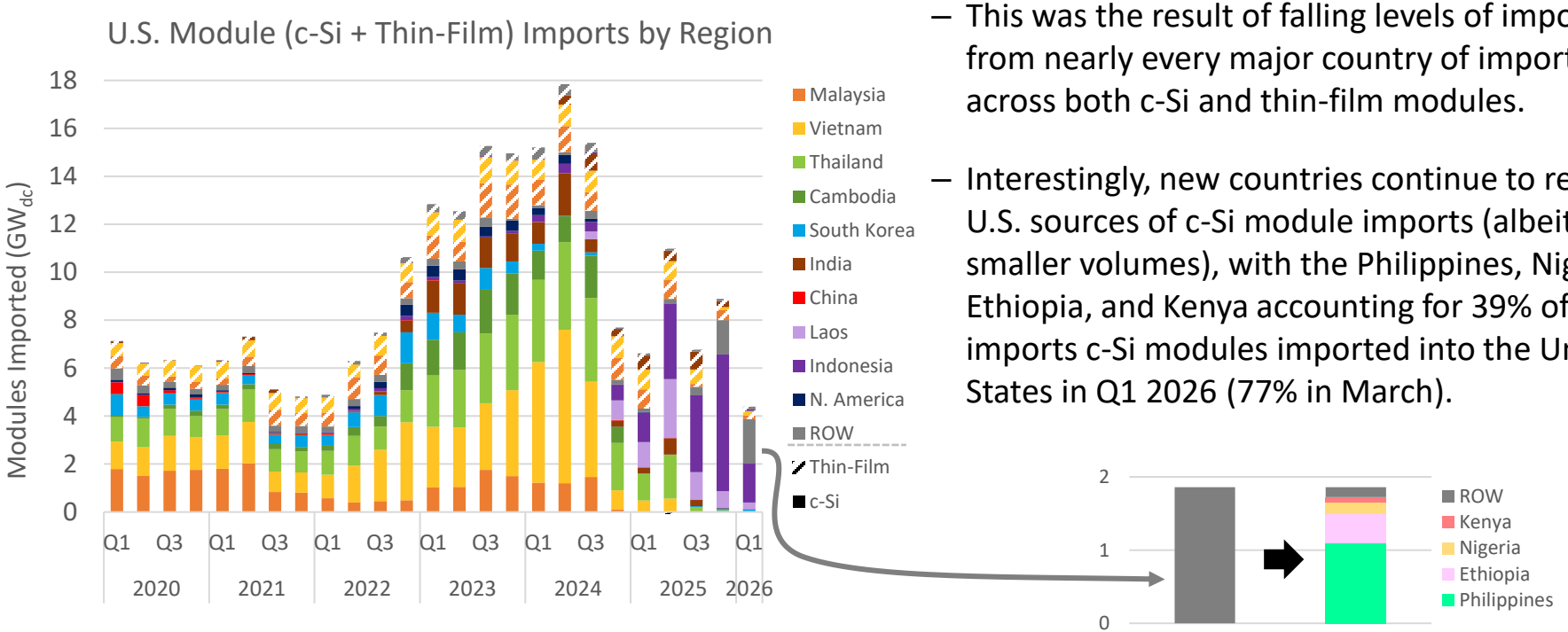
- **According to U.S. Census data, Q1 2026 module imports fell 34%, q/q, hitting only 4.4 GW_{dc}—a level not seen since the first half of 2022.**
- **According to U.S. Census data, the United States imported 3.6 GW_{dc} of PV cells in Q1 2026, a decline of 16%, q/q.**

U.S. Module Imports Q1 2026 by Region

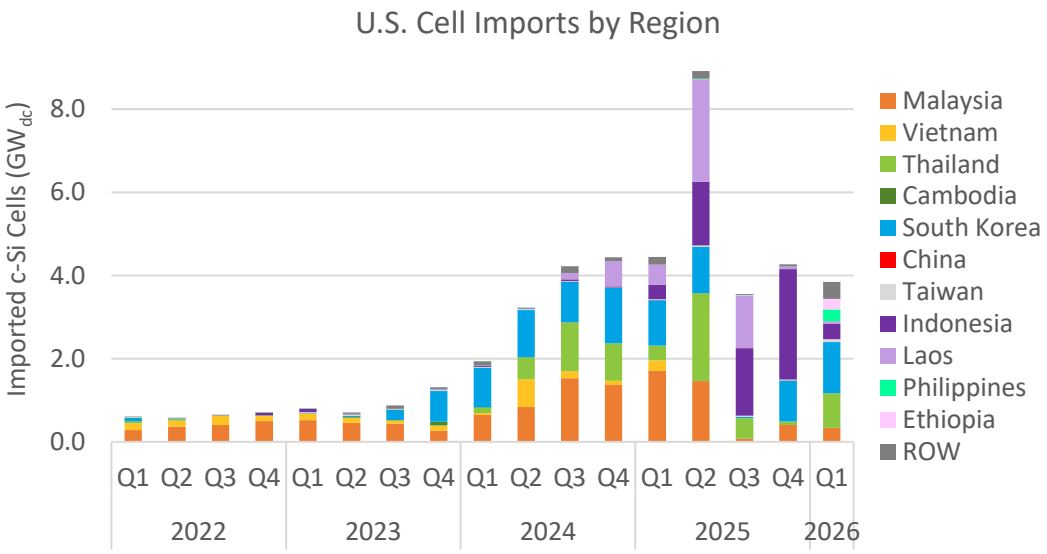
According to U.S. Census data, Q1 2026 module imports fell 51%, q/q, reaching only 4.4 GW_{dc}, the lowest volume of module imports since Q2 2019.

- This was the result of falling levels of imports from nearly every major country of import, across both c-Si and thin-film modules.
- Interestingly, new countries continue to replace U.S. sources of c-Si module imports (albeit at smaller volumes), with the Philippines, Nigeria, Ethiopia, and Kenya accounting for 39% of imports c-Si modules imported into the United States in Q1 2026 (77% in March).



Note: Several gigawatts of imports from India in 2022–2024 and Indonesia in 2025 entered under the HTS code for thin-film modules, but classifications may be erroneous, as the volumes exceed known manufacturing capacities for thin-film panels in India and Indonesia. **Sources:** Imports by HTS code: 8541460015 (2018–2021)/8541430010 (2022–) and 8541460035 (2018–2021)/8541430080 (2022-); second quantity (watts) from the U.S. Census Bureau USA Trade Online tool and corrections page as of May 8, 2026.

Crystalline Si PV Cell Import Data Q1 2026

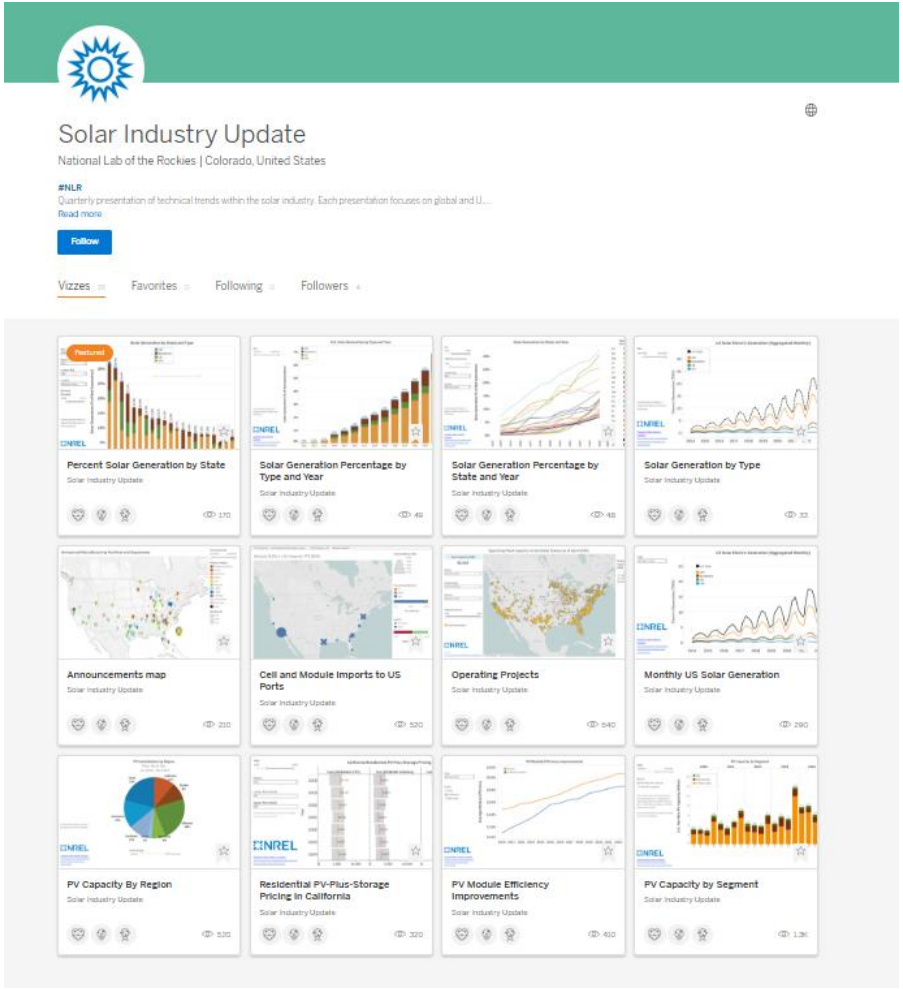


According to U.S. Census data, the United States imported 3.6 GW_{dc} of PV cells in Q1 2026, a decline of 16%, q/q.

- In Q1, imports from South Korea continued to grow, likely the result of Hanwha Qcells module production scaling back up after having halted due to UFLPA detainments.
- Similarly to c-Si modules, the Philippines and Ethiopia have emerged as new sources of c-Si cells, accounting for 15% of imports in Q1 2026, collectively.

On February 6, 2026, Section 201 tariffs on imported cells and modules ended. The USITC must submit a report to Congress on the effectiveness of the tariffs within 180 days.

Sources: Imports by HTS code: 8541460025(2018–2021)/8541420010(2022–); second quantity (watts) from U.S. Census Bureau USA Trade Online tool and corrections page as of May 8, 2026. Ben Santarris, Qcells' Customs-Detained Cells Released to Its Georgia Factories, pv magazine, Sept. 24, 2025; Federal Register: Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Evaluation of the Effectiveness of Import Relief.



Interested in checking out more of our data in Tableau? Click here.

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List of Acronyms and Abbreviations

a-Si: amorphous silicon
ac: alternating current
AD: anti-dumping
ADD: anti-dumping duties
B: billion
BESS: battery energy storage system
BNEF: BloombergNEF
C&I: commercial and industrial
c-Si: crystalline silicon
CAISO: California Independent System Operator
CC: combined cycle
CdTe: cadmium telluride
CIS/CIGS: copper indium gallium selenide
CIT: U.S. Court of International Trade
CPUC: California Public Utilities Commission
CSP: concentrating solar power
CSTA: China Solar Thermal Alliance
CT: combustion turbine
CuRe: copper replacement
CVD: countervailing duty
dc: direct current
DOC: U.S. Department of Commerce
DOE: U.S. Department of Energy
DPV: distributed PV
EIA: U.S. Energy Information Administration
ERCOT: Electric Reliability Council of Texas
ETF: exchange-traded fund
EU: European Union
EV: electric vehicle
FAA: Federal Aviation Administration
GW: gigawatt
GWh: gigawatt-hour
GWht: gigawatt-hour thermal
H1: first half of year
HJT: heterojunction
HTS: harmonized tariff schedule
IEA: International Energy Agency
IP: intellectual property
ITC: investment tax credit
kW: kilowatt
kWh: kilowatt-hour
LDES: long-duration energy storage
LFP: lithium iron phosphate
LPO: U.S. Department of Energy Loan Program Office
M: million
MISO: Midcontinent Independent System Operator
MW: megawatt
MWh: megawatt-hour
NEM: net energy metering
NLR: National Laboratory of the Rockies
NYISO: New York Independent System Operator
NYSERDA: New York State Energy Research & Development Authority
OBBBA: One Big, Beautiful Bill Act
PERC: passivated emitter and rear cell
PG&E: Pacific Gas & Electric
PPA: power purchase agreement
PV: photovoltaics
Q: quarter
Q1: first quarter of year
q/q: quarter over quarter
REC: renewable energy certificate
ROW: rest of the world
RPS: renewable portfolio standards
SHJ: silicon heterojunction
SPP: Southwest Power Pool
SREC: solar renewable energy certificate
TAN: Invesco Solar ETF
TOPCon: tunnel oxide passivated contact
TPO: third-party owned
TW: terawatt
UFLPA: Uyghur Forced Labor Prevention Act
UK: United Kingdom
UPV: utility-scale PV
USTR: U.S. Trade Representative
W: watt
y/y: year over year