



Clean Investment in 2023: Assessing Progress in Electricity and Transport

February 21, 2024



Introduction

A year and a half has passed since the Inflation Reduction Act was signed into law, and more than two years since the enactment of the Infrastructure Investment and Jobs Act. These two pieces of legislation represent the largest public investment in clean energy and transportation in US history, designed to incentivize far larger private investment. The Clean Investment Monitor (CIM), launched in September 2023, tracks public and private investment in technologies covered by those bills on a quarterly basis, to provide policymakers and stakeholders with timely information on the state of clean energy and transportation manufacturing and deployment in the United States.

The CIM can also be used to compare on-the-ground progress on clean energy deployment and GHG emissions reductions with projections of the impacts of the IRA and IIJA, developed shortly after their adoption. In this report, we take stock of progress in two key areas: the construction of new utility-scale clean electricity generation and storage capacity, and the sale of battery electric vehicles, plug-in hybrid vehicles, and fuel cell vehicles (referred to collectively as “zero emission vehicles” or ZEVs).

We compare actual progress in 2022 and 2023 in the CIM database to projections from three organizations whose assessments of the potential impact of the IRA and IIJA are widely used by policymakers and stakeholders: Energy Innovation (EI), the REPEAT Project at Princeton University, and Rhodium Group. All three groups modeled scenarios for IRA/IIJA implementation that found the possibility of a 37-42% reduction in US net GHG emissions by 2030 relative to 2005 levels (Table 1). This is broadly in line with the authors of the IRA’s [stated objective](#) of achieving a 40% reduction in emissions by 2030.

TABLE 1

Scenarios included in this assessment

Organization	Report	Scenario	Net GHG 2030 vs 2005
Energy Innovation	Updated Inflation Reduction Act Modeling Using the Energy Policy Simulator	Low	-37%
		High	-42%
REPEAT Project	Climate Progress and the 117th Congress: The Impacts of the Inflation Reduction Act and Infrastructure Investment and Jobs Act	Conservative	-37%
		Optimistic	-41%
Rhodium Group*	Taking Stock 2023: US Emissions Projections after the Inflation Reduction Act	Mid emissions	-37%
		Low emissions	-42%

* Rhodium Group also modeled a “high emissions” scenario in which faster economic growth, cheap fossil fuels and expensive clean energy technology only results in a 29% reduction below 2005 levels by 2030, which is not included in this analysis.

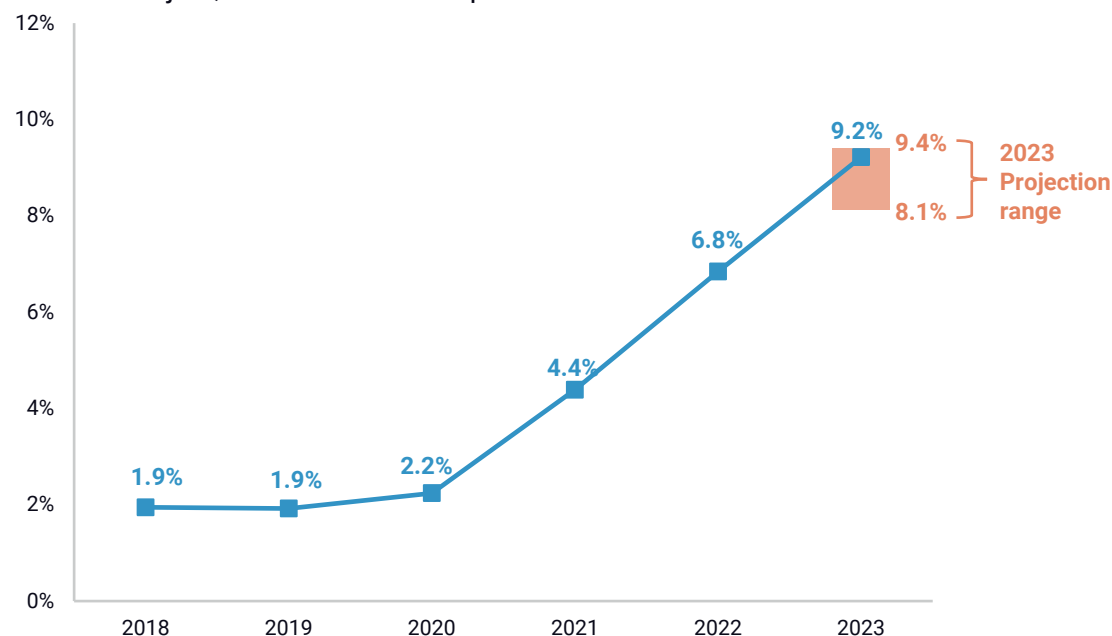
Transportation

Over the past several months, there have been a number of news stories suggesting the US is experiencing a slow-down in electric vehicle sales, but sales in 2023 came in at the top end of the range of post-IRA projections. Based on preliminary 2023 CIM data, we estimate that 1.43 million ZEVs were sold in the US in 2023, the vast majority of which were battery electric vehicles. These sales account for 9.2% of total light-duty vehicle sales last year, up from 6.8% in 2022 and 2.2% in 2020 (Figure 1). Post-IRA analysis from EI, REPEAT, and Rhodium projected an 8.1% to 9.4% ZEV sales share in 2023. While actual sales came in at the top end of the range of post-IRA projections, they dramatically exceeded projections from a few years ago. In 2020, for example, the Energy Information Administration [projected](#) 580,000 ZEV sales in 2023—a little more than one-third of the actual total last year.

FIGURE 1

ZEV share of total light-duty vehicle sales

Actual sales (based on registrations) vs. 2023 projection range from Energy Innovation, REPEAT Project, and Rhodium Group



Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor, Energy Innovation, REPEAT Project

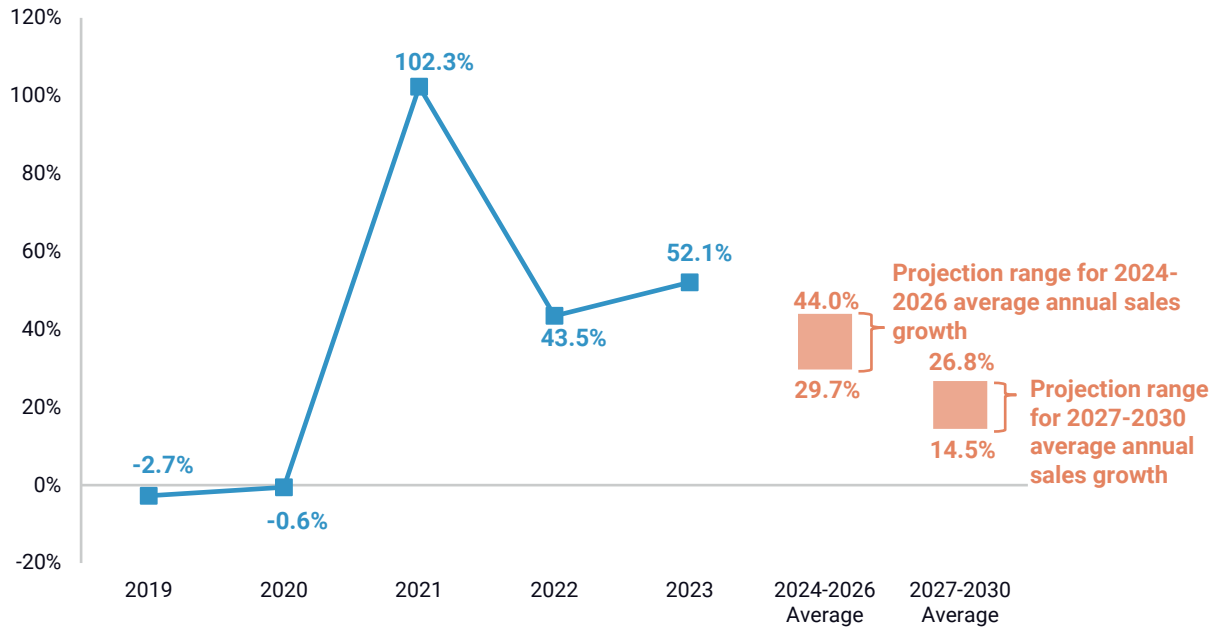
It is likely, based on Q4 growth rates, dealer inventory levels, and forward guidance from Tesla last month, that annual ZEV sales growth will fall in 2024 from the more than 50% growth experienced in 2023. But sustained 50% year-over-year sales growth was neither expected to occur as a result of the IRA, nor is it required to achieve the legislation’s goal of a 40% reduction in net GHG emissions by 2030. Indeed, the projections from EI, REPEAT, and Rhodium include between a 30% and

44% average annual growth in ZEV sales between 2024 and 2026, slowing further to 15% to 27% between 2027 and 2030 (Figure 2).

FIGURE 2

Annual growth rate in ZEV sales

Actual sales (based on registrations) vs. 2024-2030 projection range from Energy Innovation, REPEAT Project and Rhodium Group



Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor, Energy Innovation, REPEAT Project

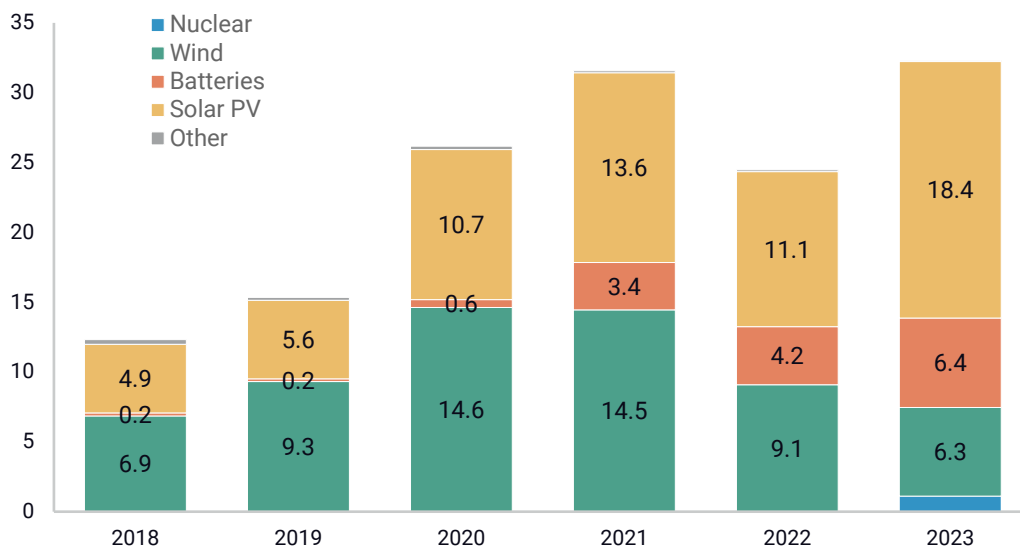
Electricity

While ZEV sales exceeded post-IRA projections in 2023, utility-scale clean electricity expansion is falling short. There was a record 32.3 GW of zero-carbon electricity generation and storage capacity added to the grid in 2023, up 32% from 2022 and topping the previous high of 31.6 GW in 2021 (Figure 3). The majority of new capacity was solar PV at 18.4 GW, followed by battery storage at 6.4 GW and wind at 6.3 GW.

While impressive, this pace of additions is lagging EI, REPEAT and Rhodium projections of electricity system pathways consistent with a 40% reduction in net GHG emissions by 2030 (let alone the US pledge under the Paris Agreement of a 50-52% reduction). Solar is performing largely as expected in the REPEAT and EI projections while falling short of the Rhodium projections. Wind and storage are falling short of the REPEAT and EI projections (and down considerably in absolute terms since 2021) but are broadly in line with the Rhodium projections.

FIGURE 3

Annual clean electricity capacity additions
GW net summer capacity



Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor

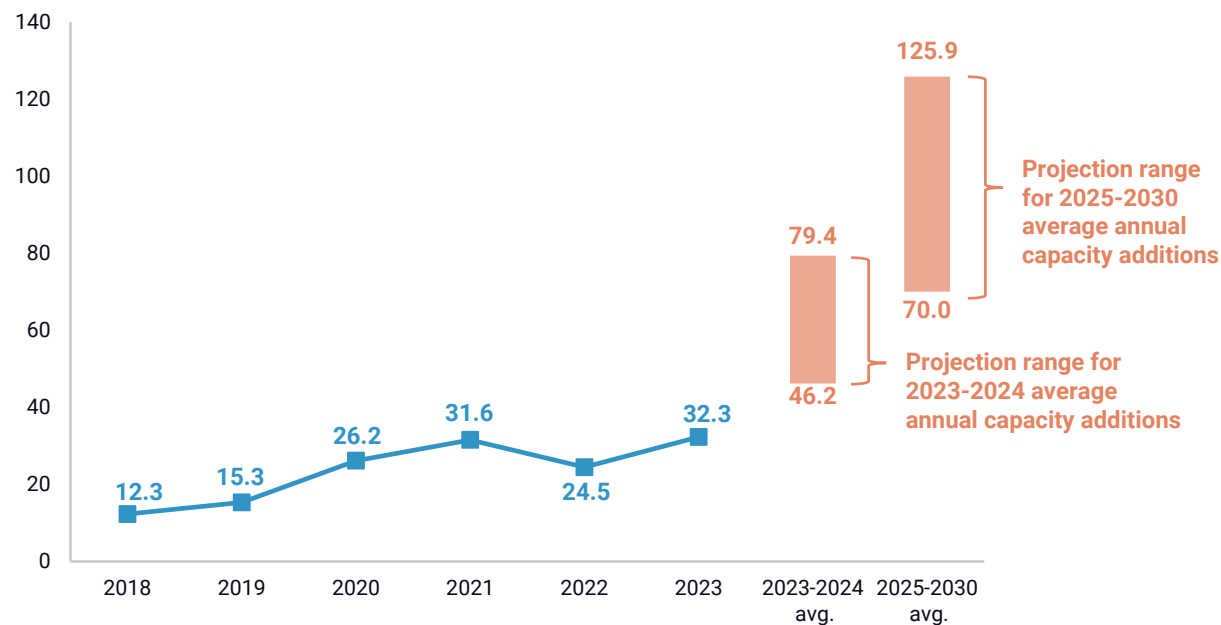
Projected average annual capacity additions in 2023-2024 from these three groups’ post-IRA modeling range from 46 to 79 GW (Figure 4). Given that 2023 capacity additions were only 32.3 GW, that leaves 60 to 127 GW of capacity that needs to be added in 2024 to stay on track with these projections. There is currently 60 GW of capacity under development with a scheduled start date in 2024—just reaching the bottom end of that range. But projected start dates at this time of the year have a tendency to slip, making it likely that the full year 2024 number for capacity additions will end up coming in considerably below 60 GW.

Beyond 2024, the pace of annual capacity additions consistent with modeled pathways to a 40% reduction in net GHG emissions by 2030 only increases. Post-IRA projections from the three organizations included in this survey have average annual capacity additions between 2025 and 2030 ranging from 70 GW to 126 GW.

FIGURE 4

Annual clean electricity capacity additions vs projections

GW net summer capacity vs. projection range from Energy Innovation, REPEAT Project, and Rhodium Group



Source: Rhodium Group/MIT-CEEPR Clean Investment Monitor, Energy Innovation, REPEAT Project

Conclusions

A year and a half after the passage of the IRA, progress in two key areas of clean energy and transportation deployment—electric vehicles and clean electricity—is mixed. For electric vehicles, sales came in at the top of the range of post-IRA projections last year. ZEV deployment can remain on a track consistent with the IRA’s 40% emissions reduction objective, even if annual sales growth slows in 2024—provided it stays in the 30-40% range. On the other hand, even though investment in utility-scale clean electricity generation and storage capacity reached record levels in 2023, it is at risk of falling behind post-IRA projections. The IRA has made renewable electricity cost-competitive with coal and natural gas (short-term cost inflation in 2022/2023 and a lag in issuing guidance on some tax credit provisions notwithstanding). The biggest barriers to deployment between now and 2030 are non-cost in nature—like siting and permitting delays, backlogged grid interconnect queues, and supply chain challenges. Tackling these non-cost barriers will be critical for the IRA to achieve its full clean energy deployment and emissions reduction potential.

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 U.S. towards net-zero greenhouse gas emissions.

ACKNOWLEDGMENTS

This nonpartisan, independent research was with support from the Breakthrough Energy Foundation and the William and Flora Hewlett Foundation. The results presented in this report reflect the views of the authors and not necessarily those of the supporting organization.

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