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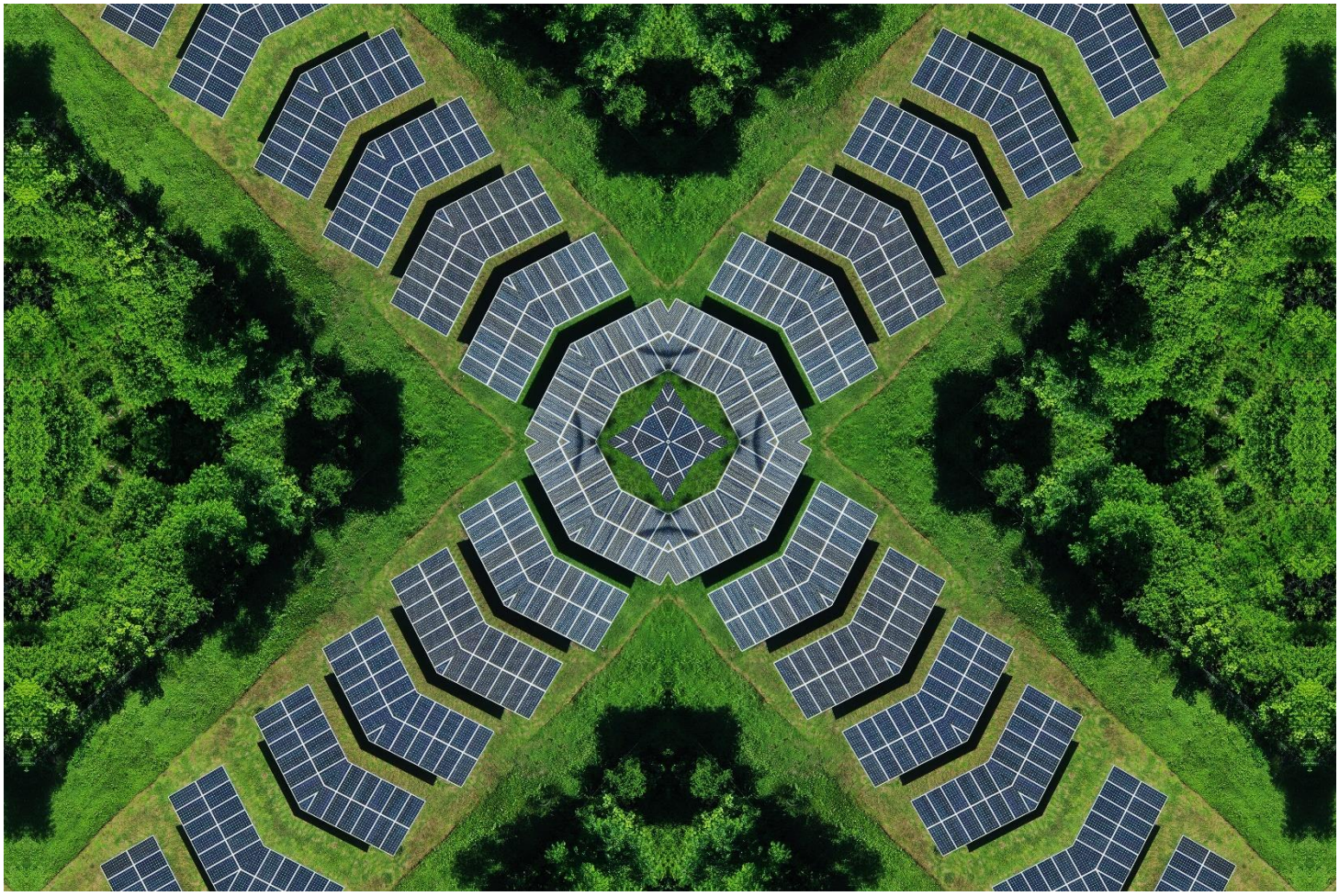

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Projected PJM load increase signals obstacles on path to net-zero

By Tanya Peevey and Steve Piper | Feb 29, 2024

On Dec. 8, 2021, US President Joe Biden signed an executive order putting the full weight of the federal government behind a goal of net-zero CO2 emissions by 2050, adding to the international effort to limit the global temperature rise to 1.5 degrees C from preindustrial levels. The Q4 2023 Market Intelligence Power Forecast projects a 90% decarbonized US power sector by the end of 2043 if renewable curtailment is recaptured and gas is converted to hydrogen where there is renewable power. The significant increase in the projected PJM Interconnection LLC load, however, exemplifies mounting obstacles on the path to net-zero, with an estimated 8.32% increase in electricity usage in the region by 2033 amounting to an annual 72.6 TWh.

The Take

➤ The PJM 2024 load update shows an 8.32% increase over 2023 projections by 2033, translating to 72.6 TWh of incremental electricity usage needing to be served by new generation.

➤ Assuming the renewable portfolio standards (RPS) in seven PJM states are met, the incremental electricity usage would reduce to 52.7 TWh from 72.6 TWh.

➤ The Q4 2023 Power Forecast for PJM projects a generation mix dominated by renewables, with wind and solar taking the top two spots by 2043. Consolidating all regions, the US power sector is on track to be 76% decarbonized by 2043, with the potential for the metric to reach 90%.

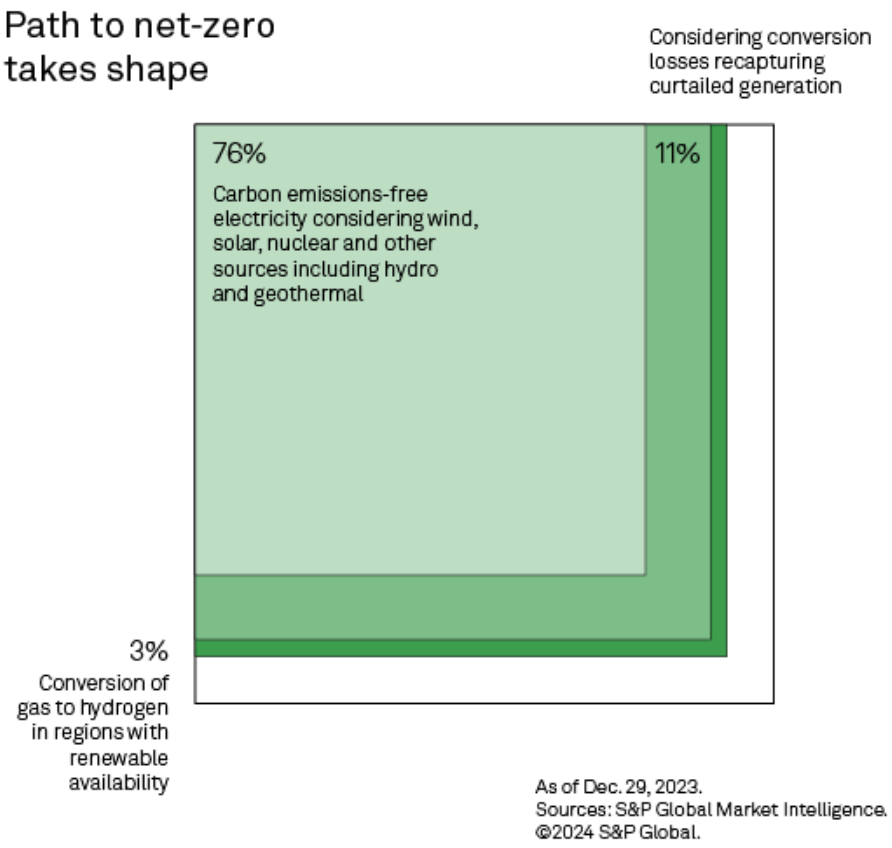
➤ Additional renewable resource due to RPS mandates should put upward pressure on prices for renewable energy credits, increasing their value.

➤ The new PJM load projection implies near-term upward pressure on capacity prices as the needed capacity rises, potentially enticing asset owners to extend the life of dispatchable resources.

According to the Environmental Protection Agency, power sector CO2 emissions declined 7% in 2023. A convergence of elements contributed to the decline, including an 18% decrease in electricity generation from coal-fired power plants; an 8% jump in gas-powered output on the back of falling commodity prices; and the rising shares of renewables in the generation mix, spurred in part by Inflation Reduction Act tax credits and federal emission restrictions. As coal- and gas-fired power plants retire, capacity is being added by intermittent renewables, with more than 45 GW from solar generation.

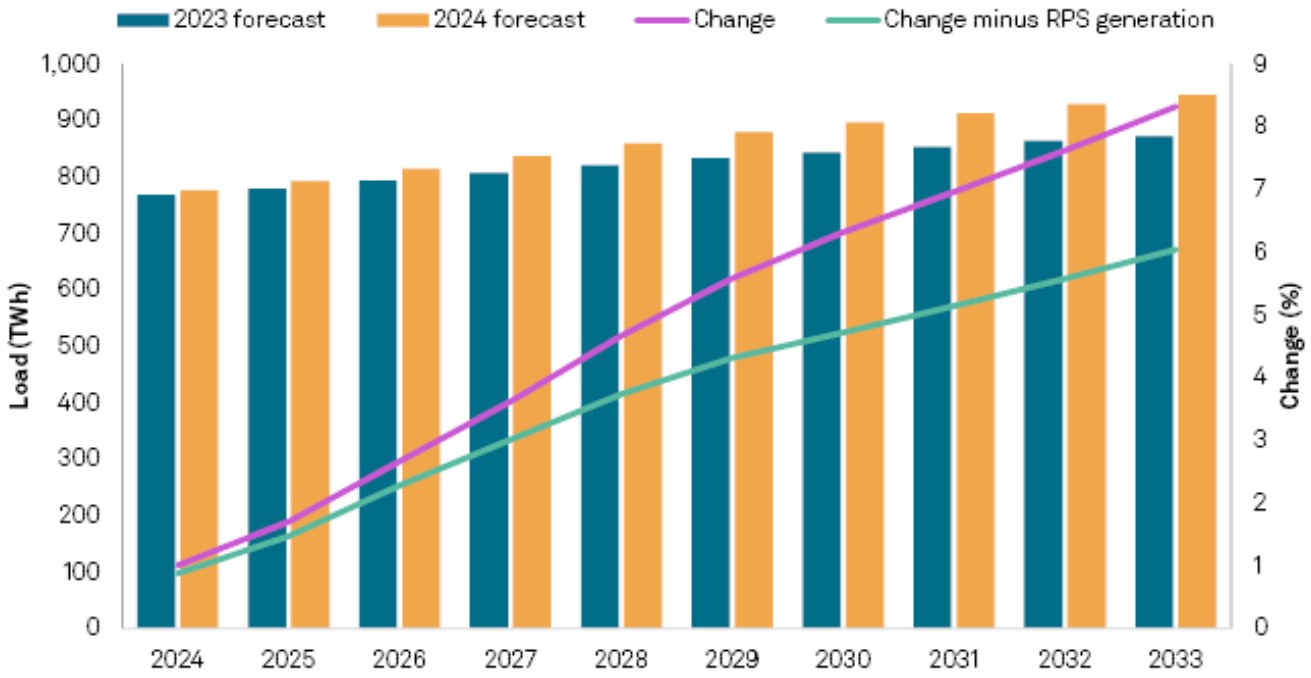
The 20-year Q4 2023 Power Forecast projects a continuation of this trend, with the share of coal and gas-fired generation declining almost 10 and 24 percentage points, respectively. As wind and solar move up to the top two spots of generation share by 2043, decarbonization of the US power sector is estimated to reach 76%. This value has the potential to reach 90% if curtailed generation is recaptured and gas is converted to hydrogen in regions where renewables are available.

Battery capacity overhang to widen through to 2030, putting plans at risk



Even with the projected positive steps toward net-zero, there are many potential impediments. An example of this is the 2024 PJM load update that projects a significant increase in load over the next 10 years compared to the 2023 update. The 8.32% increase in megawatt load by 2033 translates to new generation having to serve 72.6 TWh of incremental electricity usage or consumption. Assuming the RPS mandates in seven PJM states are met, the incremental electricity usage would reduce from 72.6 TWh to 52.7 TWh, or from 8.32% to 6.04%. Three of those seven states have carve-outs for offshore wind, accounting for about a quarter of the mandated generation.

Comparison of 2023 and 2024 PJM load

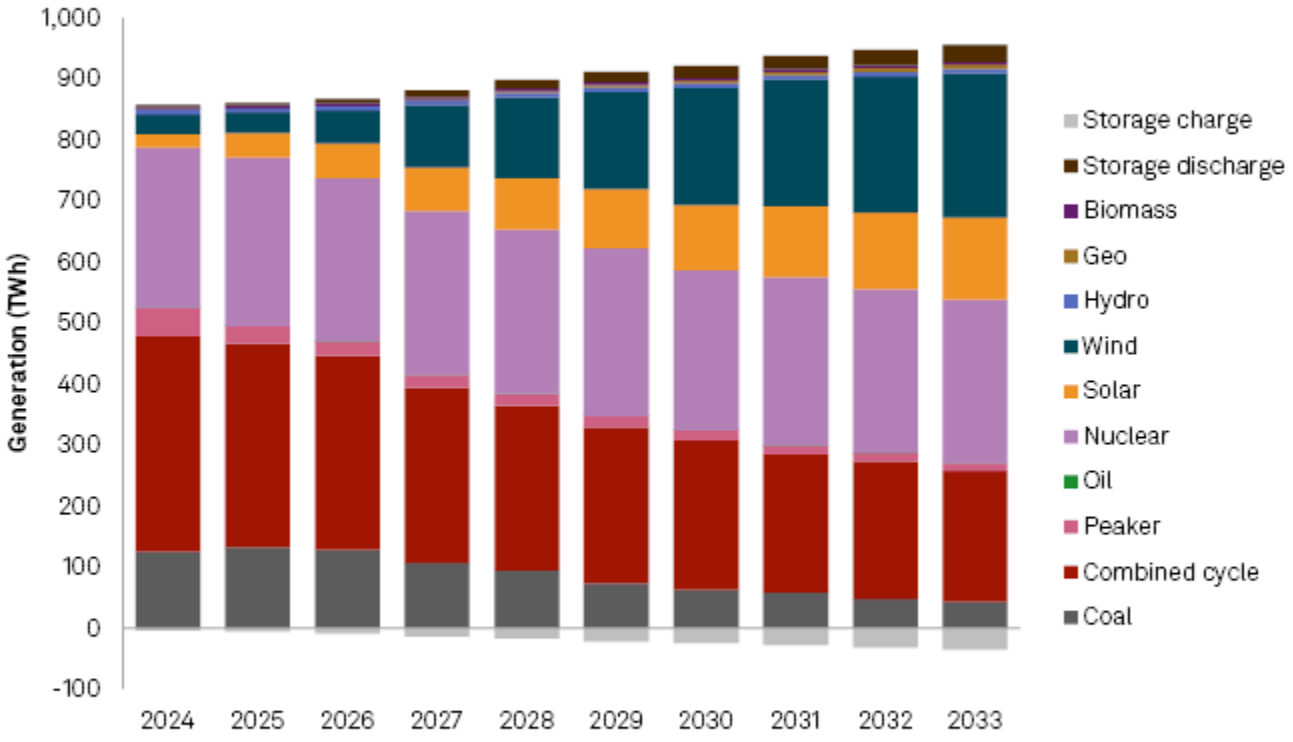


Estimates compiled Feb. 20, 2024.
Percent change is the increase/decrease in annual load values from the 2023 PJM load forecast to the 2024 PJM load forecast.
The PJM load forecast was converted from MW to MWh and thus represents electricity usage or consumption.
Sources: S&P Global Market Intelligence.

Zooming in geographically, regions with the largest projected load increases are all associated with growth in datacenter load in Ohio, Maryland, New Jersey, West Virginia and Virginia. Dominion territory is the focal point of this datacenter-related boom, having experienced a 500% load increase from 2013 to 2022, with Virginia's Loudoun County alone accounting for 80% of the current demand. In response, PJM paused datacenter connections for two months in the summer of 2022 to reevaluate its long-term transmission planning, eventually awarding $5B in grid upgrades in December 2023.

The Q4 2023 Power Forecast projects a growing share of solar and wind in the generation mix — up 519% and 613%, respectively, over the outlook — and a decreasing share of coal and gas generation, down 65% and 43%, respectively. By 2033, wind generation will reach 236 TWh and solar 134 TWh. With the 2023 fourth quarter projected renewable output more than double the generation from RPS mandates, a significant amount of the 52.7 TWh of new PJM generation is expected to be satisfied economically with less expensive green energy. Considering a 2033 PJM-wide capacity factor forecast of 16%, approximately 36 GW of new solar capacity would be needed to fill the 52.7 TWh gap. With a 39% capacity factor, the figure falls to 15 GW for wind.

PJM forecast generation



As of Dec. 29, 2023.
Source: S&P Global Market Intelligence.

The additional mandated generation should put upward pressure on prices for renewable energy credits, increasing their value and supporting investment in renewable power generation.

With PJM expecting to clear more than 260 GW of proposed capacity by the end of 2026 — with renewables accounting for 95% of the total — there is enough investment interest to satisfy generation in the region if PJM queue reforms bear fruit and provided the rate of completion greatly exceeds the 5% historical rate. Part of the equation is not just completion but deployment, getting the power to the end user. That, too, is also facing headwinds with the Maryland Office of People Counsel pushing back on PJM's allocation of costs for their package of transmission solutions, arguing that the 2022 load-share proposal will look significantly different by 2028.

The new PJM load projection implies near-term upward pressure on capacity prices as the needed capacity rises, moving up the supply stack to more expensive resources. This could entice asset owners to extend the life of dispatchable resources such as the 1,273-MW coal-fired Brandon Shores power plant scheduled to retire June 2025. Such options would allow PJM to realize "first ready, first served" interconnect queue reforms in pursuit of transmission planning goals. Of the 40 GW of anticipated retirements by the end of 2030, 15 GW are economically driven, meaning there is an opportunity for delayed retirement of dispatchable resources.

The PJM load forecast does not fully integrate the impact of AI, foreshadowing another significant load increase in the 2025 projections. AI electricity requirements are expected to rise rapidly as graphic processing units replace CPUs to train AI models, requiring five to seven times more energy.

The energy sector is a major contributor to CO2 emissions and must be part of the solution to limit the global temperature increase to 1.5 degrees C. With a lot of moving parts and many stakeholders involved, it is an uphill battle but with state, regional and federal efforts that support private investment and seek to reform regulatory policy, there is a chance the country could reach net-zero by 2050.

For wholesale prices and supply and demand projections, see the S&P Global Market Intelligence Power Forecast.

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