



FEATURE

How rural co-ops are shifting to a cleaner power mix

Driven by wind credits, low gas prices and consumer demand, rural co-ops are finding new ways to grow renewables

By **Herman K. Trabish** • Aug. 21, 2017

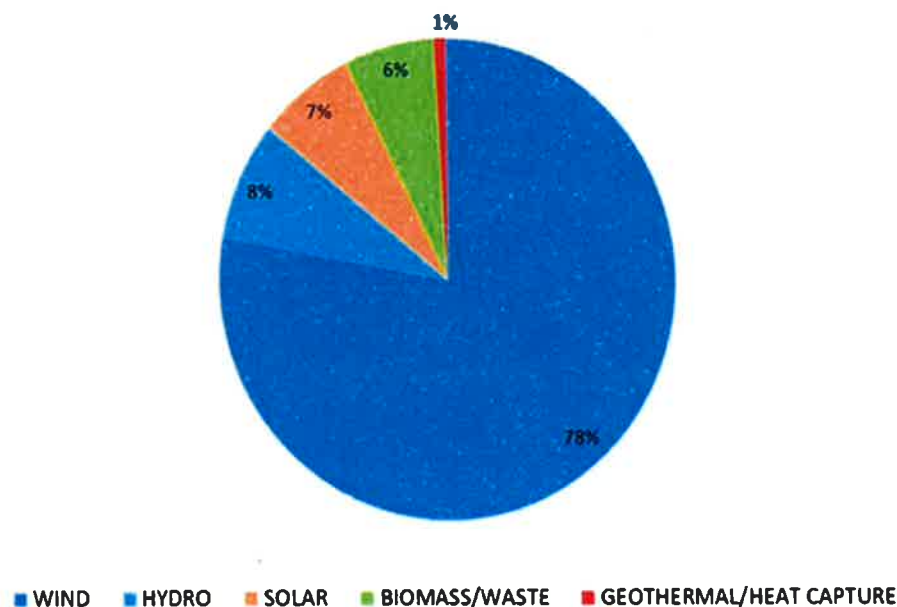
The generation mix of rural electric cooperatives is changing at the same swift pace as the the United State's power system, with wind power, natural gas and technology innovation dominating growth. But the biggest change in their respective power mixes appears to be wind energy and natural gas investment.

“Wind is set to remain the largest non-hydro renewable resource deployed by cooperatives, with more than 850 MW of new wind PPAs planned over the next two years, accounting for nearly two-thirds of planned additions,” according to the National Rural Electric Cooperative Association’s 2016 outlook.

For example, rural electric cooperatives added more than 900 MW of new wind capacity in 2016, according to the American Wind Energy Association (AWEA). To make room for the new generation resources, co-ops shuttered or converted 700 MW of coal between 2014 and 2016, and are estimated to shutter or convert an additional 1,344 MW by 2028, eliminated roughly 8% of coal capacity from co-ops.

“Co-ops have significantly expanded their wind energy capacity in the last ten years, and in the process developed ways to integrate this intermittent resource into the grid,” NRECA recently reported. Their utility-scale wind development “is now second only to hydro in the co-ops’ renewable portfolio.”

Current Cooperative Renewable Capacity by Type



Credit: NRECA

The main growth drivers for co-ops, just as for the market at large, is the federal production tax credit (PTC) and state renewables mandates, according to Tracy Warren, a spokesperson for NRECA. Another major factor are rapidly falling costs for new technologies, as reported by DOE.

The combination of these factors has driven power purchase agreement (PPA) prices from an average \$70/MWh in 2009 to an all-time low \$20/MWh in 2016, making wind an offer co-ops can't refuse. And low gas prices have spurred a shift from coal-fired generation, which has typically dominated co-ops' power mixes.

But those are not the only solutions co-ops are examining to boost a cleaner power mix. Some co-ops are shifting to natural gas in light of the low prices. And still some are advocating for policy changes to encourage investment in electric vehicles and water heaters. Regardless, it's clear the trend among all utilities, from cooperatives to investor-owned utilities, is one of fundamental resource transformation.

How co-ops are making the transition to cleaner energy resources

Generation and transmission co-ops made up the top 10 wind builders in 2016. But some are looking beyond wind energy to electric vehicles and water heaters to better integrate renewable energy. And in some areas, natural gas prices are still low enough to threaten wind energy development.

Basin Electric Power Cooperative

North Dakota's Basin Electric Power Cooperative, has a nearly 6,700 MW load serving 2.8 million customers in 11 states, and is by far the biggest co-op user of wind. Basin Electric can claim 1,360.6 MW of installed wind capacity, according to Curt Pearson, director of media relations, which is more than 20% of its generation capacity. Basin Electric owns 285.7 MW of wind capacity and holds PPAs for the remaining 1274.9 MW.

The main drivers behind its wind growth have been a 10% renewables co-op "directive" and the economic advantages to Basin from low-cost, long-term fixed-price wind, Pearson said.

PPAs in particular offer a unique opportunity for co-ops. As member-owned non-profits, they cannot take advantage of the PTC, except through a PPA. In that case, the wind developer to use the tax credit and pass its value back to the co-op in the contract terms, according to NRECA's 2016 generation, capacity, and markets outlook.

Many generation and transmission co-ops are joining organized markets in response to potential resource adequacy and reliability threats represented by rising levels of variable resources.

Basin Electric was one of them. As the co-op's wind penetration rose, it joined the Southwest Power Pool (SPP) to increase its capability for integrating wind, Pearson said.

In recent wind acquisitions, Basin has consistently used PPAs. Not only does the developer pass on the PTC through the PPA, it

also bears the burden of siting and is responsible for transmission through the interconnection agreement, Pearson noted.

Golden Spread Electric Cooperative

Golden Spread Electric Cooperative, located in the Texas panhandle with a 1,400 MW total generation capacity, has a different take on the low wind prices. Low natural gas prices are at present a threat to wind's competitiveness, DOE reported. But wind's average future stream from 2014 to 2017 vintage PPAs "compares very favorably to the EIA's latest projection of the fuel costs of gas-fired generation extending out through 2050."

To take advantage of low electricity market prices from this combination of factors, Golden Spread is adding natural gas units and building transmission capacity along with their wind investments. The co-op owns a 78.2 MW wind project and holds two PPAs for an additional 200 MW, making it "economically driven," said vice president John Eichelmann.

Golden Spread also added more than 700 MW in fast-start natural gas units between 2011 and 2016.

"They were built to take advantage of our wind and the very low-cost wind available on both the Electric Reliability Council of Texas (ERCOT) and SPP systems," Eichelmann said. "The overall market is saturated with wind. When the wind stops blowing, we can quickly start the natural gas plants to avoid high prices."

All the natural gas units are at the same physical location and Golden Spread has installed grid-switching technology to be able to serve either ERCOT or SPP and "take advantage of the price swings in either market," Eichelmann added.

Great River Energy

Great River Energy (GRE), is a Minnesota generation and transmission co-operative with a 2,800 MW load serving 28 distribution co-ops and 685,000 customers. It was the fourth

biggest co-op wind user in 2016, with 463.75 MW. An additional 400 MW is expected to be online by 2021.

Like Basin and Golden Spread, GRE leveraged the Midcontinent Independent System Operator (MISO) for much greater transmission and dispatch reach of a regional system

And, in a similar fashion to Golden Spread, GRE is using its natural gas to accommodate wind and other variable resources. It has "modified" Coal Creek Station, its biggest coal unit, "to better adjust its output in response to market signals," according to the utility's most recent IRP.

Instead of working at "a very high capacity factor," Coal Creek will be "providing reliability to the market and serving as a backup for growing wind energy in the region," the IRP added.

Gary Connett, director of member services and marketing for GRE, said the co-op also has a "load side strategy to better accommodate wind," which is using 110,000 customer-owned water heaters as "a giant battery."

GRE heats customers' water between the hours of 11 p.m. and 7 a.m. with low-cost, MISO market energy, which is dominated by wind. "Buying the low-cost kWh at night and using the hot water the next day, when the kWh are more expensive, is a sort of arbitrage," Connett said.

Drawing on MISO's wind-heavy off-peak resources also allows GRE to boost its percentage of renewable energy, which in turns helps it meet Minnesota's 25% renewables by 2025 mandate, he added.

More recently, the utility is developing a program that will manage electric vehicle (EV) charging during the same off-peak hours during which it heats water. "That is part of a long-term vision," Connett said.

Associated Electric Cooperative

Associated Electric Cooperative is a generation-only co-op with six transmission co-op members and 51 distribution co-op members, Spokesperson Robin Harrison said. Its 5,700 MW generation capacity serves 875,000 customers across most of Missouri, northeastern Oklahoma, and a small part of Iowa.

Associated's 750 MW of wind, obtained entirely through PPAs, puts it second among U.S. co-op users of wind. But load has been flat recently, Harrison said. Associated's last wind addition was the 150 MW Osage project, which went online in 2015, nor has it made any recent natural gas capacity additions and is not planning, developing, or building new capacity.

Associated is not part of a regional market but its "fast-start peaking natural gas units are one factor that enabled us to add wind generation in the past," Harrison said.

Taking advantage of the tax credits through PPAs with developers is another key factor in its wind buildout, Harrison said.

Associated's biggest reason for building wind, however, was member demand for renewables, she added. "We voluntarily stepped forward, without a renewables mandate, to add wind to our resource mix.

Wind's future after the PTC phasedown

The PTC still remains the core motivator behind co-ops investing in wind energy. But that credit is designed to phase out completely by 2021, and begins stepping down this year. For instance, a project that started construction in 2016 qualifies for the full credit, but projects starting this year will only get 80% of the credit and so on.

Luckily, a ruling from the Internal Revenue Service ensures projects that go online within four years of starting construction are eligible for the PTC. State renewables mandates also played a part in driving deployment of 51% of all installed wind capacity in the U.S. between 2000 and 2016, according to the DOE.

But that wind growth could encounter roadblocks if new transmission buildouts are stifled. Currently there are 14 projects, if completed, could “carry 52 GW of additional wind capacity,” the agency noted. But a policy led by co-ops could also help support wind growth.

The National Renewables Cooperative Association PPA plan started in 2009 “to assist its owners in the development and/or acquisition of renewable generating resources,” said spokesperson Todd Bartling.

At the end of 2016, NRCO members had over 2,500 MW of installed wind capacity, Bartling said. Approximately 40% of the 800 MW came through an aggregated off-taker PPA plan, which allows multiple co-ops to back a wind project that no single one of them could individually afford.

The ability to aggregate is important when no single off-taker can “provide enough revenue certainty for the developer to move the whole project forward,” Bartling said.

It is not an entirely new concept, he said. The aggregation is on the load side and the wholesale level, using normal market mechanisms to ensure that each co-op pays for the part of the project’s output for which it contracted.

Another policy initiative, backed by NCREA, is an effort to encourage the Federal Energy Regulatory Commission (FERC) to “adopt wholesale market policies which encourage resource diversity,” according to testimony by Michael Cocco, senior director of RTO and regulatory affairs for Old Dominion Electric Cooperative. NRECA wants FERC to endorse principles or issue guidance supporting state-level policies by RTOs.

The association wants FERC to reduce RTOs’ “repeated, reactionary revisions to market designs” and to support market policies that “accommodate legitimate state policy objectives” and “allow regional flexibility.”

GRE’s Connett advocated for a different type of policy that would support more use of renewables for “beneficial electrification”

such as heating water and charging electric vehicles during off-peak hours. This is a similar argument outlined in a white paper from the Regulatory Assistance Project describing beneficial electrification.

“Traditional energy efficiency metrics are increasingly obsolete,” the white paper says. Using only “kWh saved” as a metric for reduced emissions misses opportunities “in fuel conversions from fossil energy to efficient electric technologies powered by an increasing clean generation fleet.”

Connett argued that “if the kWh come from renewables, we should encourage their use.”

A policy is urgently needed recognizing “that using electricity generated from renewables is a good thing,” he added. “And it is needed as soon as possible because the purchase of things like water heaters and EVs are long term decisions.”