

20  
24 | Q3

CLEAN POWER QUARTERLY

# Market Report



Photo credit: Evn

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\*The Clean Power Procurement section was updated on Dec. 9, 2024 to reflect changes to the text and charts. The underlying data remains unchanged.

# Clean Power Definitions & Acronyms

## Definitions

**Advanced development:** Projects not under construction, but with a PPA, firm equipment order, or moving forward with plans to be placed under utility ownership as of the end of the most recent quarter. For offshore wind, advanced development consists of projects that have secured offtake or have had successful bids in response to a state solicitation even if final offtake negotiations have not concluded.

**Capacity:** Project nameplate capacity. Unless otherwise stated, ACP reports capacity in MW-ac.

**Clean power:** For the purposes of this report, clean power includes land-based wind, offshore wind, utility-scale solar, and battery storage technology.

**Decommissioned:** Project is offline and is no longer delivering power to the grid on a permanent basis. Physical removal of equipment is not a requirement.

**Duration:** The amount of time, in hours, a battery can discharge its power capacity before depleting its energy capacity. For example, a 2 MW battery that has 4 MWh of energy capacity has a duration of 2 hours.

**Full repowering:** Full decommissioning of a utility-scale project. The original equipment is physically removed from the project site and replaced with new utility-scale equipment.

**Inverter Loading Ratio (ILR):** The ratio of installed DC capacity to the inverter's AC power rating. Also known as the AC-to-DC ratio.

**Online:** Project has reached commercial operation and is delivering electricity to the ultimate point of delivery.

**Partial repowering, nacelle replacement:** Complete replacement of a utility-scale wind turbine's nacelle, rotor, and blades. The tower and foundation are retained.

**Partial repowering, major retrofit:** Complete replacement of a utility-scale wind turbine's rotor and blades, along with the replacement of at least one major component within the nacelle, typically the gearbox or the generator.

**Pipeline:** Projects either under construction or in advanced development.

**Repowered:** Full or partial equipment replacement. Currently only wind repowering activity is tracked, but ACP will expand repowering activity tracked as the market progresses.

**Under construction:** Construction team has begun work on the ground at the project site. For offshore wind, under construction is defined as in-ocean construction.

## Acronyms

<b>AC</b>	Alternating Current
<b>C&amp;I</b>	Commercial & Industrial
<b>CAISO</b>	California ISO
<b>DC</b>	Direct Current
<b>ERCOT</b>	Electric Reliability Council of Texas
<b>GW</b>	Gigawatts
<b>GWh</b>	Gigawatt hours
<b>ILR</b>	Inverter Loading Ratio
<b>IOU</b>	Investor-Owned Utility
<b>ISO</b>	Independent System Operator
<b>MISO</b>	Midcontinent Independent System Operator
<b>MW</b>	Megawatts
<b>MWh</b>	Megawatt hours
<b>NE-ISO</b>	New England ISO
<b>NYISO</b>	New York ISO
<b>OEM</b>	Original Equipment Manufacturer
<b>PJM</b>	Pennsylvania-New Jersey-Maryland Interconnection
<b>PPA</b>	Power Purchase Agreement
<b>RTO</b>	Regional Transmission Organizations
<b>SPP</b>	Southwest Power Pool

# 2024 Q3 Highlights

## U.S. developers installed 10.2 GW of clean power in Q3

- Developers brought 10,194 MW of utility-scale solar, wind, and energy storage projects online in the third quarter of 2024, up 78% from the 5,724 MW installed in Q3 2023.
- As of September 30, 2024, the U.S. had 293,920 MW of clean power capacity in operation, enough to power 72 million homes.

## 2024 hot streak continues, with strongest Q3 on record

- The U.S. clean power industry connected more clean power to the grid in the third quarter of 2024 than in any previous third quarter.
- The record for largest Q3 follows the record-setting Q2 2024, which was the largest second quarter in U.S. history, and sets 2024 on the path to surpass 2023's record for most clean power installed in a single year.

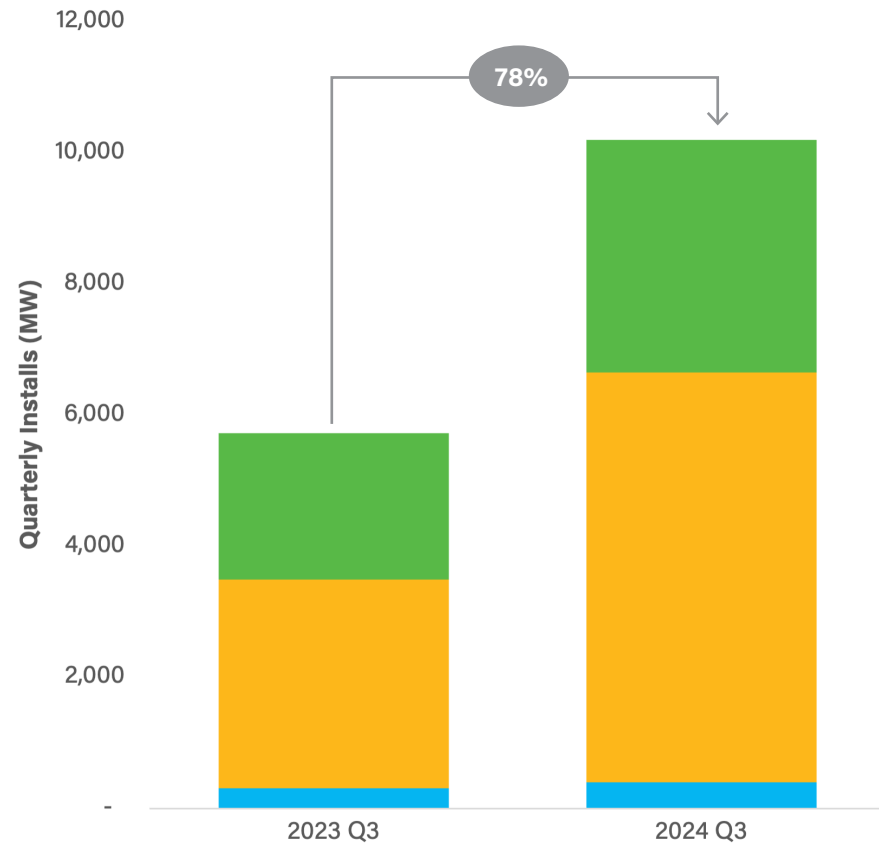
## New states join the top installers list in Q3 2024

- While Texas and California came in first and second again for quarterly clean power installations in Q3 2024, the rise of utility-scale solar in the U.S. Southeast has led new states to join the list of top installers.
- Louisiana, Arkansas, and Mississippi made it on to the Top 10 list for quarterly clean power installations for the first time ever in the quarter.

## Energy storage powering pipeline growth

- The energy storage pipeline increased by 5.8 GW in Q3, accounting for 80% of the clean power pipeline's net growth during the quarter.
- The new additions drove the overall storage pipeline up to 39.2 GW at the end of Q3 — 17% higher than it ended Q2 and an acceleration from its 14% average quarterly growth rate going back to 2022.

Clean Power Capacity Additions by Quarter, Q3 2023 vs Q3 2024



Land-based Wind



Offshore Wind



Solar



Storage

Solar capacity is reported in MWac

# U.S. Clean Power Deployments Soar Toward 294 GW

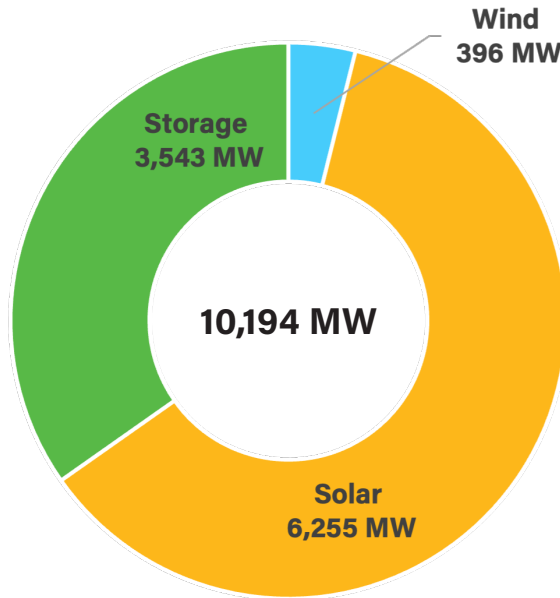
## 2024 Q3 installs

- Project developers commissioned 132 utility-scale solar, battery storage, and wind projects in the third quarter, adding 10,194 MW of clean power capacity to the grid.
- Clean power capacity installations were 78% higher in the third quarter of 2024 than in the same quarter in 2023, continuing the record-setting trend set in the first two quarters of the year.
- Year-to-date clean power installations totalled 29,587 MW for the first nine months of 2024, dramatically outpacing the 15,892 MW installed during the same time in 2023 by 86%. Notably, 2023 was the strongest year for clean power installations on record.
- While solar provided 61% of quarterly clean power installations with nearly 6.3 GW deployed, storage installations comprised 35% of the quarter's additions with more than 3.5 GW of new capacity completed.

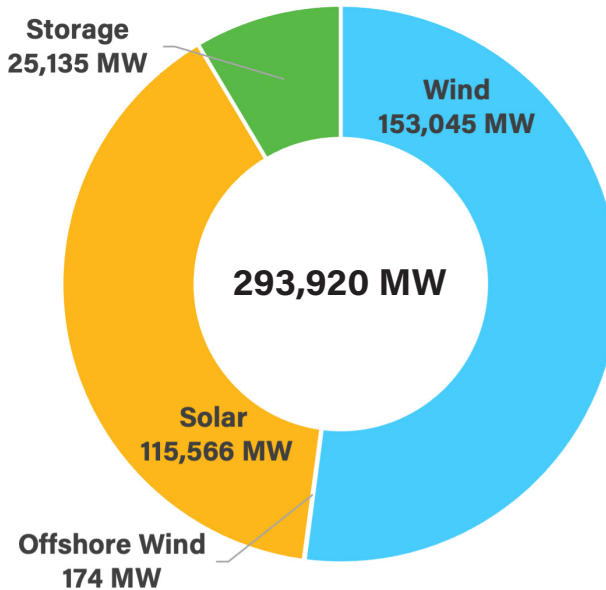
## Cumulative operating clean power capacity

- As of the end of Q3 2024, 293,920 MW of clean power capacity had been installed in the U.S., enough to power around 72 million American homes.
- The U.S. storage fleet soared past the 25 GW capacity mark during the third quarter, continuing the dynamic growth pattern observed in the last three years.
- Record-breaking solar installations led clean energy installations in Q3 2024, with cumulative installed solar capacity breaking 115 GW.
- No offshore wind projects were fully commissioned in Q3, keeping installed capacity at 174 MW.
- Even with a slowdown in installations in recent quarters, land-based wind remains the top installed clean power technology with over 153 GW.

Q3 2024 Clean Power Installs by Technology

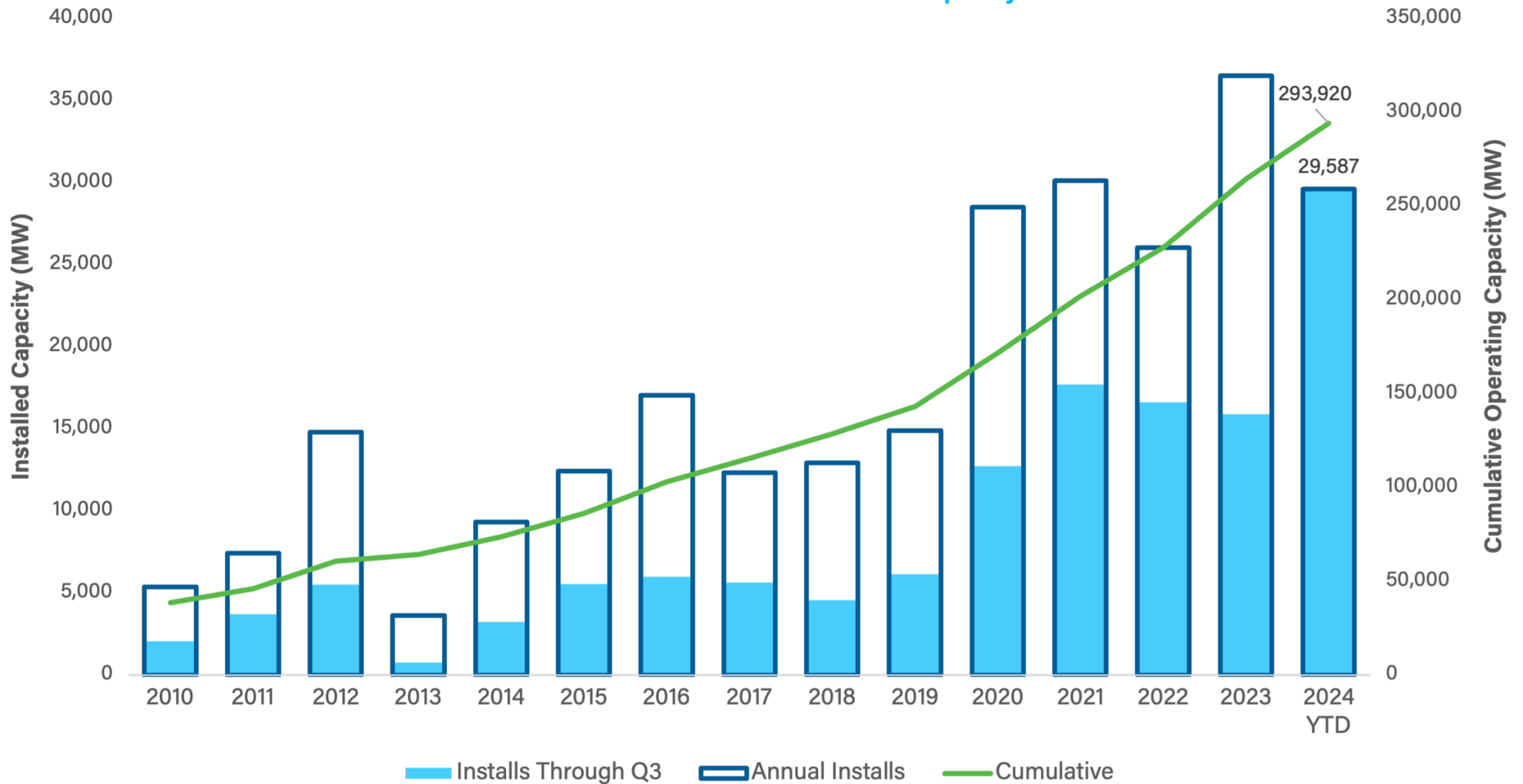


Total Operating Clean Power Capacity by Technology



# U.S. Clean Power Deployments Soar Toward 294 GW (continued)

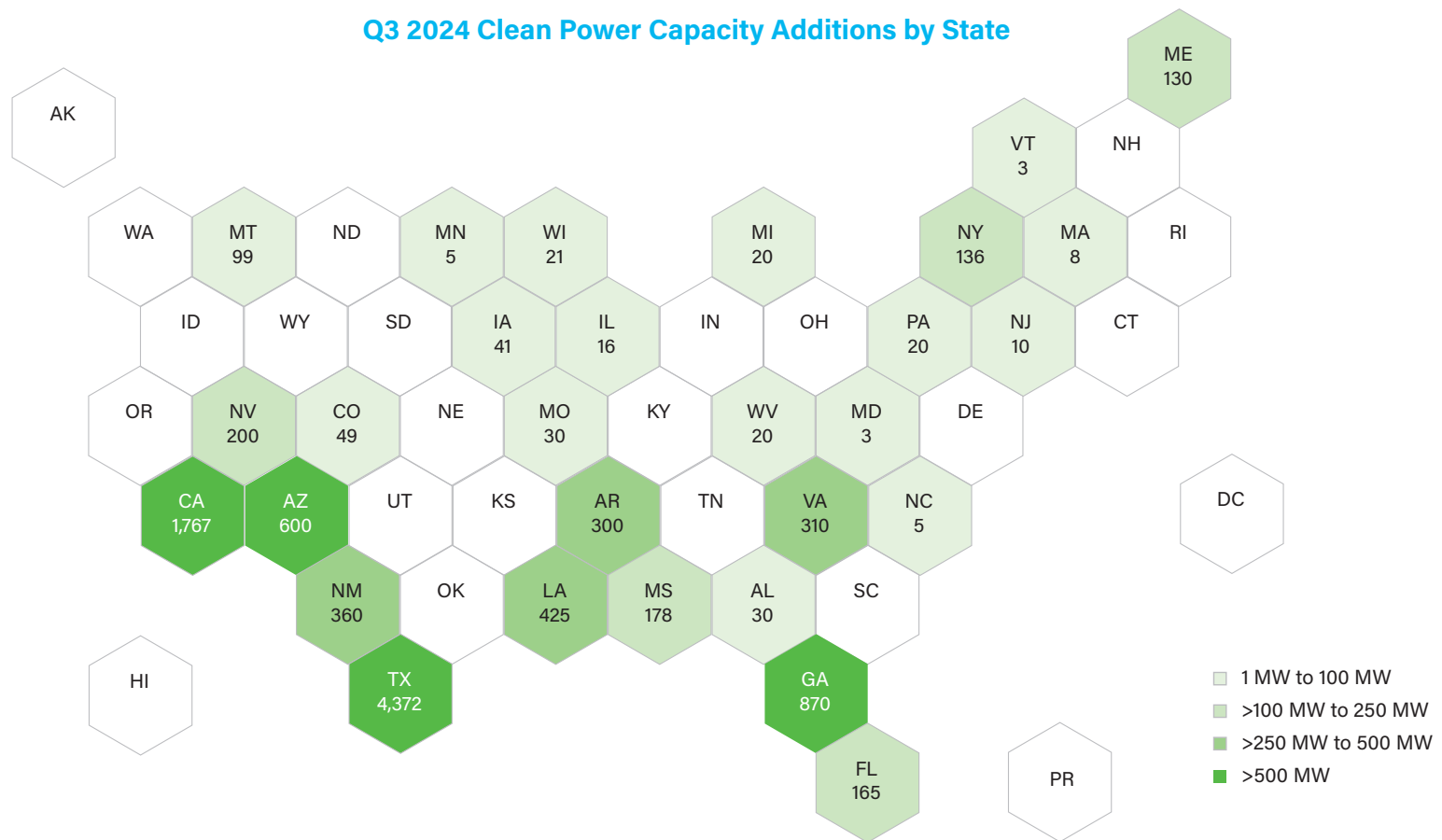
U.S. Annual and Cumulative Clean Power Capacity Growth



# Q3 2024 Clean Power Capacity Additions by State

- Twenty-nine U.S. states brought new clean power projects online in Q3 2024.
- Thirteen states brought online more than 100 MW of new clean power capacity, with four of those 13 bringing online more than 500 MW.
- Texas brought the most new clean power capacity online of any state in Q3, adding 4,372 MW of utility-scale solar, wind, and storage capacity to the grid. The Lone Star State accounted for 43% of all clean power capacity installed in Q3 and was the only state to commission projects from all three technologies.
- California came in second place for third quarter installations, adding 1,767 MW. Energy storage accounted for 85% of California’s clean power additions during the quarter, continuing its trend toward connecting more storage than solar.
- Georgia’s 870 MW of new utility-scale solar placed it in third place in Q3, shaking up the previous quarter’s installations ranking which had Arizona in third.
- Arizona and Louisiana rounded out the Top Five in the third quarter, adding 600 MW and 425 MW, respectively.

Q3 2024 Clean Power Capacity Additions by State

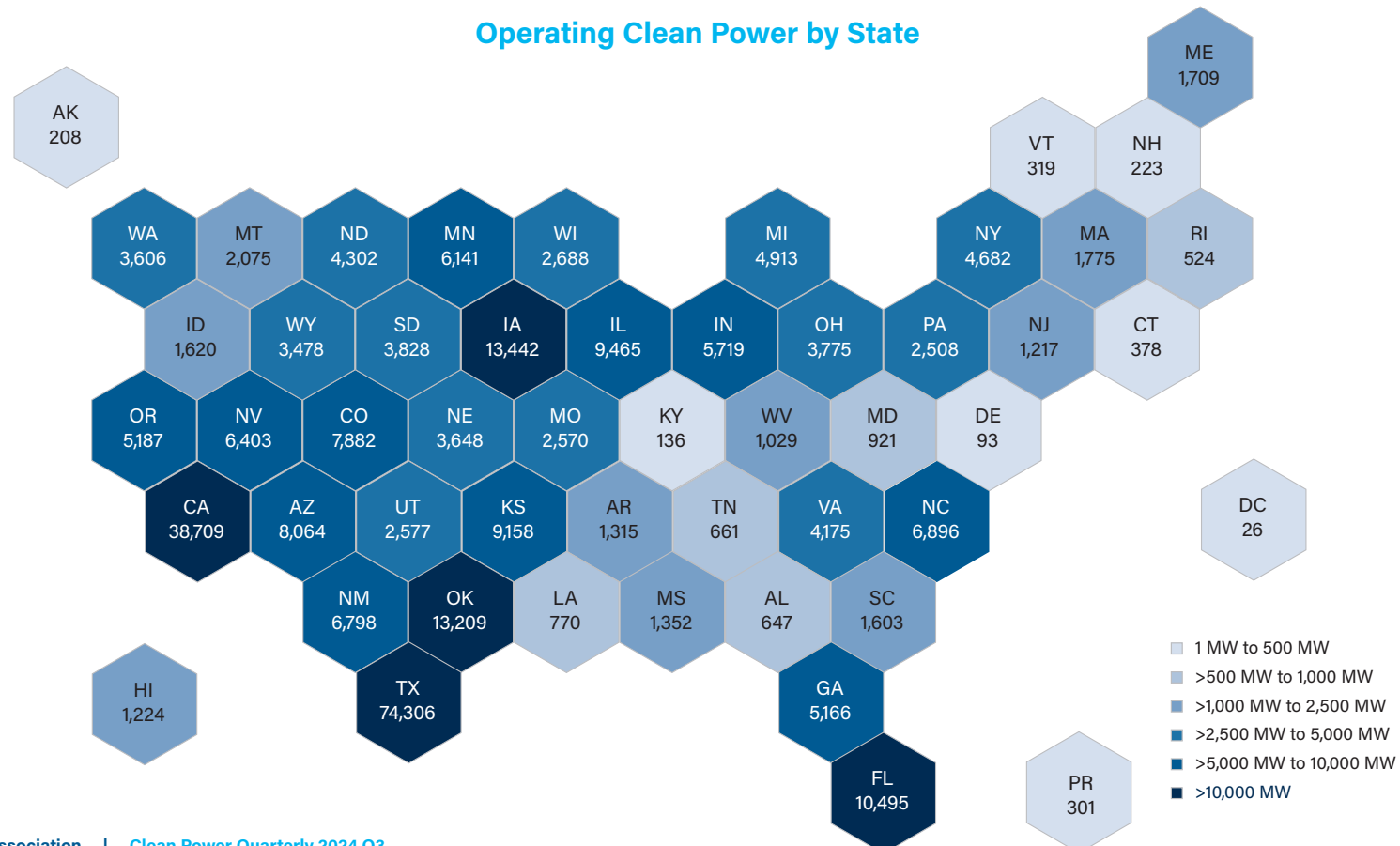


## CLEAN POWER CAPACITY GROWTH

# Operational Clean Power Capacity

- Operational utility-scale solar, wind, and battery storage capacity is present in all U.S. states as well as DC and Puerto Rico, powering American homes and businesses.
- As of September 30, 2024, operational clean power capacity stood at 293,920 MW, enough to power 72 million American homes.
- With 74,306 MW online, Texas hosts the country's largest operational clean power fleet. While the backbone of Texas's clean power portfolio remains wind, Texas consistently brings substantial amounts of new solar and storage capacity online each quarter. Texas ranks first for total operating wind capacity and total operating solar capacity, as well as second for operating storage capacity.
- California remains in second place for total clean power in operation, with 38,709 MW online. The state ranks first for installed energy storage capacity with more than 11 GW installed but slipped to second for installed solar capacity in Q2 2024.
- Five states have more than 10 GW of clean power in operation and 16 states have more than 5 GW installed, up from 15 in Q2 2024. Georgia was the new entrant into the 5 GW and above club in Q3, after adding 870 MW of new solar during the quarter.

### Operating Clean Power by State



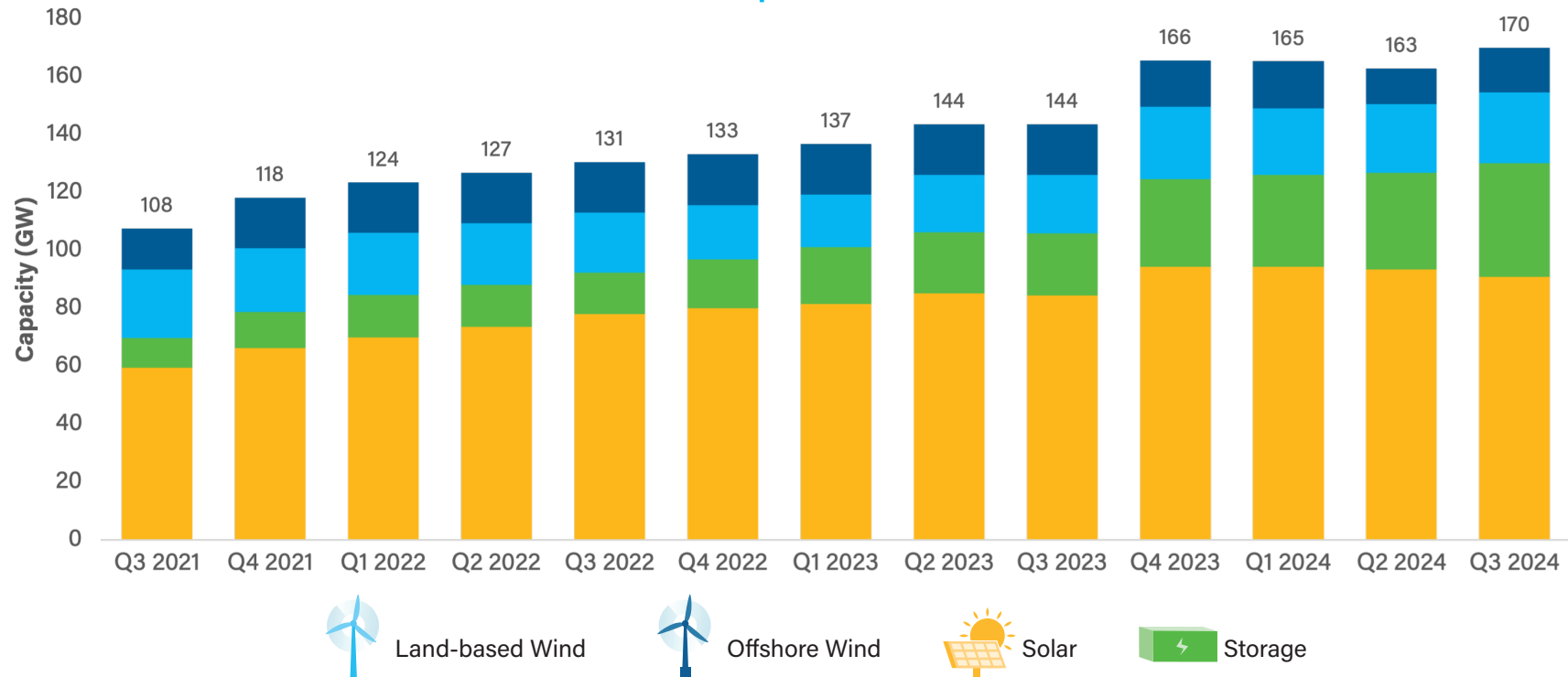


## CLEAN POWER CAPACITY GROWTH

# Clean Power Pipeline Over Time

- At the close of Q3 2024, the clean power project pipeline totaled 170,099 MW, an 18% increase year-over-year. The steady growth of the clean power project pipeline can be attributed to battery storage and solar, which have expanded by 286% and 53% respectively in the last three years.
- On average, the pipeline has experienced a quarterly growth rate of 3% over the past two years. After a dip in Q2 2024, the pipeline grew again by 4% in Q3 2024. The quarterly growth was driven by battery storage and offshore wind.
- The pipeline for battery storage projects continued its robust growth trajectory, increasing by 17% quarter-over-quarter.
- Meanwhile, newly announced provisional contracts in New England boosted the offshore wind project pipeline by 27% compared to Q2 2024.
- The land-based wind pipeline experienced modest quarterly growth of 3% while the solar project pipeline contracted by 3%.

Clean Power Development, Q3 2021 - Q3 2024



# Clean Power Pipeline By Technology

## Land-Based Wind

**24,413 MW**

as of Q3 2024  
across **82 projects**



**21%** growth  
year-over-year



**15,704 MW** under construction  
**8,710 MW** in advanced development

## Battery Storage

**39,235 MW**

as of Q3 2024  
across **362 projects**



**83%** growth  
year-over-year



**15,987 MW** under construction  
**23,248 MW** in advanced development

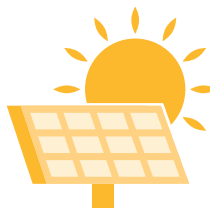
## Utility-Scale Solar

**90,944 MW**

as of Q3 2024  
across **938 projects**



**9%** growth  
year-over-year



**41,626 MW** under construction  
**49,318 MW** in advanced development

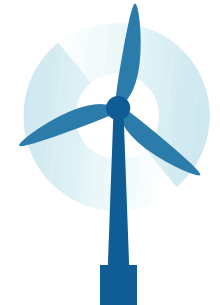
## Offshore Wind

**15,507 MW**

as of Q3 2024  
across **15 projects**



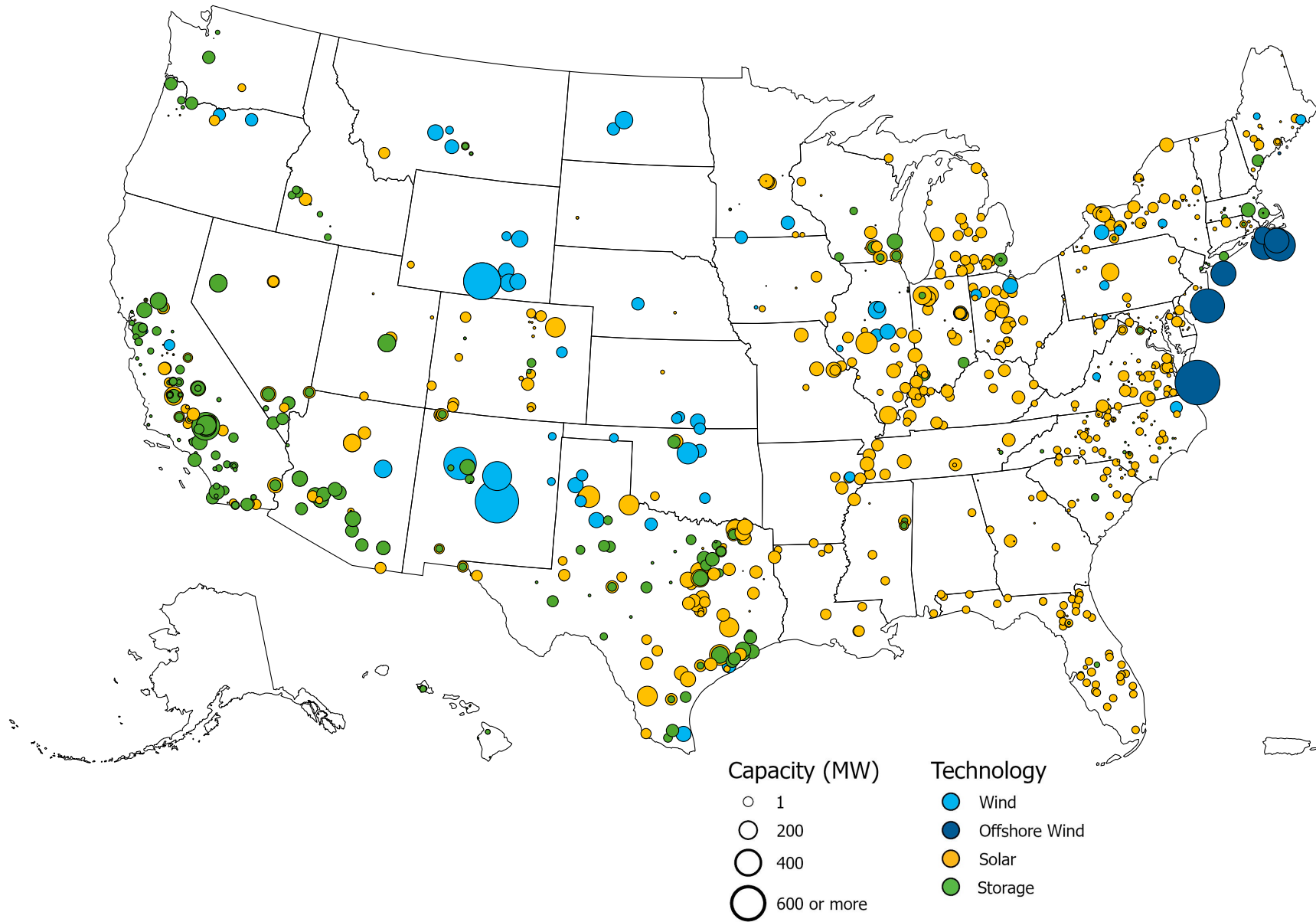
**11%** decrease  
year-over-year



**4,096 MW** under construction  
**11,410 MW** in advanced development

# CLEAN POWER CAPACITY GROWTH

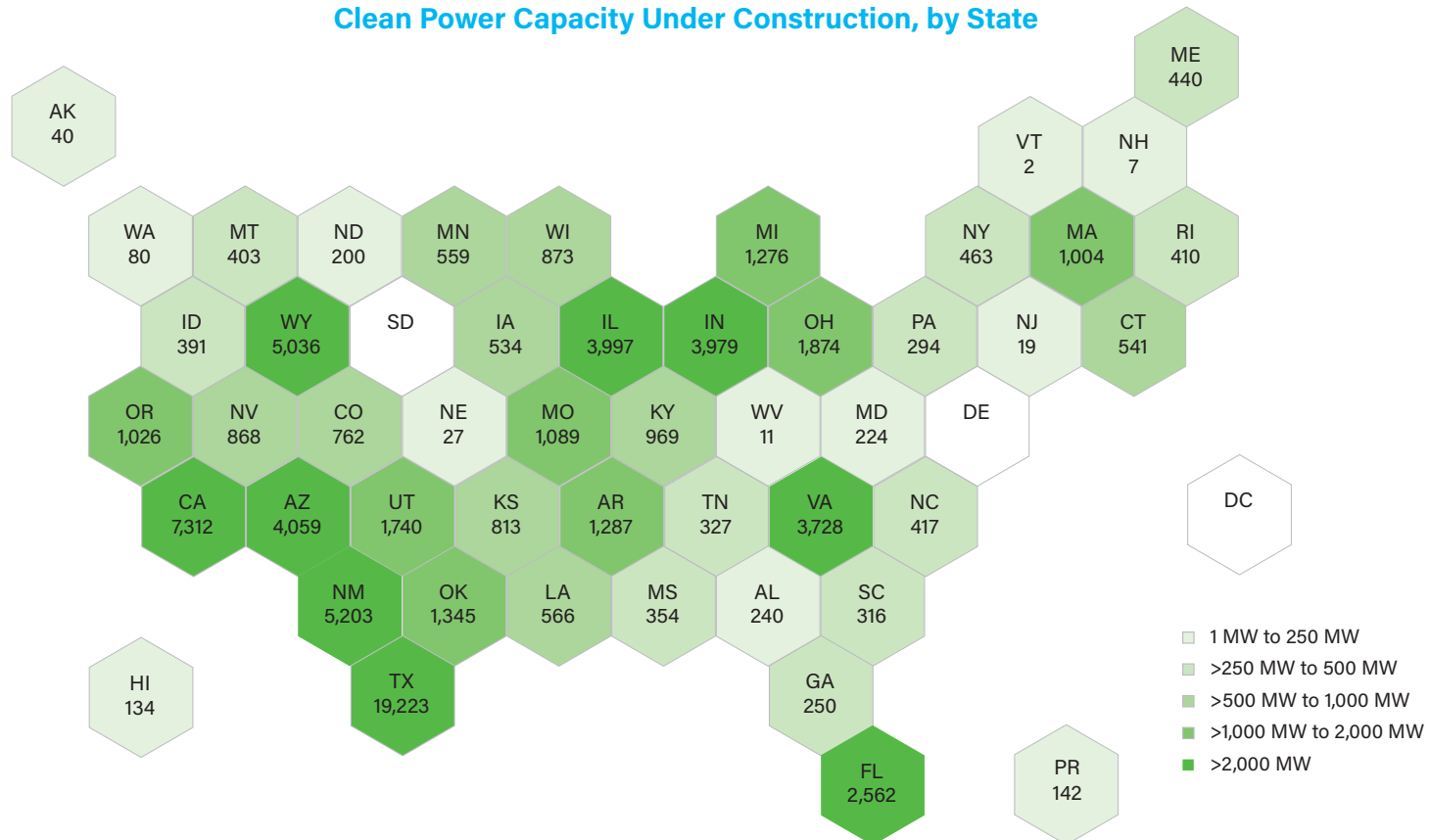
## Projects in Pipeline



# Clean Power Construction Activity

- Developers reported that construction was underway for 77,413 MW of clean power capacity at the close of Q3 2024. In total, 611 projects across 48 states were under construction. Delaware and South Dakota were the only states with no clean energy projects under construction.
- By technology, utility-scale solar accounted for the lion’s share (54%) of the clean power capacity under construction. Battery storage made up 21% of capacity under construction, closely followed by land-based wind (20%). Finally, offshore wind represented 5% of the project capacity under construction.
- Texas was the top state for under construction projects, with 19.2 GW of capacity in progress. Texas also led the nation for solar and battery storage, with 11.6 GW and 5.7 GW of capacity under construction, respectively. Texas was the third-ranked state for land-based wind under construction.
- Following Texas, California (7.3 GW), New Mexico (5.2 GW), Wyoming (5.0 GW), and Arizona (4.1 GW) round out the top five states for total capacity under construction.
- At 5.0 GW, Wyoming was the top state for land-based wind under construction while Virginia led the nation for offshore wind (2.6 GW).

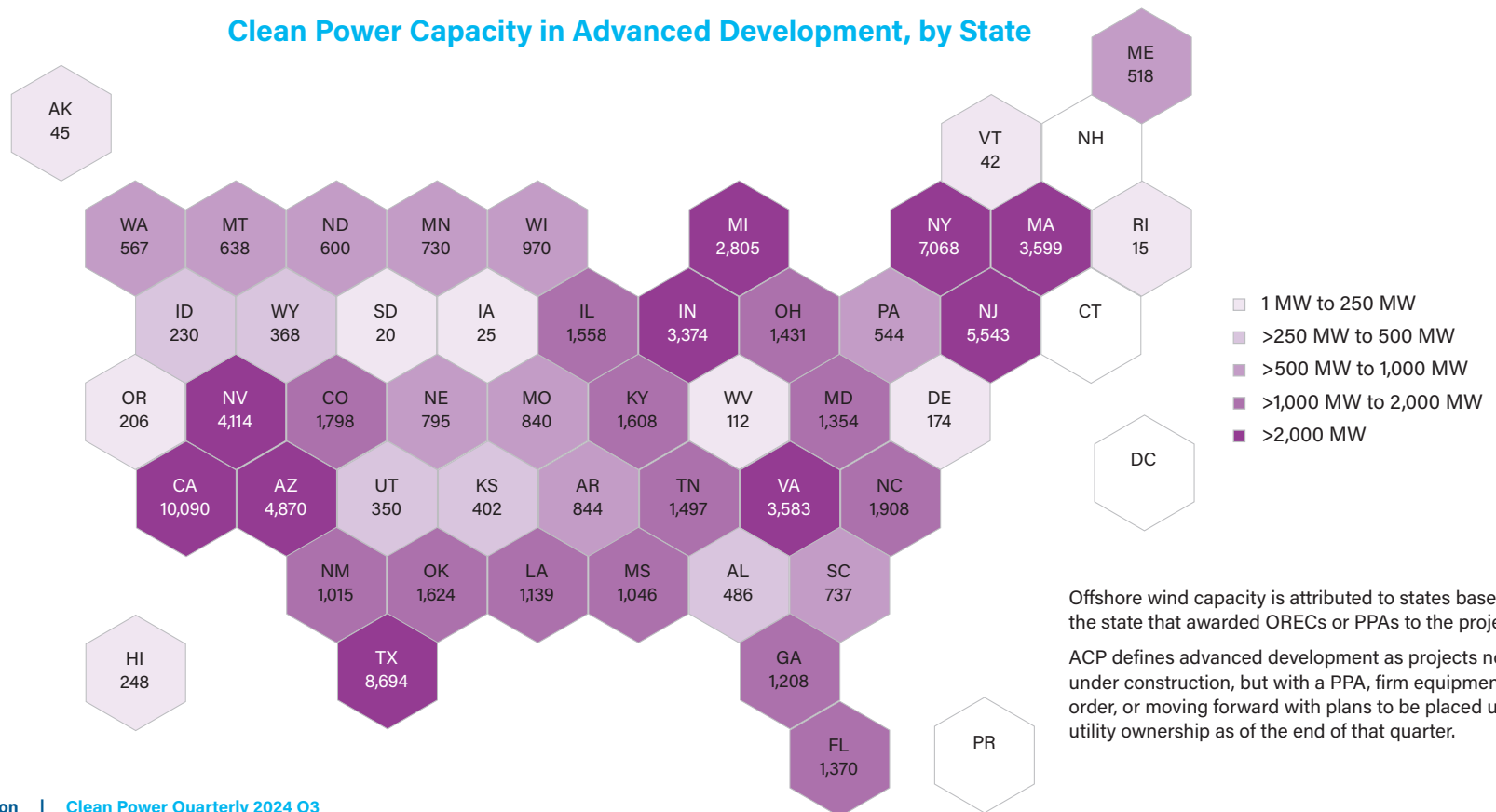
Clean Power Capacity Under Construction, by State



# Clean Power Advanced Development Activity

- The amount of clean power capacity in advanced development grew to 92,686 MW by the end of Q3 2024, an increase of 4% compared to the previous quarter. Offshore wind and battery storage were the main drivers in the amount of capacity entering advanced development.
- 785 projects spanning 48 states were reported to be in advanced development. Connecticut and New Hampshire were the only states with no clean energy projects in advanced development.
- With over 10 GW in advanced development, California is the national leader for clean power projects that have yet to break ground. Texas and New York follow with 8.7 GW and 7.1 GW of capacity in advanced development, respectively.
- Utility-scale solar was the dominant technology in terms of capacity in advanced development, making up 53% of the advanced development pipeline. Solar was followed by battery storage (25%), offshore wind (12%), and land-based wind (9%).
- Unlike the under construction pipeline, no single state dominated the ranks of the advanced development pipelines for the different clean power technologies. Texas was the national leader for solar (4.8 GW), while California was the top state for battery storage (6.6 GW). New Jersey continued to be the top state for offshore wind capacity contracted (5.3 GW). Finally, New York had the highest amount of land-based wind capacity (1.6 GW) in advanced development.

Clean Power Capacity in Advanced Development, by State



Offshore wind capacity is attributed to states based on the state that awarded ORECs or PPAs to the projects. ACP defines advanced development as projects not under construction, but with a PPA, firm equipment order, or moving forward with plans to be placed under utility ownership as of the end of that quarter.

## CLEAN POWER CAPACITY GROWTH

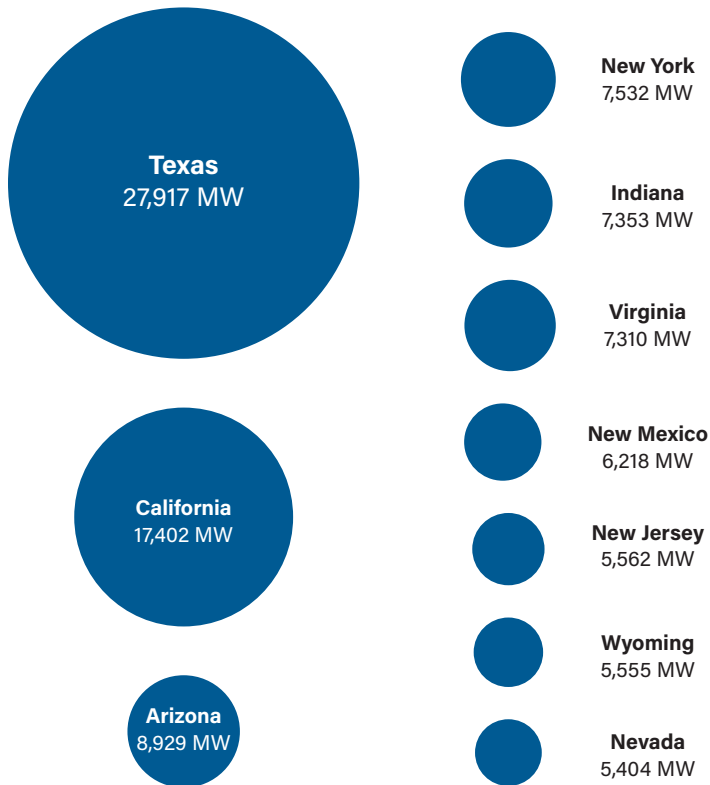
# Clean Power Pipeline by State and Region

- At the end of Q3 2024, the clean power pipeline had grown to 170,099 MW across all 50 states.
- Texas continued to be the runaway leader for pipeline capacity, with 27.9 GW of capacity in advanced development or under construction. Ranking second, California's pipeline capacity increased to 17.4 GW this quarter, outpacing Arizona (8.9 GW), New York (7.5 GW), and Indiana (7.4 GW).
- Several states are expected to expand their operational capacity dramatically over the next few years. Led by Kentucky, 16 states have project pipelines that

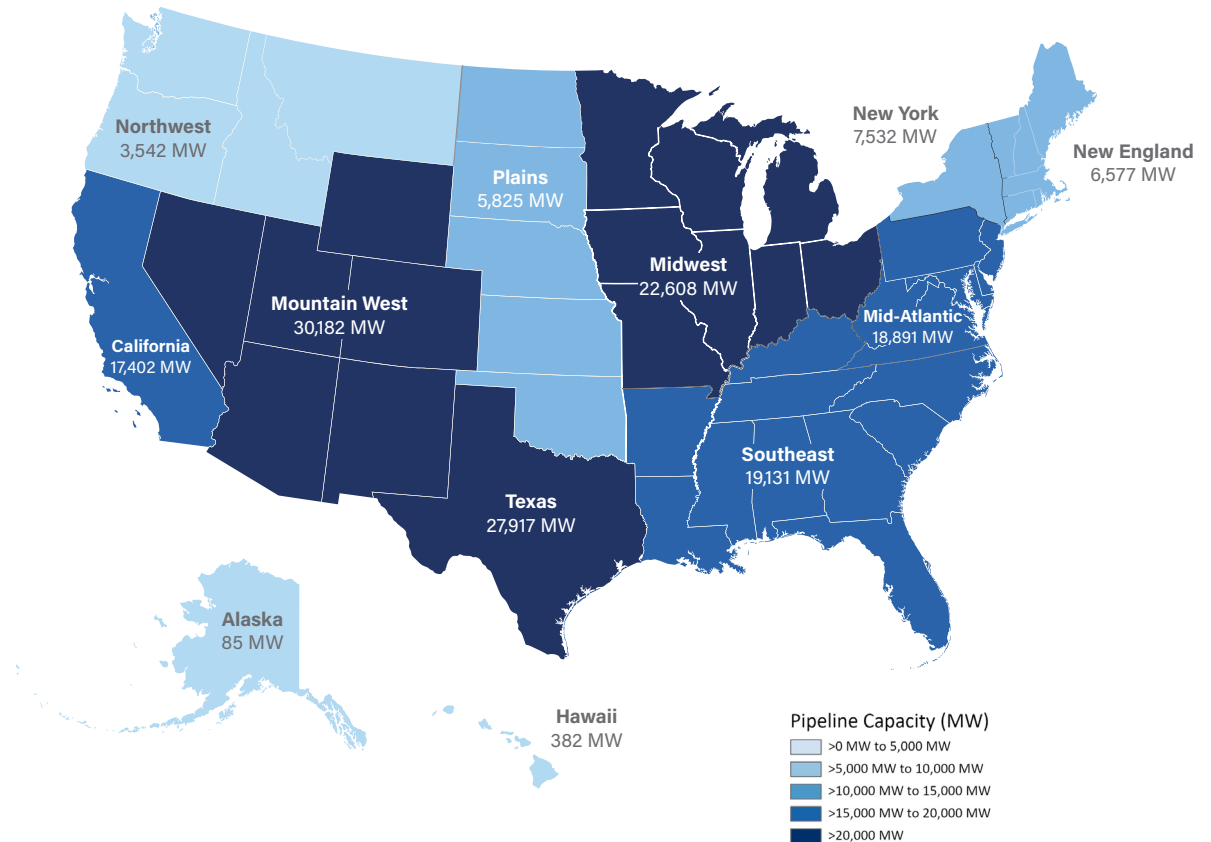
exceed the size of their operational fleet of clean power projects. Kentucky's operational capacity is expected to balloon by 1,896% while New Jersey, Tennessee, Massachusetts, and Louisiana will also experience over 200% growth in their portfolio of operational capacity.

- Regionally, the project pipeline in the Mountain West rose to 30.2 GW at the end of Q3 2024, making it the top region for clean power capacity under development, ahead of Texas (27.9 GW) and the Midwest (22.6 GW).

### Top States, Clean Power Development Capacity



### Clean Power Development Capacity by Region



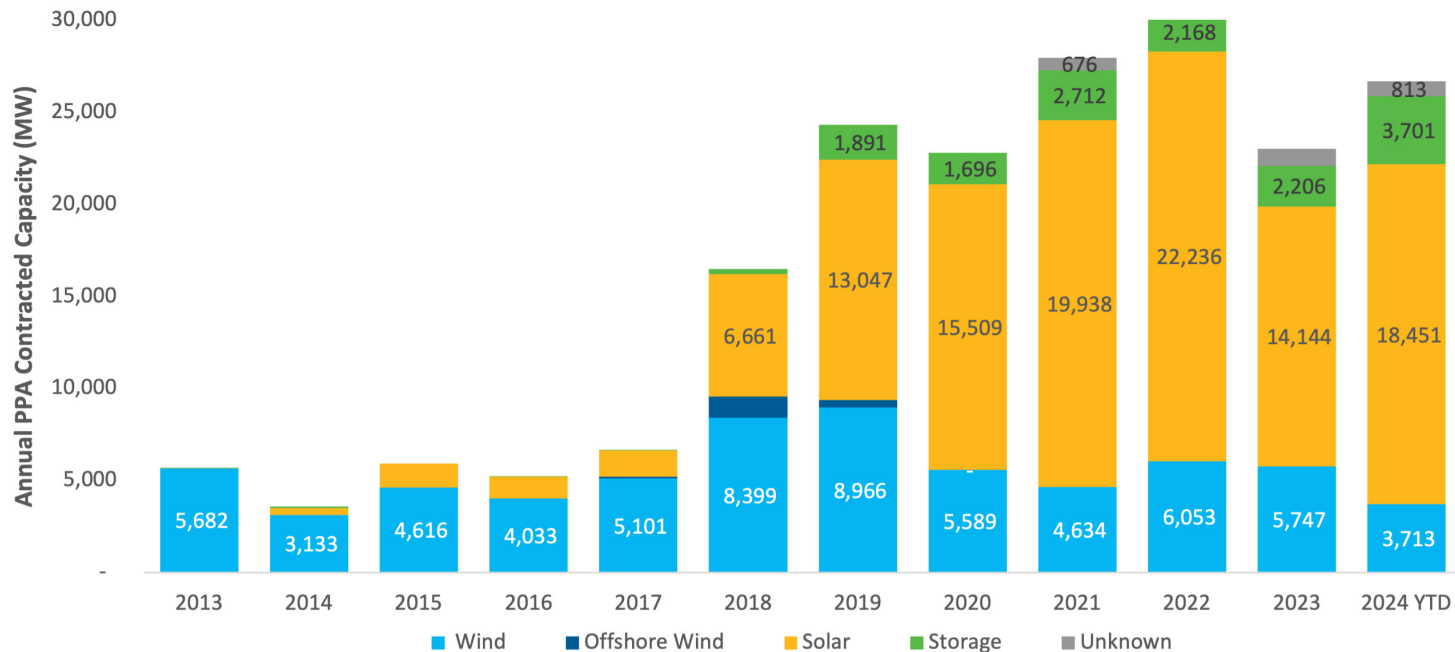
# PPA Announcements by Technology

- Developers announced a total of 6,846 MW of power purchase agreements in the third quarter: 5,419 MW of solar, 735 MW of battery storage, and 692 MW of land-based wind.
- Despite year-on-year growth of 66%, not all clean power technologies experienced a surge in announcements. Solar and battery storage grew substantially, while land-based wind saw a contraction.
- In Q3 2023, solar PPAs were 68% of announced PPAs that quarter. It has grown by 94% to make up 79% of the total amount of PPAs announced in Q3 2024.
- Battery storage followed a similar trajectory. The capacity of storage PPAs executed in Q3 2024 was 162% higher than in Q3 2023. The battery storage share of PPAs announced rose from 7% in Q3 2023 to 11% this quarter. The surge in solar and battery storage PPAs more than offset the drop in land-based wind

PPAs. The amount of wind PPAs announced in Q3 2024 was 35% lower than the amount announced in Q3 2023. Wind PPAs announced in Q3 made up just 10% of overall clean power PPA announcements during the quarter.

- The slowdown of land-based wind PPAs executed is likely a result of several factors, including transmission constraints, interconnection and permitting delays, and a higher average PPA price compared to solar. Data from LevelTen Energy shows that wind PPA prices have significantly outpaced solar PPA prices since Q2 2021. In recent years, early purchasers of wind power have also sought to balance their clean energy portfolios with more solar.
- The surge in solar and battery storage PPAs since 2019 have contributed to a dramatic rise in solar and battery storage installations in recent years. The healthy pace of PPA announcements in 2024 is likely to fuel more clean power deployments in coming years.

Annual Clean Power Purchase Agreements, By Technology

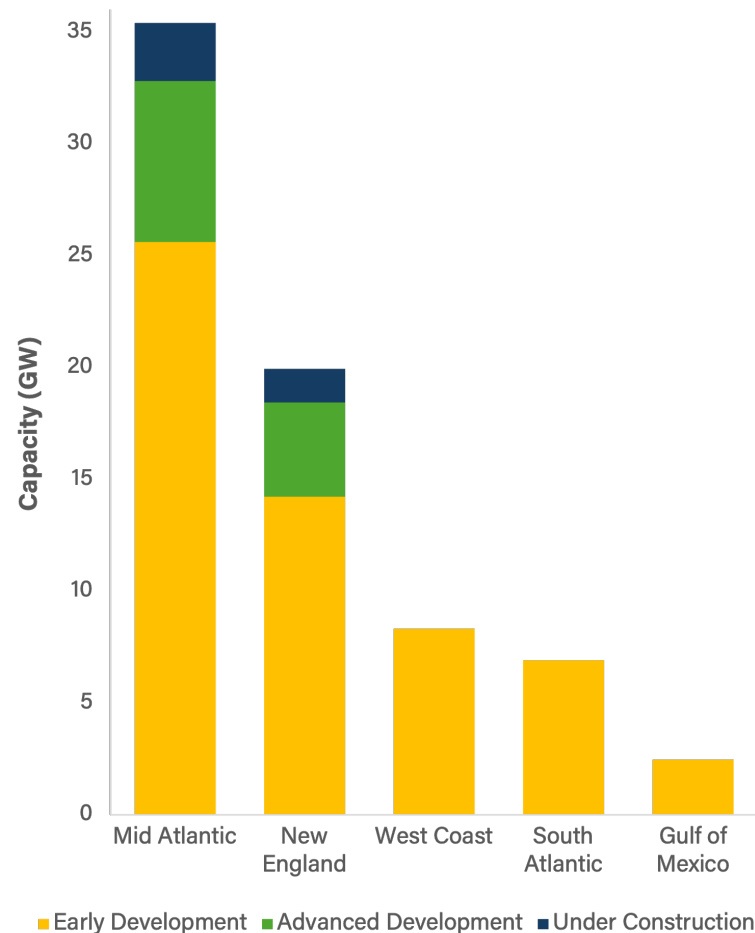


## OFFSHORE WIND ACTIVITY

# Progress in Development

- Ørsted's **Revolution Wind** started offshore construction in May 2024 and remains on track to start commercial operations in 2026. At the end of the third quarter, monopile installation progressed to 80% with 52 monopiles installed, and turbine installation was underway with nine turbines installed. Eversource, no longer a joint owner of the project, continues to manage the onshore substation construction, which is also progressing on schedule.
- **Coastal Virginia Offshore Wind**, Dominion Energy's 2,587 MW project off the Virginia coast, finished its first monopile installation season, and all construction plans remain on schedule and within budget. As of Nov. 1, Dominion marked the project as 43% complete. There are 78 monopiles installed, three pinpiles installed to support the first planned substation, and two of the nine marine deepwater export cables laid. Dominion expects nacelle and blade production for turbines to begin in Q1 2025.
- **Sunrise Wind**, now solely owned by Ørsted, began onshore construction in July. Progress remains on schedule, and the project is expected to begin offshore construction in 2025. Ørsted expects the project to be commissioned in late 2026 or 1H 2027.
- **Vineyard Wind 1**, the 806 MW project owned by Avangrid and Vineyard Offshore (Copenhagen Infrastructure Partners), commissioned ten turbines by the end of the second quarter. As of October 2024, the project remains under construction.
- **Atlantic Shores South** received its Record of Decision (ROD) in July and Construction and Operations Plan (COP) approval for Project 1 and Project 2 in October. Atlantic Shores' pre-construction activities are scheduled to be completed in 2024, and they have secured suppliers for construction to start in 2025. The two projects will deliver a combined 2,800 MW of power to the grid.
- **New England Wind 1 and 2**, Avangrid's projects off the coast of Massachusetts, also progressed in the federal permitting process. The projects received COP approval from BOEM in July.
- US Wind's Construction and Operations Plan (COP) for its OCS-A 0490 lease area off the coast of Maryland, including the **MarWin** and **Momentum Wind** projects, received a ROD in September. The ROD marks the tenth commercial offshore wind project to be approved by the Department of the Interior.

### U.S. Offshore Wind Capacity in Development, by Region



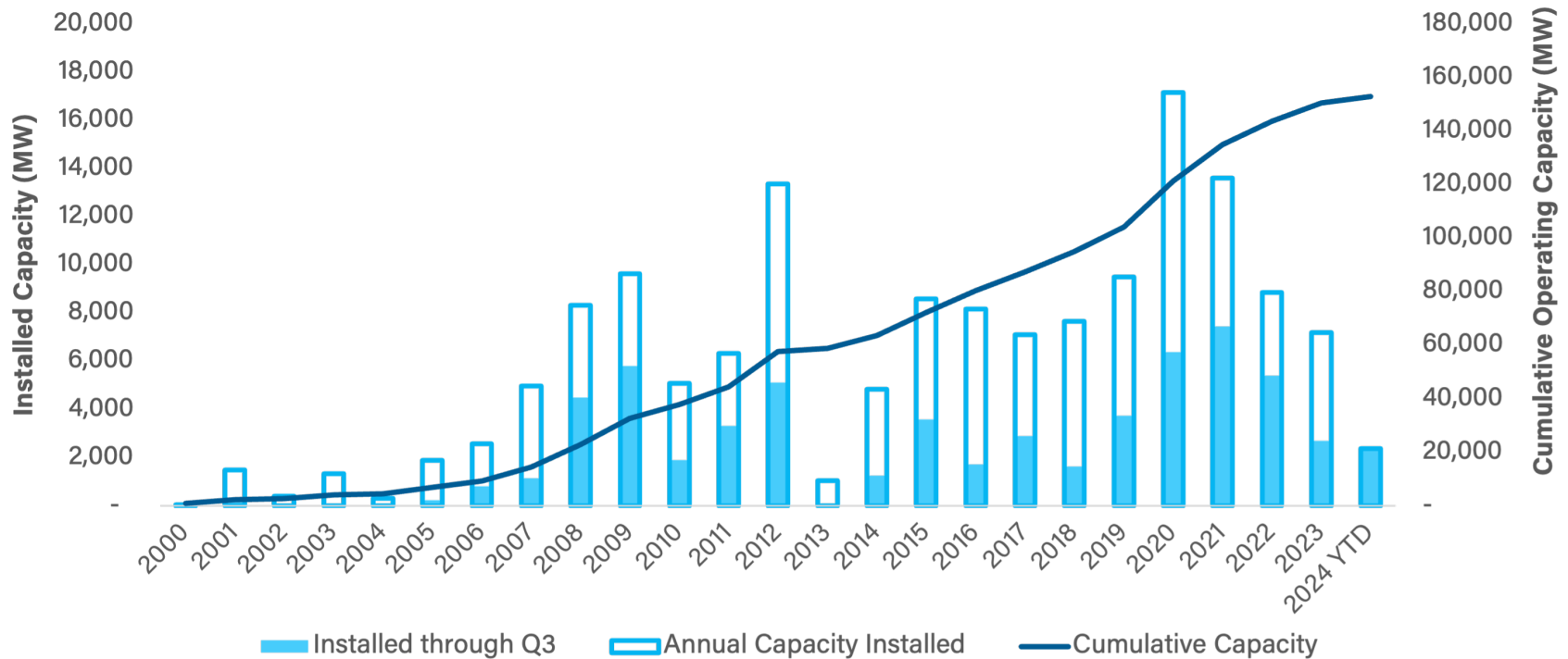


LAND-BASED WIND ACTIVITY

# Q3 2024 Land-Based Wind Installations

- Developers commissioned three onshore wind project phases and completed one partial repowering project in Q3 2024, adding 396 MW to the grid. The U.S. onshore wind industry has brought 2,378 MW of greenfield capacity online during the first three quarters of 2024.
- Onshore wind installations were 31% higher in Q3 2024 than in the same quarter in 2023, when new wind generation totalled 302 MW. Typically, more than half of all new wind capacity for the year comes online in the fourth quarter, with the third quarter the smallest in each of the last three years.
- The largest project phase to start commercial operations in the third quarter was NextEra Energy Resources' Roadrunner Wind Project in Texas, at 256 MW.
- New wind projects were commissioned in three states: Texas, Montana, and Iowa. Texas added the most wind capacity to the grid in Q3, bringing the state's operational wind capacity up to 37,643 MW and further cementing its status as the nation's top onshore wind state.
- Challenges with transmission congestion, long interconnection queue waits, inflation, and permitting delays have added complexity to bringing new wind projects online in recent quarters, contributing to the slowdown in installations.

U.S. Annual and Cumulative Land-based Wind Capacity Growth

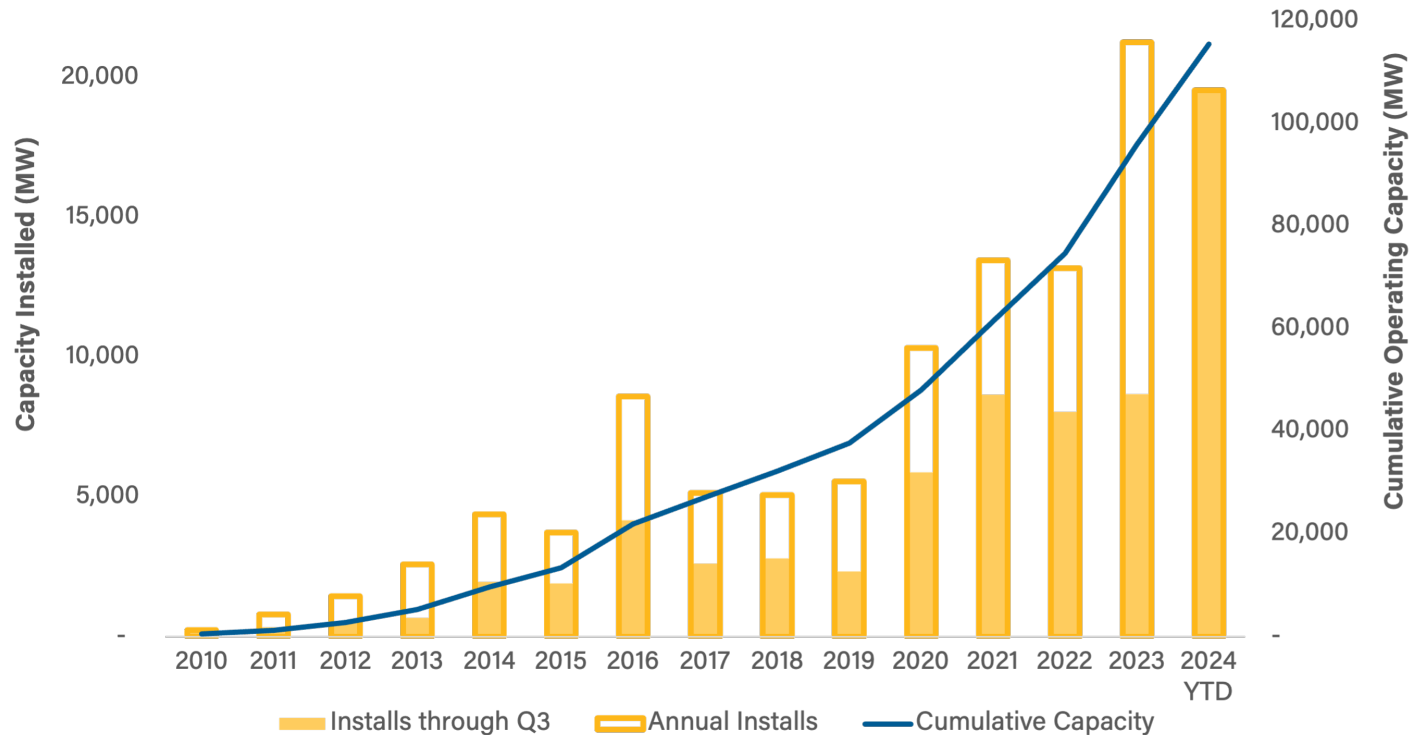


## UTILITY SCALE SOLAR

# Q3 2024 Solar Deployments

- Developers continued to connect utility-scale solar projects to the grid at a rapid pace. 6,255 MW of solar was installed in Q3 2024, a 97% increase compared to Q3 2023.
- Cumulatively, 19,537 MW of solar has been commissioned in the first three quarters of 2024, more than double the amount of solar capacity energized compared to the same point in 2023.
- At the end of the quarter, 115,566 MW of utility-scale solar was delivering clean electricity to the grid in all 50 states along with the District of Columbia and Puerto Rico.
- During Q3 2024, 39% of utility-scale solar that became operational was in Texas. The Lone Star State was home to three of the four largest solar projects to begin commercial operations in Q3 2024.
- TotalEnergies' Danish Fields Solar was the largest utility-scale solar project brought online during the quarter. Located in Matagorda County, Texas, the project has a capacity of 600 MW and is paired with a 150 MW/225 MWh battery storage system that also became operational during the quarter. Danish Fields Solar will deliver solar power to Saint-Gobain and TotalEnergies' industrial facilities in the Gulf Coast.

### U.S. Annual and Cumulative Utility Solar Power Capacity Growth



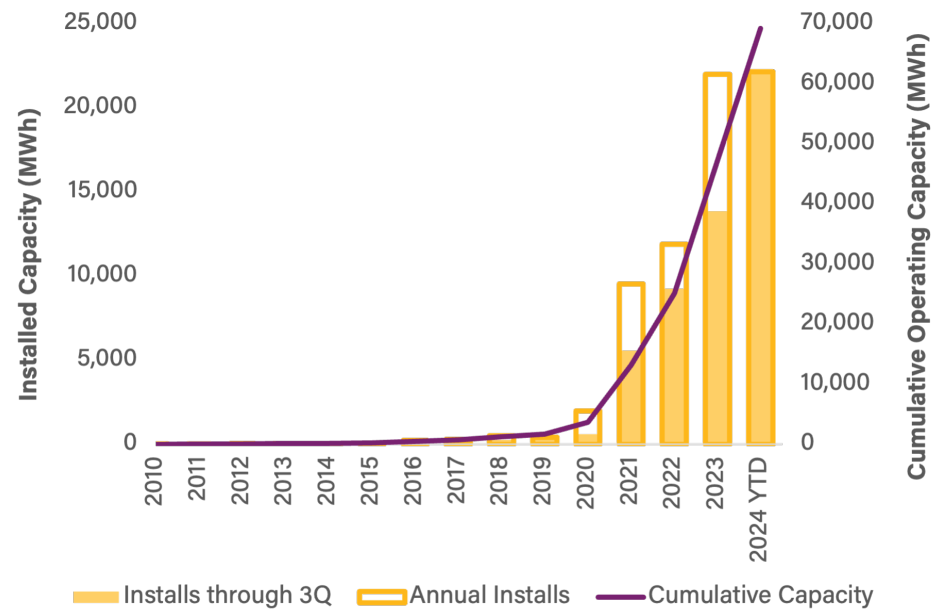
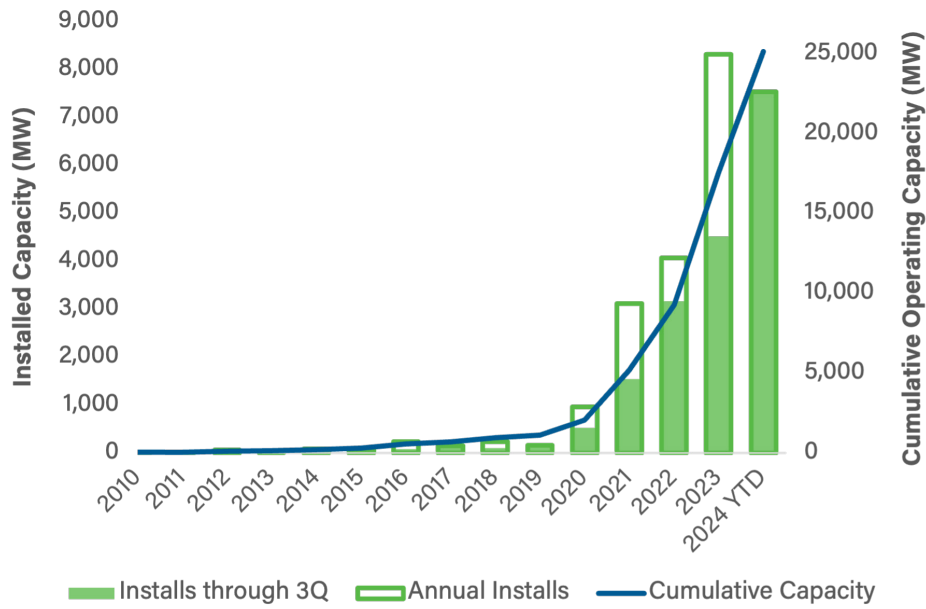
Solar capacity is reported in MWac

## UTILITY-SCALE BATTERY STORAGE

# Q3 2024 Storage Installations

- Battery storage capacity is tracked in terms of rated power capacity (MW), the maximum possible instantaneous discharge, and energy capacity (MWh), the maximum amount of stored energy.
- Installed U.S. energy storage capacity continued to reach new milestones in the third quarter, surpassing the 25 GW mark to end the quarter at 25,135 MW/69,247 MWh. The country had just over 1 GW installed at the start of the decade and has rapidly ramped up installations in the four and a half year since.
- With 3,543 MW of capacity added to the grid, battery storage experienced its strongest Q3 on record and second strongest quarter overall. Battery storage installations in Q3 2024 were 17% higher than the previous quarter and 58% higher compared to Q3 of 2023.
- Developers commissioned a total of 44 battery storage projects in Q3 2024, including 36 standalone projects and 8 phases paired with wind or solar capacity.
- With a capacity of 230 MW/920 MWh, the Nova II phase of Calpine Corporation's Nova Battery Storage Project was one of the largest battery storage projects to begin commercial operations in Q3 2024.

### U.S. Annual and Cumulative Utility Battery Storage Capacity Growth



The American Clean Power Association (ACP) is the leading voice of today's multi-tech clean energy industry, representing over 800 energy storage, wind, utility-scale solar, clean hydrogen, and transmission companies. ACP is committed to meeting America's national security, economic and climate goals with fast-growing, low-cost, and reliable domestic power.

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