

Strong Co-op Renewable Growth Continued in 2021

Key Findings

- Co-ops added nearly 1.4 gigawatts of new renewable capacity in 2021.
- Co-op renewable deployment is accelerating, with solar dominating planned capacity.
- Most capacity growth has been through power purchase agreements, rather than direct ownership.
- Hybridization of renewables with battery energy storage is becoming more common.

Electric Cooperatives and Renewable Energy – A Long History

Electric cooperatives have been involved with renewable energy since the very beginning, as the growth of rural electrification was intertwined with the growth in federal hydropower, both resulting from economic development “New Deal” programs of the 1930s. Today, co-ops and NRECA’s public power members purchase the output from roughly 10 gigawatts of hydroelectric plants sold by the four federal Power Marketing Administrations and the Tennessee Valley Authority. Most of this power is purchased under the “preference principle,” wherein not-for-profit co-ops and public utilities are given first right of purchase at the lowest possible cost, which provided an early source of affordable power for rural electrification. While co-ops across the U.S. purchase federal hydro, co-ops in the Pacific Northwest are particularly reliant on this resource for the majority of their power supply.

Co-ops Added Nearly as Much New Renewable Capacity in 2021 as in 2020

With cumulative additions of nearly 1.4 gigawatts, 2021 was second only to 2020 when a record of over 1.6 gigawatts of new renewable capacity was added.¹ By the end of 2021, co-ops had more than 13 gigawatts of renewables in their resource portfolios, in addition to 10 gigawatts of purchases from federal hydro facilities. These resources include non-federal hydroelectric resources, as well as wind, solar, biomass, and heat capture technologies.² Most of this capacity, about 80%, is owned or contracted for by generation & transmission cooperatives.

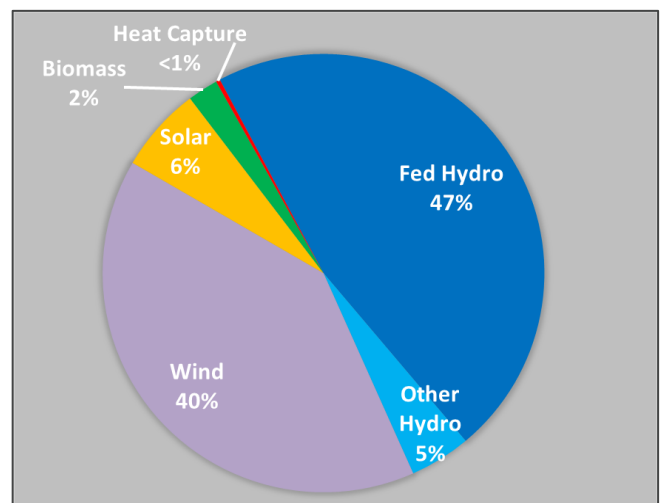


Figure 1: Co-op Renewable Portfolio, Including Federal Hydro, 23 gigawatts (2021)

¹ Data on cooperative renewable resources are based on NRECA analysis using a variety of public sources.

² Some co-ops sell the environmental attributes of power generated using renewable resources.

Wind has Dominated Growth Since 2004, but Solar Growth has Accelerated

Wind has made up the vast majority of renewable additions since 2004, with more than 9.2 gigawatts of wind capacity online by the end of 2021, and another 1.4 gigawatts planned through 2025. Most co-op wind projects are located in the Midwest and Texas, where wind resources are concentrated. Solar has grown rapidly in the last five years, reaching nearly 2.3 gigawatts in total capacity by the end of 2021. With over 5.5 gigawatts of new solar capacity planned to come online from 2022 through 2026, solar projects now account for the large majority of planned renewable capacity. Solar capacity growth has accelerated in large part due to the increasing size of recent and planned co-op solar projects, including more than 30 projects of 100 megawatts or larger either online or planned. Co-op solar resources have seen particular growth in the Southeast and the West, though many large projects are also online or planned in the Midwest.

The shift from wind to solar growth follows national trends, in part due to the status of federal renewable incentives; the production tax credit for wind projects commencing construction after 2021 has expired, while the investment tax credit for solar projects does not start to phase down until 2023. There is also an effort by resource planners in wholesale markets to increase solar deployment to balance wind generation across regions where wind and solar production patterns can complement each other throughout the day.

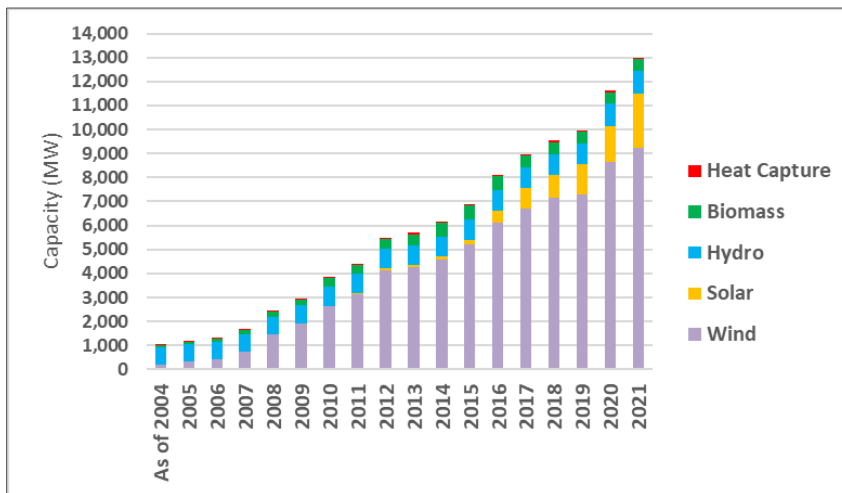


Figure 2: Cumulative Co-op Renewable Capacity Online (By Type, Excl. Fed Hydro)

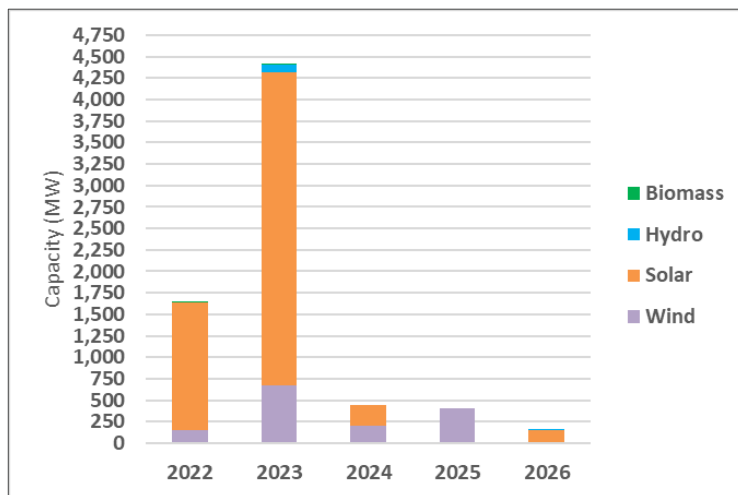


Figure 3: Planned Capacity by Year (By Type)

Most Growth has Come through Power Purchase Agreements

Most electric cooperatives are not-for-profit and exempt from federal taxes, making it difficult to directly access federal tax credits for renewable project development. For this and other reasons (e.g., lack of experience with operations & maintenance), co-ops have primarily used power purchase agreement (PPA) contracts to add new renewable resources, capturing the benefits of the tax credits through negotiated contract rates. Of the more than 13 gigawatts of non-federal co-op renewable capacity, about 11.3 gigawatts are under PPAs, with most planned new capacity also from contracted projects. This is of course in addition to purchasing the output from about 10 gigawatts of federal hydro facilities annually.

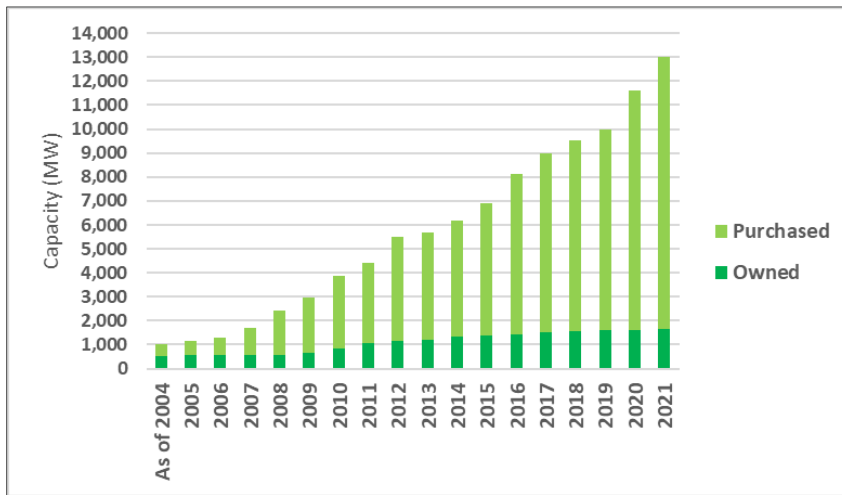


Figure 4: Cumulative Co-op Renewable Capacity Online (By Owned or Purchased through PPA, Excl. Fed Hydro)

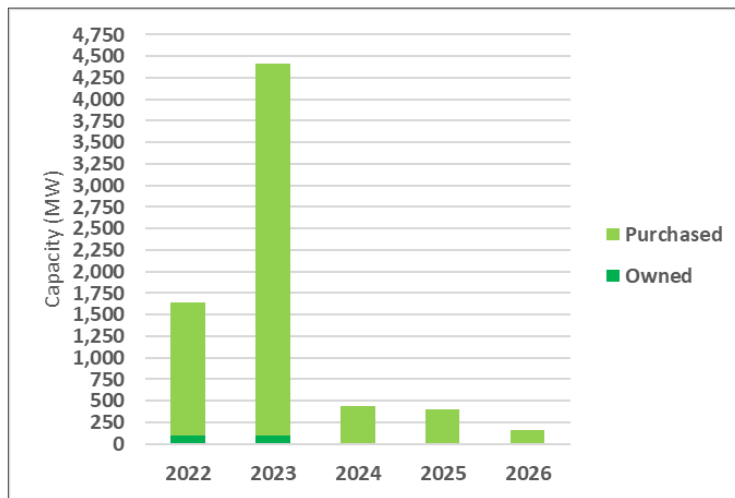


Figure 5: Planned Capacity by Year (By Owned or Purchased through PPA)

Growth of Battery Storage Paired with Renewables

The pairing of renewable generation with battery energy storage systems (BESS) in hybrid projects is becoming more common nationwide. Batteries can help address some of the challenges of intermittent renewable resources by smoothing out production and, with longer duration batteries, shifting output to peak times when the energy is more needed and valuable. According to the U.S. Energy Information Administration, solar-battery hybrids are expected to account for 63% of utility-scale (1 megawatt+) BESS capacity additions from 2021-2024. Solar-battery hybrids are most common, in part due to the ability to

apply the solar investment tax credit towards an associated BESS charged by the solar asset,³ however there are also benefits to wind-battery hybrid systems, and systems pairing all three technologies are emerging.

Electric cooperatives are taking an active part in the deployment of renewable hybrid generation. More than 40 projects are already online or planned across the nation, with BESS ranging in size from 100 kilowatts to 200 megawatts, most sized to store two to four hours of output from their associated renewable generation for later use. While most of these are solar-battery hybrids, co-ops have also paired wind, hydro, and other technologies, and several have been deployed as part of a microgrid. Looking ahead, battery storage offers co-ops an opportunity to enhance the value and predictability of renewable generation at all scales, especially as the costs of BESS decline.

Other Resources

- NRECA maintains interactive maps of co-op renewable resources based on this analysis [here](#).
- More information on battery energy storage can be found [here](#).
- The most recent analysis of the electric cooperative fuel mix, including renewables, can be found [here](#).

Contact for Questions

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³ For more information, see <https://www.eia.gov/todayinenergy/detail.php?id=49756>.