# Clean Investment Monitor: Q3 2024 Update

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## Summary

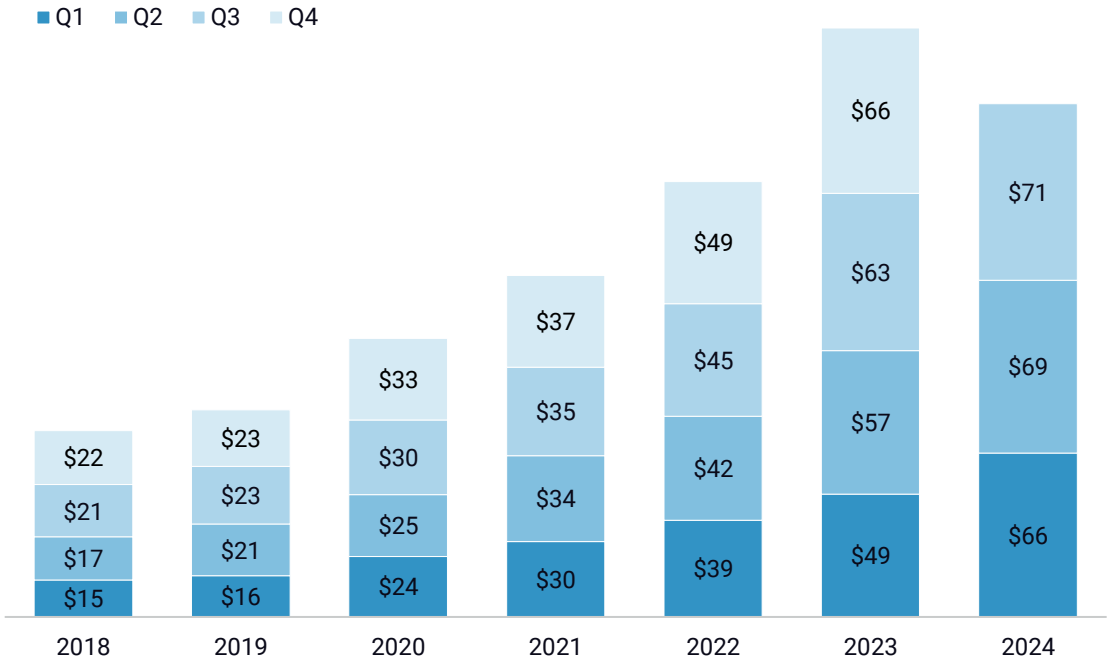
Clean energy and transportation investment in the United States continued its record-setting growth in Q3 of 2024, reaching a new high of $71 billion. This continues a nearly unbroken quarter-on-quarter growth trend over the past three years, and marks a 12% increase in Q3 of 2024 from the same period in 2023. Clean investment accounted for 5% of total US private investment in structures, equipment, and durable consumer goods in the United States, compared to 4.5% in Q3 2023.

Retail investment grew by 9% relative to the previous quarter, acting as the main driver of clean investment growth. This quarterly increase was due to a surge in zero-emission vehicle (ZEV) sales in Q3. Investment in clean technology manufacturing was flat quarter-on-quarter—declines in solar manufacturing investment offset small increases in battery and ZEV manufacturing investment—but up 57% from the same period last year. Investment in deploying technology to decarbonize energy and industrial production slipped 7% quarter-on-quarter, the third quarter of decline, and is now down 6% compared to Q3 2023. Investment in the deployment of emerging climate technologies (ECT) like clean hydrogen, carbon management, and sustainable aviation fuels increased by 4% from the previous quarter but slipped by 6% relative to the same period last year.

Using the Clean Investment Monitor database, we assessed the progress of the US clean electricity transition and found that the current pace of capacity expansion is falling short of what is needed to deliver a 40% reduction in net GHG emissions below 2005 levels by 2030—a target that the Inflation Reduction Act (IRA) was projected to achieve at the time of its enactment. Our latest analysis of projects in the pipeline shows that both solar and wind are underperforming, aligning more closely with a scenario that would yield only a 30% emissions reduction by 2030.

This quarter's report includes several updates to our methodology that expand the scope of technologies covered and affect the magnitude of our findings. On the technology front, we have broadened our clean industry tracking to include approaches to decarbonizing the production of cement, iron and steel, and pulp and paper. This addition provides a more comprehensive view of advancements in industrial emissions reduction. We have also refined our inflation adjustment process, now tracking price changes with greater specificity to improve the accuracy of our cost assessments over time. Finally, we have dialed up our attention to the construction status and progress of tracked facilities, conservatively assuming a facility advances through construction stages only when we can identify evidence of a groundbreaking. Facility timelines are adjusted accordingly, with start dates pushed back if groundbreaking evidence is lacking. These updates have lowered our actual investment estimates for this quarter and previous quarters.

FIGURE 1
**Clean investment by quarter**
Billion 2023 USD




Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

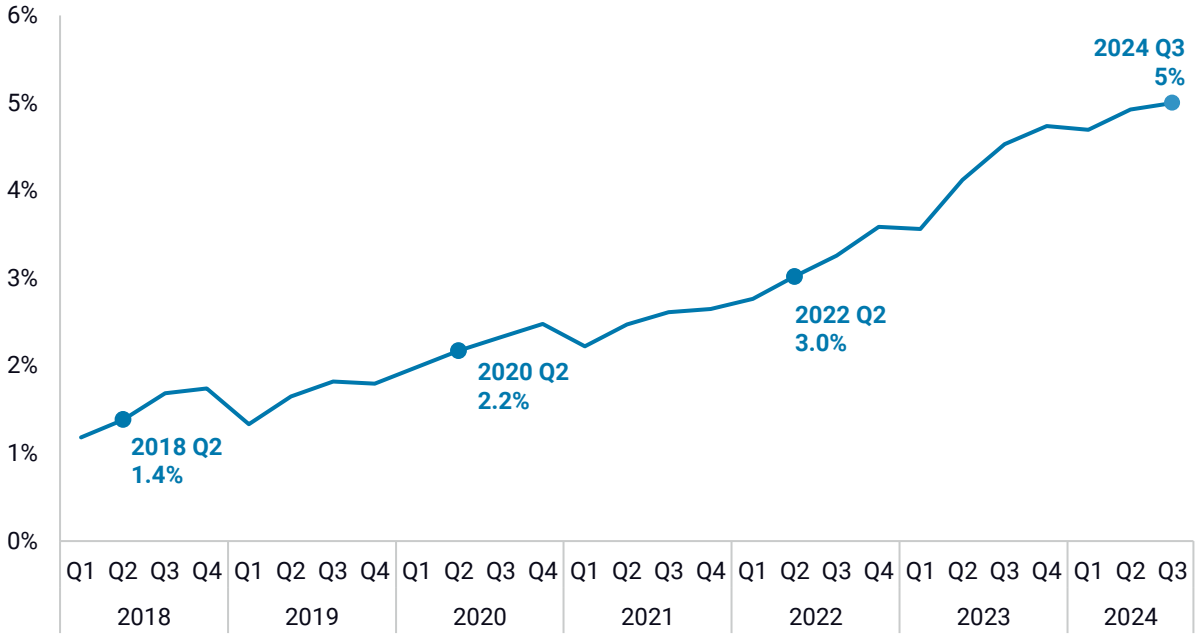
## Investment trends

Actual clean energy and transportation investment in the US continued its record-setting growth in Q3 of 2024, reaching a new high of $71 billion (Figure 1). That's a 2% increase from Q2 2024, sustaining a nearly unbroken streak of quarter-on-quarter growth over the past three years, minus a small decline in Q1 2024. Actual investment this quarter is a 12% increase from the same period in 2023. Clean investment represents a growing share of the US economy as well. In Q3, clean investment accounted for 5.0% of total US private investment in structures, equipment, and durable consumer goods nationwide, up from 4.9% in Q2 2024 and 4.5% in Q3 2023 (Figure 2).

FIGURE 2

**Actual clean investment as a share of total US private investment**

Annualized basis, total investment in all private structures, equipment, and durable consumer goods




Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

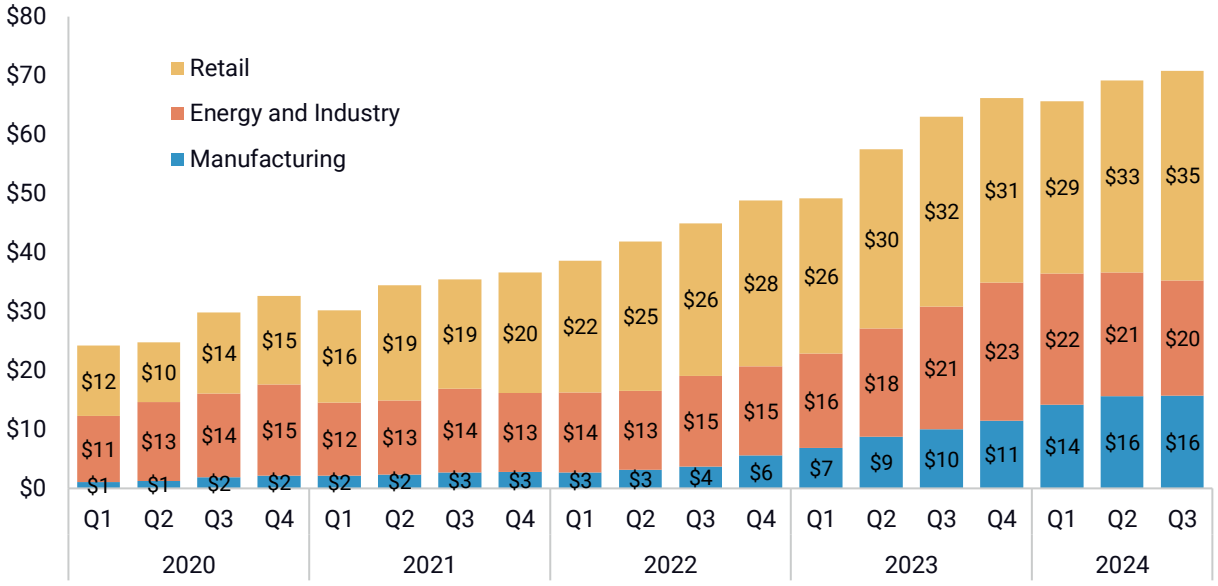
We categorize our clean investment tracking into three segments: investment in the manufacture of GHG emission-reducing technology ("manufacturing"); investment in the deployment of that technology, both to produce clean energy or decarbonize industrial production ("energy & industry"); and investment through the purchase and installation of that technology by individual households and businesses ("retail"). Each dollar figure in this report is actual investment in Q3 2024, or the real dollars spent in the previous quarter on retail purchases or new facility construction. For example, when we confirm an announced facility breaks ground, we begin tracking actual investment in its construction and equipment. At the end of subsequent sections, we summarize announced investments to provide context and insight into potential future actual investments.

This quarter's report includes several data and methodological updates, some of which significantly impact our headline findings. First, we refined our carbon management tracking within the energy and industry segment to include a number of more granular industrial processes, specifically cement production, clean fuels, and iron and steel. Our carbon management technology category now includes only direct air capture, point-source capture in the power sector, and carbon dioxide utilization and removal. Second, we have updated our inflation adjustments to align more closely with price indices specific to each investment category we track, ensuring more accurate cost assessments. And finally, we have

conducted a thorough review of our tracked manufacturing, energy, and industrial facility projects to confirm construction timelines are current. This update provides that greenfield facilities are included in our actual spending estimates only when it's confirmed that they have broken ground, regardless of originally reported timelines. For projects reporting delays or timeline changes, we have adjusted both the completion date and associated spending rates. These updates impact different components of our tracking in both directions. On net, the refined inflation adjustment and closer construction timeline tracking have lowered our actual investment estimates in every quarter across the CIM dataset.

By segment, retail investment drove the quarter's clean investment growth, accounting for 50% of total clean investment in Q3 at $35 billion. Actual retail investment increased 9% relative to the previous quarter and was up 11% relative to Q3 2023. In the energy & industry segment, there was $20 billion in new investment in clean energy production and industrial decarbonization in Q3 2024, slipping 7% quarter-on-quarter and down 6% compared to the same period last year. Manufacturing investment stayed flat from Q2 with $16 billion of new investment but was still up 57% year-on-year.

FIGURE 3
**Actual clean investment by segment**
Billion 2023 USD




Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

## Manufacturing

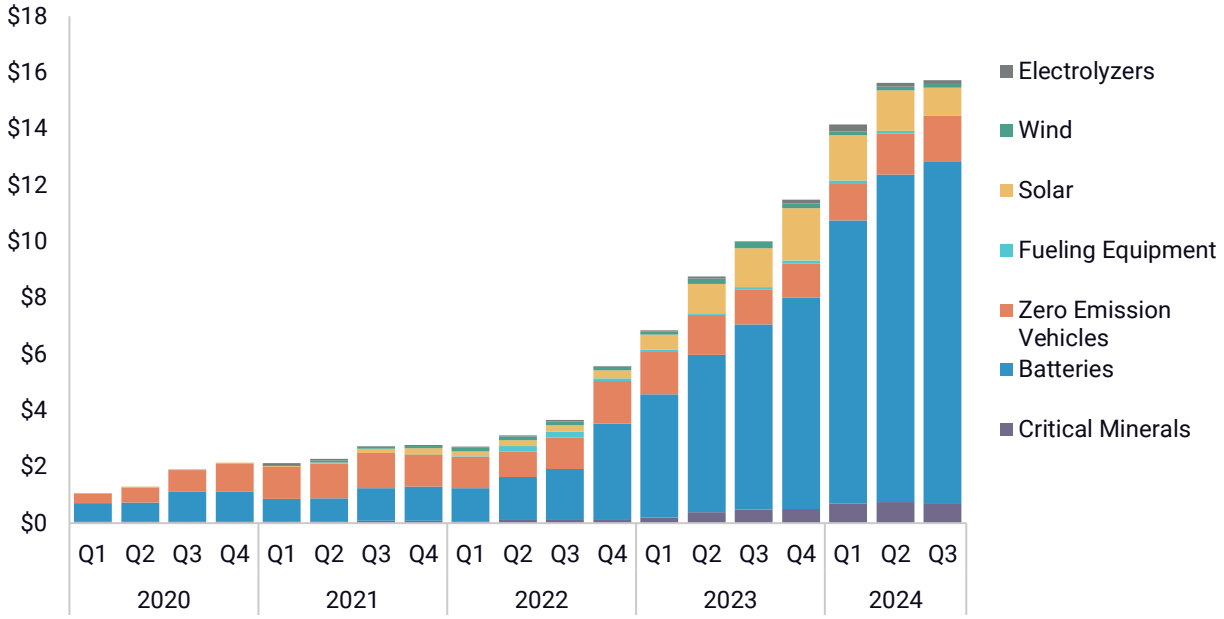
The electric vehicle (EV) supply chain—critical minerals, batteries, vehicle assembly, and charging equipment—continued to dominate clean manufacturing investment in Q3, at $14.5 billion (92%) of the total $16 billion in actual investment (Figure 4). Battery manufacturing investment increased by 4% quarter-on-quarter

to $12 billion, offsetting declines in other technologies. Solar manufacturing investment decreased by 33% quarter-on-quarter from $1.5 billion in Q2 2024 to $974 million in Q3 2024. Electrolyzer and wind manufacturing investment both decreased by 6% quarter-on-quarter.

FIGURE 4

**Manufacturing investment by technology**

Billion 2023 USD



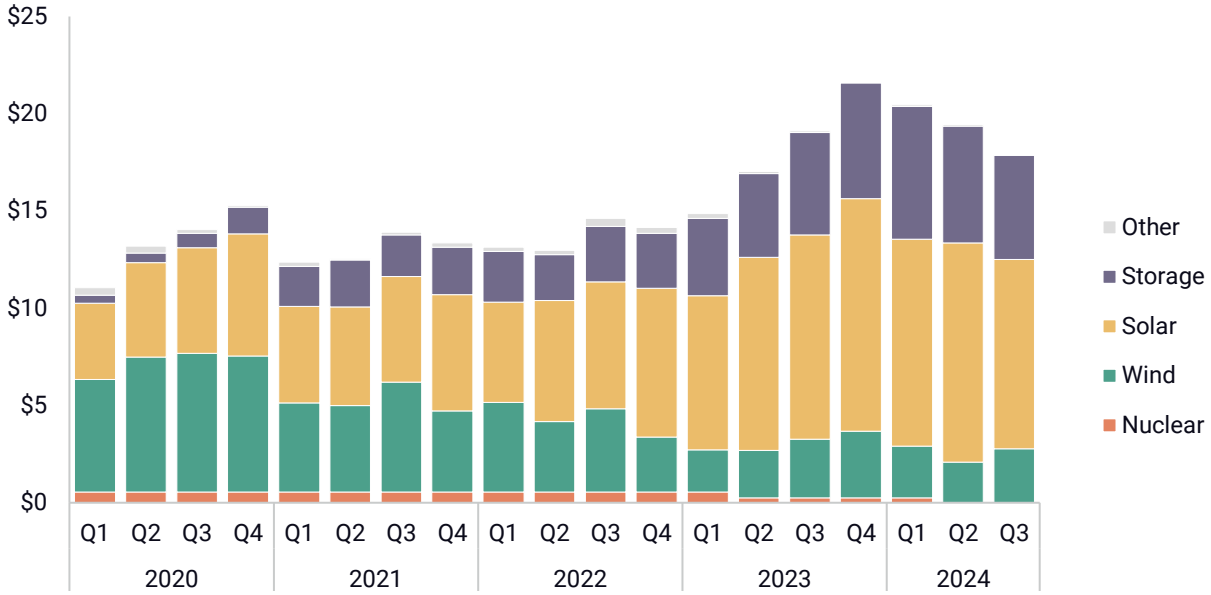

Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

The pipeline of new clean energy and transportation manufacturing investment—measured by new announcements in manufacturing projects—slowed this quarter to $5.8 billion. This 9% decrease quarter-on-quarter and 62% decline year-on-year suggests that actual investment may fall in future quarters. More than two-thirds (68%) of the new manufacturing investment announced in Q3 2024 was concentrated on the EV supply chain.

## Energy & industry

Of the total $20 billion in new actual investment in clean energy production and industrial decarbonization in Q3 2024, utility-scale solar and storage investment accounted for the majority at $15 billion (Figure 5). Grid-scale storage investment fell by 11% quarter-on-quarter, but increased by 1.3% year-on-year. Utility-scale solar investment also fell by 14% this quarter. Wind investment increased 34% quarter-on-quarter to $2.8 billion in Q3, but was still down 8% year-on-year.

FIGURE 5
**Electric power investment by technology**
Billion 2023 USD

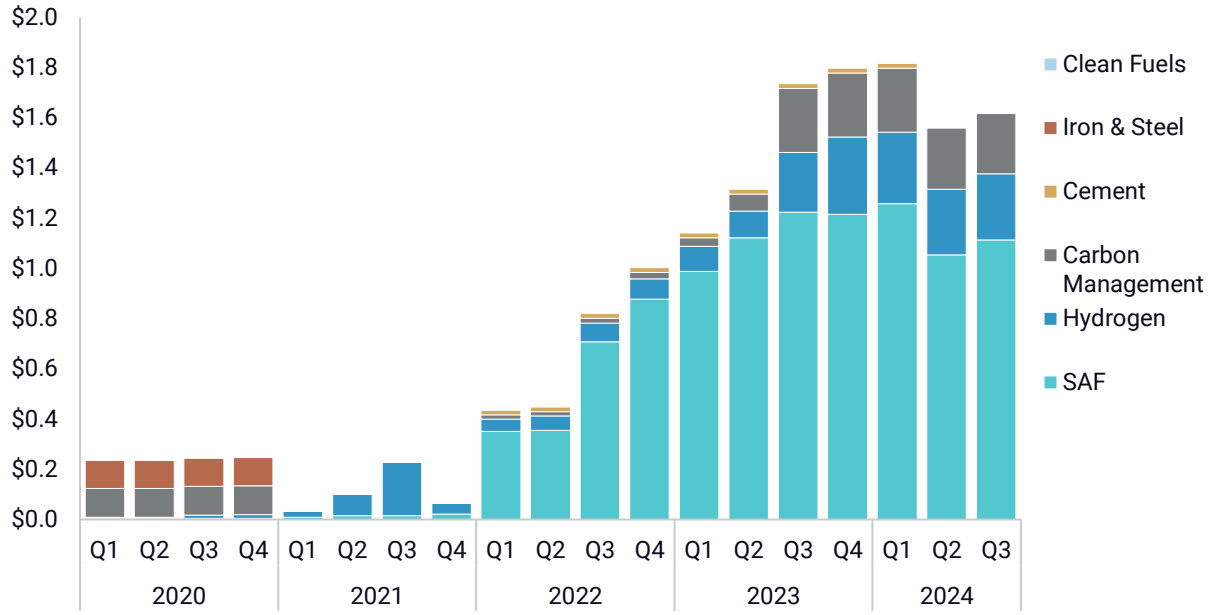



Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

This quarter, we expanded our industry tracking to include new approaches to decarbonizing the production of cement, iron and steel, and pulp and paper. Previously, our coverage in these sectors focused solely on facilities that adopted carbon capture technologies. Now, we capture a broader range of emissions reduction methods across these industries. Additionally, our carbon management category has been refined to include only explicit carbon management technologies: direct air capture, power-sector carbon capture, and bio-based carbon removal.

Within industry, 70% of actual industry investment went to the production of sustainable aviation fuel (SAF), with $1.1 billion invested in Q3 2024 (Figure 6). SAF investment grew 5% quarter-on-quarter but was still down 9% year-on year. The rest of the Q3 industry investment is split between hydrogen (16%, $263 million) and carbon management (15%, $241 million). Hydrogen was up 10% relative to Q3 2023, while carbon management was down 6% over the same period.

FIGURE 6
**Industry investment by technology**
Billion 2023 USD



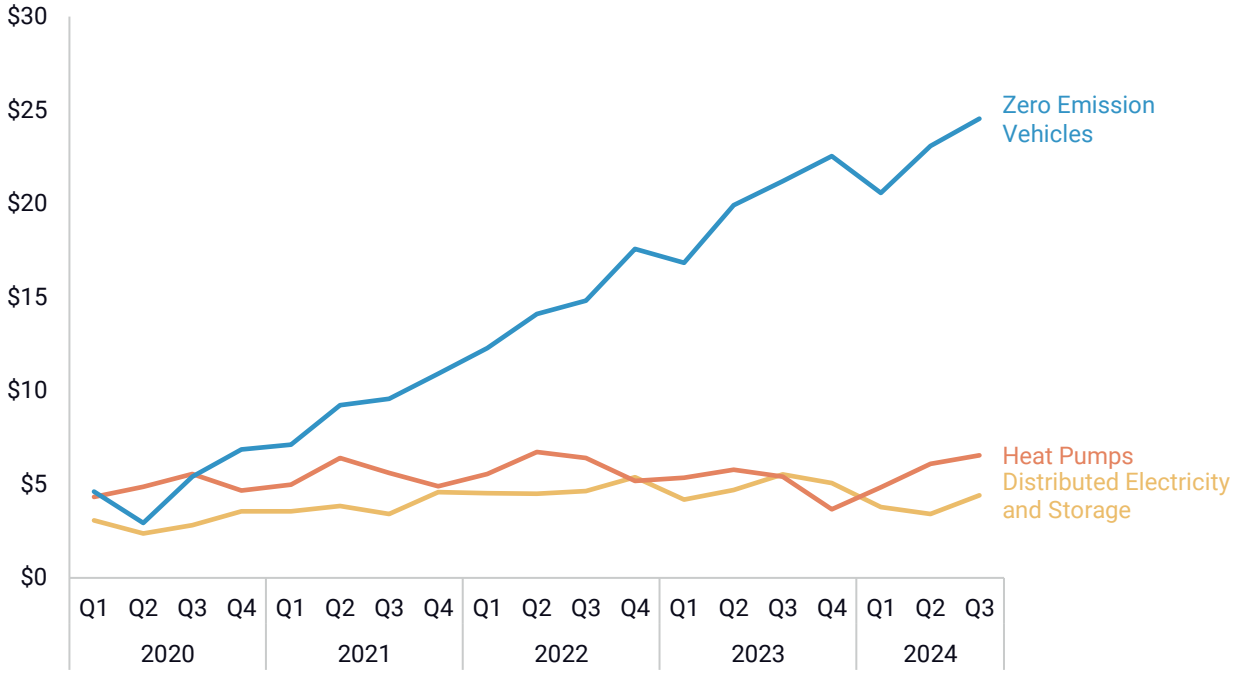

Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

In terms of newly announced investments, energy and industry grew by 10% from Q2 for a third consecutive quarter of growth and was up 16% year-on-year. Storage posted the second-highest quarter ever in announcements at $13 billion. Announcements were also strong for solar, flat year-on-year but up 13% quarter-on-quarter and flat year-on-year. SAF dominated industry announcements in Q3, with the strongest quarter of announcements since Q1 2023.

## Retail

Retail purchases of ZEVs, distributed renewable electricity and storage, and heat pumps came in at $36 billion in Q3 2024, up 9% from Q2 2024 and 11% relative to Q3 2023 as ZEV sales rebounded after declines in Q1 2024 (Figure 7). New ZEV registrations (a proxy for sales) increased by 6% in Q3 2024 compared to the previous quarter and 16% relative to Q3 2023. The growth came entirely from battery electric vehicles (BEVs) at 8% quarter-on-quarter. Plug-in hybrid electric vehicles declined slightly, down 4% quarter-on-quarter. BEVs saw substantial growth from the "Big Three" US automakers—General Motors, Ford, and Stellantis—and Japanese automakers. Meanwhile, Tesla experienced modest growth. Distributed electricity generation and storage investment increased 30% quarter-on-quarter in Q3, the first quarter of growth in this technology in the past year. Heat pump investment also grew modestly, by 8% quarter-on-quarter and 21% year-on-year.

FIGURE 7
**Retail investment by technology**
Billion 2023 USD




Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

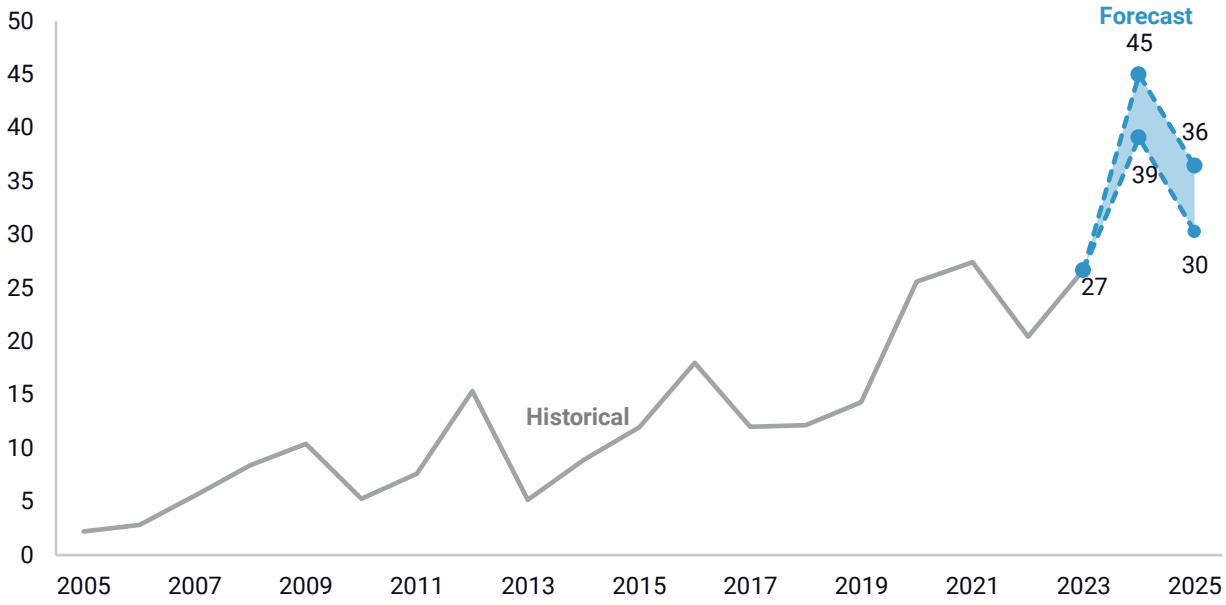
## Status of the transition: clean electricity

We flagged in our **February 2024 report** that while clean electricity investment in the US has been quite strong since the enactment of the Inflation Reduction Act (IRA), early warning signs suggested the pace of clean electricity capacity expansion might not meet the levels needed to deliver a 40% reduction in net GHG emissions below 2005 levels by 2030—the target that **a number of analyses suggest** the legislation has the potential to achieve. A fresh look at the announced and under-construction clean electricity projects in the CIM database reinforces these concerns. While we expect a record-breaking surge of clean electricity capacity additions in 2024, and 2025 will likely be the second-highest year on record, the current pipeline of clean electricity projects does not translate to enough new capacity in 2025 to keep pace with decarbonization expectations.

In 2023, the US added 27 GW of new clean electricity generating capacity to the grid, up from 21 GW in 2022 (Figure 8). In 2024, based on projects that have already come online or are expected to be completed by year-end, we anticipate a record of 39-45 GW of new clean generating capacity in 2024. While both impressive and encouraging, we expect capacity additions to fall in 2025, independent of any policy changes enacted under the incoming Trump

administration. Based on the existing project pipeline in the CIM database, we currently expect 30-36 GW of new capacity to come online in 2025.[1]

FIGURE 8
**Expected clean electricity generation additions**
GW net summer capacity. Actual additions through 2023; 2024-25 estimated based on projects currently in CIM database




Source: EIA and Rhodium Group
Note: Generation capacity additions do not include battery or pumped hydro storage.

While still meaningfully above historical levels, this pace of clean electricity capacity additions is at the lower end of **Rhodium Group's initial projections following the passage of the IRA.** We now expect an average of 32-36 GW of new clean generating capacity annually between 2023 and 2025, compared to the original 36-46 GW projected range (Figure 9). Both wind and solar are underperforming, coming in at the lower end of their respective projected ranges. If the US continues adding around 40 GW annually, that's consistent with Rhodium Group's post-IRA scenario a 30% reduction in net GHG emission relative to 2005 levels by 2030 (referred to in Rhodium's **August 2022 report** as the "High Emissions scenario"). To be on track for a 40% reduction or more by 2030, annual capacity additions will likely need to double between 2026 and 2028.

[1] We estimate rest of year 2024 and 2025 expected capacity additions by discounting planned additions for the last quarter of 2024 and full year 2025 based on historical rates of capacity additions falloff for solar PV and onshore wind (3 and 15 months out, respectively). These technologies account for the largest expected additions uncertainties in the pace of additions. Falloff rates are derived from over/under-predictions 3 and 15 months out, taken over the last two years of monthly additions in EIA860M with the low and high ranges representing the middle 67% of the distribution of these overprediction rates (the "likely" range in IPCC parlance). For other generating technologies, we use planned capacity additions as reported in EIA860M.

FIGURE 9
**Clean generation economics point to significantly higher levels of deployment**
GW net summer capacity, average annual additions over 2023-25 and 2026-28 periods


Source: EIA and Rhodium Group
Note: Generation capacity additions do not include battery or pumped hydro storage.

A variety of factors contribute to clean electricity capacity additions growing at the lower end of Rhodium's post-IRA projected range. Natural gas prices fell more quickly and sharply than anticipated from their 2022 post-Ukraine invasion highs, and are **currently projected** to remain at or below $3 per MMBTU at Henry Hub through 2025, increasing the appeal of natural gas relative to clean electricity technologies. Additionally, wind and solar costs increased modestly in 2022 and 2023. Siting and permitting challenges, along with long interconnection queues, are also likely slowing the deployment of cost-competitive wind and solar projects.

Policy interventions have the potential to address the latter permitting-related obstacles—whether at the federal level, through regional power market regulation, or in addressing state and local barriers to clean electricity construction. Such policy would enhance the likelihood that the IRA can fully deliver on its clean electricity deployment potential, even in the face of persistently low natural gas prices.

## ABOUT THE CLEAN INVESTMENT MONITOR

The Clean Investment Monitor (CIM) is a joint project of Rhodium Group and MIT's Center for Energy and Environmental Policy Research. The CIM tracks public and private investments in manufacturing and deployment of climate technologies in the United States. Through this data and analysis, the CIM provides insights into investment trends, the effects of federal and state policies, and on-the-ground progress in the US towards net-zero greenhouse gas emissions.

## ACKNOWLEDGMENTS

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