DISTRIBUTED WIND FINANCE CASE STUDY: Member-Financed Small Wind at a Cattle Business

RADWIND Project

This is the third in a series of case studies on distributed wind projects at electric cooperatives for NRECA Research's Rural Area Distributed Wind Integration Network Development (RADWIND) project. RADWIND's goal is to understand, address, and reduce the technical risks and market barriers to the adoption of distributed wind technologies by rural utilities. Distributed wind projects can use any scale of turbine from small kilowatt-scale units up to large multi-megawatt units, as long as they are connected on the distribution side of the electric grid. Turbines may be connected on the customer side of the meter to serve a local load, directly to the distribution grid as a utility generating asset, or directly powering an off-grid load. For more information on the project and additional resources, please visit the project landing page at www.cooperative.com/radwind.

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Project Snapshot

Cooperative Territory	Project Ownership	Project Size	Turbine Size	Other System Equip.	Connection	Energy End Use
Y-W Electric Association, Inc.	Agricultural member	300 kW	100 kW	none	Behind-the-meter, distribution grid	Net-metered by distribution co-op

Introduction

The small wind project at Heritage Dairy, a family-owned cattle business in northeastern Colorado, was the result of the owner's desire to do the right thing for the environment, increase the value of his products, and diversify his business model. Taking the project from concept to reality involved a number of creative partnerships, but after five years, the wind project met all of those goals and one more. It turned out to be a profitable financial investment as well.

Project Background

Erick Farmer, who founded the dairy in 2008 and converted it into a feed yard in 2021, had a number of motivations when he began exploring renewable energy options around 2015. “I wanted to feel good about not mining the earth for something to create power, and I was at a point in my life where it didn't have to be a bang-up financial return,” he said. But he was also thinking about business innovation. “I was never going to be the guy that created some new mousetrap for the dairy industry or the beef industry. And so, I thought, here's the chance that I can do something unique that all these people can't. I can power my milking barn, which uses a hell of a lot of electricity, off of wind.” Beyond the “feel-good return,” as Farmer described it, generating his own renewable energy would reduce power bills and increase the value of his products to key customers like Whole Foods and Chipotle that have their own sustainability goals.

Farmer first evaluated solar photovoltaics (PV), but decided against it. The 30-year estimated payback (at that time) was too long, and the panels’ cleaning needs were water- and labor-intensive. Unlike the mountainous part of the state, northeastern Colorado, which borders Nebraska and Kansas, is flat, dry, and windy. The resulting dust on PV panels can degrade performance.

Figure 1. Heritage Dairy's cows and wind turbine. Photo credit: Heritage Dairy

Coincidentally, United Wind[1] approached Farmer about leasing wind turbines shortly after he had ruled out PV. When Farmer casually mentioned this idea to his local bankers at a Colorado State University game, they brainstormed how they could help Farmer purchase his own wind turbines.

Thus began a year-long planning phase that involved a wind developer (United Wind), a wind turbine manufacturer (Northern Power Systems), local engineering firms (Hoss Consulting[2] and Ethos), a bank, a

[1] The United Wind involved in this project is no longer in business. The United Wind in business in 2022 is unrelated to this project.
[2] Hoss Consulting is a RADWIND project partner.

business partner, the county permitting and zoning department, and the local electric cooperative, Y-W Electric Association, Inc. Farmer, as the owner of the business and the land, managed the process. By October of 2016, Heritage Dairy's wind turbines were installed, interconnected, and producing electricity.

Technical Details

The wind energy system consists of three 100-kW Northern Power Systems wind turbines (NPS 100-24) on 37-meter (121-foot) towers.[3] Two are located in Yuma, CO, and one is in St. Francis, KS.[4] Due to capacity on the power lines that serve the dairy in Yuma, the wind turbines there were derated such that each turbine's capacity is now limited to 95 kW.[5] The site is an excellent location for wind turbines, because it has no tall obstructions and a favorable average wind speed of 6 to 6.5 meters per second. At the turbine's 37-meter height, this translates to a Wind Power Class of 3 or 4 (out of 7), indicating a favorable site for wind generation. And importantly, cows can graze beneath the wind turbines, a benefit that is not possible with PV panels.

Production

The wind turbines at this location have a capacity factor of about 30%, which results in an annual energy production (AEP) for the three wind turbines combined of about 750,000 kWh. This amount of generation accounted for about 60% of the dairy's electricity needs and even more at the feed yards. At a retail electricity rate of around $0.10/kWh, this comes to an electricity bill savings of about $80,000 a year.[6]

Operations & Maintenance

Farmer contracts with Ohio-based Power Grid Partners for maintenance. Average annual routine maintenance expenses are about $7,500 per wind turbine, and to date there have not been any major maintenance issues.

Interconnection and Metering

The two Yuma wind turbines are connected to Y-W Electric Association, Inc.'s distribution grid with long distribution lines. The co-op completed grid infrastructure upgrades as part of the project. The system is net-metered by Y-W Electric Association, Inc. Colorado's renewable energy standard, SB 13 – 252,[7] permits distribution co-ops to have up to 2 MW of net-metered distributed renewable generation; however, because the project is larger than 25 kW, it required and received approval from the co-op's board of directors to be net-metered.

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[3] https://en.wind-turbine-models.com/turbines/365-nps-northern-power-nps-100c-24

[4] In 2019, Farmer added a fourth turbine to his fleet, a 25-kW EOX S-16 Eocycle turbine that is net-metered by Y-W Electric Association, Inc.

[5] Northern Power Systems, like many other manufacturers of variable speed wind turbines, made on-site derating possible through a set point in the turbine control system and therefore required no additional equipment or meters to be installed.

[6] Source: *Fundamentals of DG: Building the Colorado Market*, presentation to the Distributed Wind Energy Association (DWEA), Yuma, CO, December 4th, 2017.

[7] https://www.aeltracker.org/bill-details/1996/colorado-2013-sb-13-252

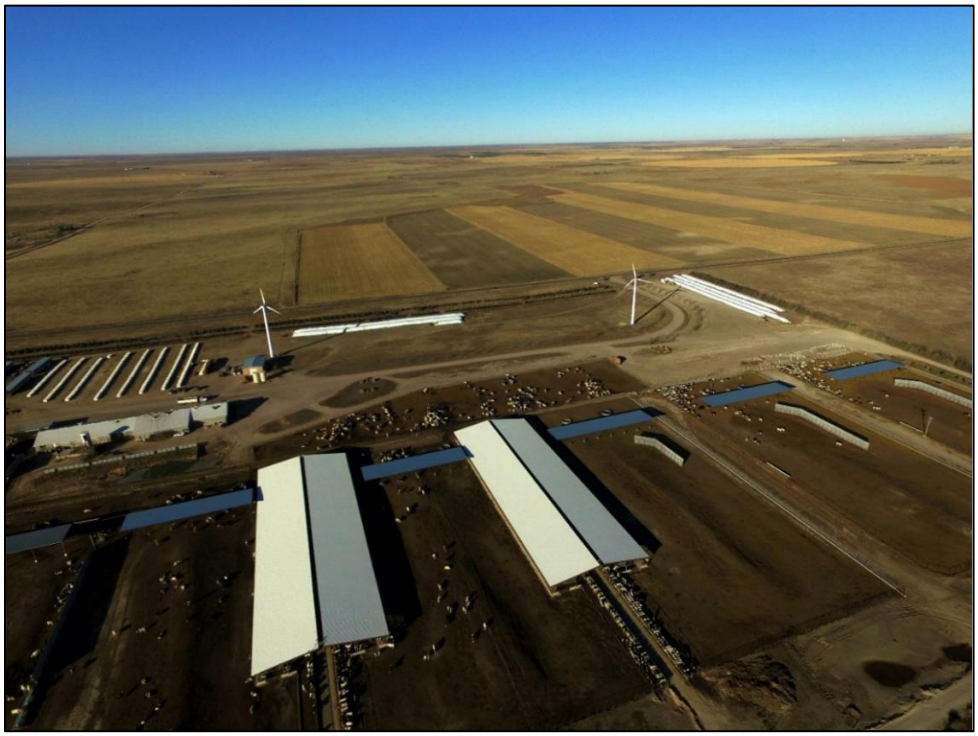

Figure 2. Heritage Dairy's Yuma, Colorado Wind Turbines.
Photo credit: Charles Newcomb, Hoss Consulting

Economic Details

The installed cost was about $450,000 per wind turbine for a total of $1.35 million. The project's 10-year bank note was paid off in about five years, and the return on investment has "exceeded my expectations," said Farmer.

Financing

In addition to the favorable loan interest rate that Farmer's bank offered (based on his good standing as a long-time customer), the project financing had three key components—the federal Investment Tax Credit (ITC), the United States Department of Agriculture (USDA) Rural Energy for America Program (REAP) grants, and the Modified Accelerated Cost Recovery System (MACRS) property depreciation.[8]

In 2016, the federal Business Energy Investment Tax Credit (ITC) was available to offset 30% of the total development costs for small wind projects.[9] Depending on several factors, the Internal Revenue Service (IRS) determines which kind of business income the tax credits may be applied to. In this case, the credit

[8] https://www.irs.gov/publications/p946
[9] "Investments in small wind property (a wind turbine with 100 kilowatts of capacity or less) qualified for the 30% ITC through 2019, with the credit rate reduced to 26% through 2022 and 22% in 2023." See: https://crsreports.congress.gov/product/pdf/IF/IF10479 However, the Inflation Reduction Act of 2022 (IRA) extended the 30% tax credit for 2022 and beyond. See: https://crsreports.congress.gov/product/pdf/R/R47262

could be applied only to passive income.[10] Heritage Dairy had enough active income to accommodate the credit, but not enough passive income. Passive income is generated from activities in which the recipient is not actively involved on a daily basis, like renting property or being a silent investor. [11] To help, Farmer's bank offered to buy the ITC credit from the project at $0.90 on the dollar, but that arrangement ultimately fell through. However, Farmer and a business partner were able to form a new business that had sufficient passive income for the wind project to get the full value from the ITC.

The dairy also applied to the USDA's REAP, which "provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements." [12] The maximum REAP grant award is 25% of total eligible project costs. In this case, that would have amounted to more than $110,000 per wind turbine. Hoping to receive grants for close to that amount, Farmer delayed the project by two or three months, in order to submit REAP applications. One application was required for each turbine. The completed applications were more than 600 pages each, for which Farmer paid about $10,000 per application for grant writing services. The dairy was awarded REAP grants, but the amount was much lower than expected— $78,000 total, just over $25,000 per wind turbine, which is about 6% of total project costs. Given the $30,000 grant writing expense, the net award value came to $48,000.

Once the project was up and running, it became an asset that the dairy could deduct on its taxes through depreciation. "Depreciation," according to the IRS, "is an annual income tax deduction that allows you to recover the cost or other basis of certain property over the time you use the property. It is an allowance for the wear and tear, deterioration, or obsolescence of the property."[13] The dairy used the 5-year depreciation schedule that MACRS assigns to most renewable energy property. This created significant allowable tax deductions during those years.,[14,15]

Benefits to Members and Community

The project reduced the dairy's energy expenses, and continues to reduce the feed yard's energy expenses, while increasing the value of its products due to the green energy inputs. Owning a portion of its electrical generation also means that the business will have fixed costs for the majority of its electricity needs for the life of the project, insulating it from future rate increases. Because the wind turbines improve the business's bottom line, they help support local economic vitality as an important component of a successful local business. More than 40 people are employed at the feed yard operations where the wind turbines are located, and the business pays property taxes in Colorado based on a $1 million assessed property value. Keeping energy costs down helps ensure the business's long-term viability and continued contribution to the community.

The project also has local, state, and national visibility. The wind turbines can be seen from the main highway, which increases community awareness of small wind energy. Partially because of this

[10] Requirements can vary from project to project. A potential developers should consult a licensed tax professional. For a general overview, see: https://www.berrydunn.com/news-detail/passive-activity-loss-rules
[11] For the Internal Revenue Service's definitions of active and passive incomes, see: https://www.irs.gov/publications/p925
[12] https://www.rd.usda.gov/programs-services/energy-programs/rural-energy-america-program-renewable-energy-systems-energy-efficiency-improvement-guaranteed-loans
[13] https://www.irs.gov/publications/p946#en_US_2020_publink1000107292
[14] https://www.ourenergypolicy.org/wp-content/uploads/2014/01/MACRSwhitepaper.pdf
[15] Projects should engage a tax professional to determine the most appropriate depreciation approach for that project.

community connection, Colorado's Governor Polis visited the dairy in October of 2019 on a tour organized by the Colorado Livestock Association. Farmer was able to discuss the project's successes and hurdles directly with the governor and other state officials.[16] Before that visit, Farmer traveled to Washington, D.C. in September 2016 to testify to lawmakers about the benefits of small wind energy.

Importantly, these kinds of projects promote a sustainable future for rural, agricultural businesses. Many family farms are struggling to stay afloat amidst competition from multinational agribusinesses and rising supply prices. According to the USDA's 2022 Farm Sector Income Forecast,[17] farms are facing decreased income and increased expenses for things like fertilizer. In a related analysis, the American Farm Bureau Federation states, "Managing financial risk by lowering production costs and diversifying revenues, or even supplementing revenues with off-farm income, are some of the solutions farmers are considering."[18] On-site renewable energy production is one avenue farming families can pursue to expand and diversify their on-farm incomes with reduced energy expenses and possibly revenue from net metering payments. Smaller distributed wind projects have the advantage of a smaller footprint compared to solar PV, with less impact to land they're already using for crops and livestock.

Considerations for Cooperatives

The cattle business's two net-metered wind turbines displace just under 200 kW of load for the co-op and increase the cattle business's use of green energy. While both are notable, these details are only two parts of a broader landscape.

The bigger picture is that this project highlights a new opportunity for co-ops to continue their leadership in sustainable agriculture. Many family-owned agricultural businesses served by co-ops are facing pressure to innovate to stay viable. Strong rural businesses are critical not only for their communities, but also for the electric cooperatives that serve them.

Heritage Dairy's project highlights a new opportunity for co-ops to continue their leadership in sustainable agriculture through innovative distributed wind applications.

In this case, a business-savvy agricultural businessperson who wanted grid-tied distributed wind took the reins. He worked directly with wind project developers, engineers, equipment manufacturers, local government, and his co-op. He secured his own financing and formed a business partnership to gain full benefit from the ITC. Through this project and other efforts, he drew state and national attention with a visit from Colorado's governor and a testimony to lawmakers in Washington D.C. – but not every member is this tenacious.

Co-ops have significant value to offer members on these kinds of projects as advisors and/or project collaborators to support farms and ranches to be sustainable well into the future. Early engagement in a partnership approach gives co-ops more upfront input on system size, location, equipment, interconnection point, and increasingly of concern, cybersecurity of components like inverters and controllers. In some cases, distributed wind projects may help defer distribution infrastructure upgrades or support increased electric vehicle charging needs. In these situations, co-ops may want to consider

[16] https://coloradolivestock.org/cla-members-host-renewable-energy-tour-for-gov-polis-in-yuma-county/
[17] https://www.ers.usda.gov/topics/farm-economy/farm-sector-income-finances/farm-sector-income-forecast/
[18] https://www.fb.org/market-intel/2022-farm-profitability-outlook-production-expenses-up-net-farm-income-down

targeted outreach to members in appropriate locations. The co-op and the member may realize additional advantages of adding battery storage for peak reduction and resiliency.

Co-ops may also be able to improve project financing for members by providing low-interest capital through on-bill programs or other mechanisms. Starting in 2023, electric co-ops will have access to a "direct-pay" option for renewable energy tax credits available under the Inflation Reduction Act of 2022 (IRA).[19] This can open doors for generation and transmission (G&T) and distribution cooperatives to own distributed wind projects and enter into energy-as-a-service or PPA agreements with the agricultural or other business.[20] However, established options for partnering with for-profit entities that can benefit from the ITC will continue to be available.

Key Lessons and Insights

All the pieces came together to make this project a business success in many ways. However, Farmer cautions others to be aware that these kinds of projects can have thin margins. Based on the lower-than-expected REAP grants he received, he advises others not to pursue a project that depends on variable funding sources. However, properly planned small wind projects can contribute to a healthy business. "They went from a good investment and a lot of feel-good capital to a great investment on paper," said Farmer.

More co-ops may be able to help their agricultural members plan and execute similar projects. When properly designed, these projects can be valuable assets for rural businesses, co-ops, and the communities they serve.

Contact for Questions

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Additional Information on NRECA's RADWIND Project

For more information on the RADWIND project and additional resources, please visit the project landing page at www.cooperative.com/radwind.

Want to stay informed of our progress with the RADWIND project, and provide your input and feedback? We welcome all NRECA members to join the project as an advisor. Contact our team at: RadwindProject@nreca.coop.

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[19] The IRA was signed into law on August 16, 2022, becoming Public Law 117-169.
[20] For more information on energy service agreements, see the 2022 RADWIND report *Business Case for Distributed Wind in Rural Electric Cooperative Service Areas* available at: www.cooperative.com/RADWIND