Business & Technology Report

August 2021

Financing Distributed Wind Projects in Rural Electric Cooperative Service Areas

NRECA

America's Electric Cooperatives

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Prepared By:

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Background

The RADWIND Project

Financing Distributed Wind Projects in Rural Electric Cooperative Service Areas is part of a series of NRECA Research Rural Area Distributed Wind Integration Network Development (RADWIND) reports about wind as a distributed energy resource (DER). The RADWIND project seeks to understand, address, and reduce the technical risks and market barriers to distributed wind adoption by rural utilities. More than 20 electric co-ops and rural utilities have participted in the RADWIND project as project advisors or in other roles like featuring in a case studies or holding calls with the project team. The goal of the project is to reduce the barriers for distributed wind deployment, either as a standalone resource or as part of a hybrid power plant with other DER. Additionally, the RADWIND project aims to provide resources that enable cooperatives to be the first contact and trusted advisor for a member considering distributed wind.

Many co-ops that have participated in the RADWIND project indicated interest in deploying or supporting deployment of distributed wind in their territories to reduce energy costs, meet consumer-member demand, provide local energy security, and increase economic development. Some of the identified barriers to deploying distributed wind in co-op territories include industry gaps in cost-benefit analysis tools; assistance with finance, procurement, and permitting; and training and best practices for operations and maintenance. This report is designed to support electric cooperatives[1] as they explore and pursue distributed wind deployments by explaining the primary ways distributed wind energy technologies can be financed in electric cooperative service territories. This report complements the preceding RADWIND reports: *Use Cases for Distributed Wind in Rural Electric Cooperative Service Areas* (henceforth “Use Cases Report”) and *Value Case for Distributed Wind in Rural Electric Cooperative Service Areas* (henceforth “Value Case Report”). These reports are available on the project landing page at www.cooperative.com/radwind.

Defining Distributed Wind

As detailed in the Use Cases Report, distributed wind (DW) projects can use any scale of wind turbine. “Small” turbines have less than 100 kW generating capacity. “Mid-sized” or “medium-sized” turbines can generate between 100 kW and 1 MW, and “large” machines have 1 MW or greater generating capacity (Orrell 2021). A wind energy asset is considered “distributed” based on its closer proximity to end-use and its interconnection point on the distribution side of the grid (Orrell 2021). Front-of-meter (FTM) distributed wind projects are connected to the distribution grid and serve as a general power supply for all connected loads. Behind-the-meter (BTM) projects are located behind a co-op member’s utility meter and serve on-site loads; excess energy may enter the distribution grid depending on the cooperative’s billing mechanisms. Off-grid

[1] While this report generally uses “cooperatives” or “co-ops,” NRECA’s membership also includes more than 40 utilities that are not organized as cooperatives, mostly rural public power districts as well as small municipal, tribal, and mutual utilities. Though business models differ, this report should be applicable to them as well as other rural utilities that are not NRECA members.

distributed wind turbines can serve a variety of loads in a range of sizes, but they do not connect to a distribution grid.

Introduction

Finance is a crucial component of distributed wind development. Because renewable energy projects are more capital-intensive than conventional fossil fuel generation projects, their long-term financial performances are sensitive to the cost of capital and how their financing is structured when the project is undertaken. Using Levelized Cost of Energy (LCOE) as a metric, distributed wind projects can be cost competitive in many markets today, and costs are expected to decrease.

Medium or large-scale distributed wind projects will usually use project finance to attain capital. In this non-recourse method, a project company is established to own and operate the wind asset, and the obligations and interactions of the participating entities are highly structured. Investors contribute a mix of equity and debt to the project referred to as the capital stack.

Federal tax incentives are a powerful tool to decrease the cost of a distributed wind project. The ITC and PTC are dollar-for-dollar repayments of an entity's federal tax liability, while MACRS involves a deduction of an entity's taxable income. Cooperatives can access these incentives by creating a taxable subsidiary or by partnering with a for-profit company that can utilize the benefits in exchange for a capital contribution. Selling RECs can also provide revenue to offset costs. In addition, the USDA provides many grants and low-cost loans that co-ops and their members can access to fund distributed wind projects.

A distributed wind project can be fully owned by a rural utility, partially owned by the utility, owned by a third party with or without the option for a utility to purchase the project later, or owned by a co-op member. Within each of these ownership structures, the asset could be interconnected in front of the utility meter, behind the meter, or off-grid, and the capital can be acquired from multiple sources. Each combination of asset ownership, funding source, and interconnection has its advantages and challenges.

Numerous developments in distributed wind energy finance have the potential to alter the market in the near and far future. Some, such as the phaseout of federal tax incentives and the increase of BTM C&I installations, open the door to increased utility ownership of assets. On-bill financing and corporate PPAs, on the other hand, provide new methods of funding distributed wind projects. Other developments worth watching include direct payment of tax credits to non-profits like rural cooperatives, the reintroduction of CREBs, the CFC Sustainability Bond, extensions for the PTC and ITC, and the establishment of a U.S. Green Bank.

Cooperatives can mitigate risk in developing and operating a distributed wind asset by partnering with their G&T or wholesale energy provider. It may avoid conflicting with a wholesale energy purchase contract to have the G&T own the asset or to arrange a PPA with the G&T. Additionally, cooperatives can undertake several pre-development and development tasks and complete them faster, cheaper, and better than developers. A thorough feasibility study and detailed financial modeling will help a co-op determine an action plan to satisfy their stakeholders.

As of Summer 2021, there are many uncertainties concerning the financial landscape for distributed wind. Congress is simultaneously considering several infrastructure bills with unknown implications for co-ops and their energy resource planning. The futures of renewable energy tax benefits, public funding sources, and clean energy generation standards are all in question. The RADWIND project team will stay apprised of the situation and update the project's materials as more information becomes available.

Additional Information on NRECA Research'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.

Why Finance Matters in Distributed Wind Development

The Levelized Cost of Energy for a generation or storage asset is a common way to compare potential investments in the energy industry. While there are alternatives to this metric that account for system value and market competitiveness,[2] LCOE provides a widely used, simple, standard basis of cost comparison that serves as a good starting point when evaluating assets (Mai et al., 2021). Simply, LCOE is a ratio of a system's cost to the energy it produces over its lifecycle (Donev et al., 2018):

$$LCOE = \frac{lifetime\ system\ costs\ discounted\ to\ present\ day}{lifetime\ energy\ production\ discounted\ to\ present\ day}$$

$$= \frac{NPV\ (investment + operations\ \&\ maintenance\ costs + fuel\ costs)}{NPV\ (energy\ production)}$$

Both conventional and renewable energy projects require significant capital investment, but cost profiles for the two categories differ over the projects' useful lives. Wind and solar power have no fuel costs, yet they have higher upfront capital costs than modern fossil assets like combined cycle gas turbines (U.S. Energy Information Administration, 2021a). As a result, wind energy projects are "capital-intensive;" they are particularly sensitive to costs of capital and to how their financing is structured. In 2016, researchers at the National Renewable Energy Laboratory (NREL) analyzed future growth possibilities for distributed wind. They found that improvements in financing, more than any other project category, would likely unleash distributed wind development and allow it to realize its economic potential (Lantz et al., 2016).

Due to improved efficiencies in multiple aspects of the industry, large-scale wind projects have enjoyed a steadily declining LCOE for the past decade. New multi-megawatt wind farms are now cost-competitive with new fossil fuel assets — even without subsidies — and they are in some cases cheaper than maintaining legacy conventional generation facilities (Ray, 2020). But are the same trends evident in distributed wind? That question is difficult to answer. Distributed projects can go unreported, the sample size of projects is small, and costs vary widely with local economic conditions, but a snapshot of current distributed wind projects suggests that the price is competitive now and will decrease in the future.

[2] Full evaluation of an investment decision will involve more nuanced metrics and a consideration of dispatchable vs. non-dispatchable resources. See page 3 of the EIA 2021 Outlook and the cited Mai et. al. document for more information. https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

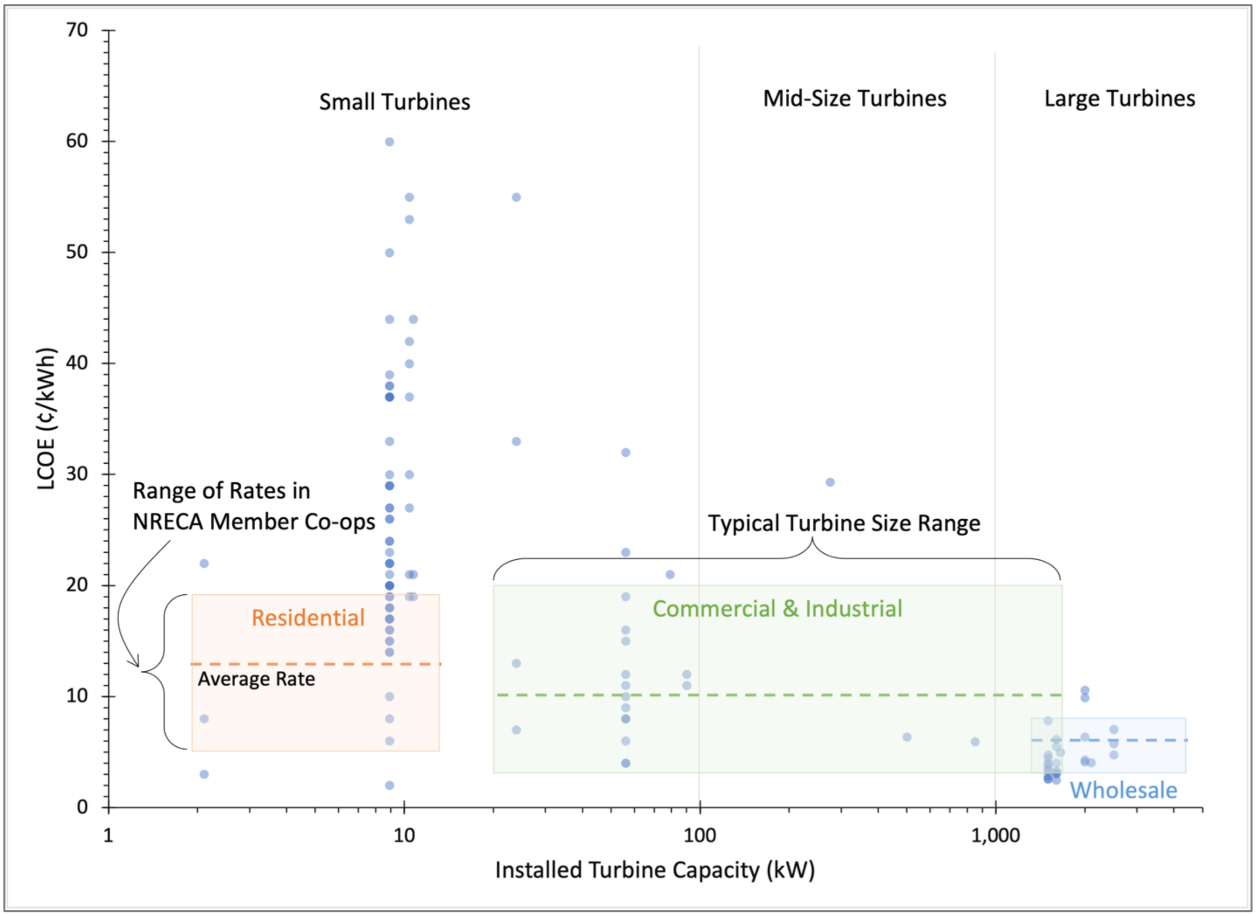

Figure 1: LCOE (after incentives) for select distributed wind projects built prior to 2018 (blue dots) vs. turbine capacity. Ranges for 2019 (rectangles) and averages (dotted lines) for retail and wholesale rates in NRECA member cooperatives overlaid

Using data from the Pacific Northwest National Laboratory's (PNNL) *2018 Distributed Wind Market Report*, the after-incentive LCOE of distributed wind projects possessing a cost statement, a verified power curve, and three years of operations data were plotted against their turbine size (blue dots on Figure 1) (Orrell et al., 2019). Retail electricity rate ranges from NRECA member co-ops were overlaid (U.S. Energy Information Administration, 2020).[3] Many dots fall within or below the residential, commercial & industrial (C&I), and wholesale rate ranges at the appropriate load-matched turbine capacities.

Furthermore, Stehly, et al., at NREL modeled the LCOE of distributed wind in 2019 using nationwide system cost and production averages and found that a single-turbine 20 kW installation had a LCOE of 15.9 ¢/kWh and a single-turbine 100 kW installation had a LCOE of

[3] Residential electricity rates were determined by dividing Residential Sales and Residential Revenues values from NRECA member distribution co-ops. Commercial and Industrial Sales and Revenue amounts were combined to create a single rate category. Wholesale electricity rates were determined by dividing electricity revenues labeled "From Sales for Resale" and disposition amount labeled "Sales for Resale" from NRECA member G&T cooperatives. Outlying values identified by Chauvenet's criterion were eliminated. 38% of all outliers in Residential and C&I rates were from electric cooperatives in Alaska or Hawaii.

10.4 ¢/kWh without incentives. These are well within the rate ranges in NRECA member co-ops; using incentives would make projects like these even more financially attractive.

These two analyses demonstrate that distributed wind projects of various sizes can be cost-competitive today. Looking to the future, cooperative and other rural utilities are commissioning more large-scale turbines (Orrell et al., 2019). If this trend continues, the overall average cost for distributed wind deployment in cooperative service territories should decline since projects using larger turbines have lower LCOE. As for projects in the small and medium size classes, technology lessons learned on large-scale machines are continuously being applied to smaller turbines and thus should drive costs down over time. Projects in the residential and C&I markets show greater cost variability and greater sensitivity to local economic conditions; their costs should decrease, but each project needs close evaluation by the host entity to determine its financial viability.

Because the LCOE of distributed wind projects are sensitive to initial capital costs, financing a project wisely can be the difference between a sound investment that meets consumer-members' needs and one that struggles to pay for itself. To introduce electric cooperatives to distributed wind financing, this paper will explain typical capital sources and financial incentives for projects, outline ownership and financing options, describe recent financing developments, and finally provide some strategies to assist in successfully financing a distributed wind project.

Capital Sources

Renewable energy developers typically use project finance structures to acquire funds for their projects. In traditional corporate finance, a parent corporation will guarantee the debt obligations of its subsidiaries and provide recourse for a lender to pursue compensation in the case of default. In contrast, project finance is a "non-recourse" method that prevents lenders from pursuing claims against the project sponsors (owners). Project sponsors can walk away from a project risking only the money they themselves contributed. Lenders are exposed to more risk as debt service is tied to the economic fortunes of the project and recovery in a default is limited to the assets of the project company (Raikar & Adamson, 2019).

Another feature of project finance that differentiates it from traditional corporate finance is the establishment of a company, a Special Purpose Entity (SPE),[4] with the specific purpose of owning and operating the asset. These are usually organized as a Limited Liability Corporation (LLC). The company is brought into existence to do a single project with a specific purpose over a finite lifespan with a pre-determined operational plan. They usually dissolve when the project is bought by another company or when the wind farm is decommissioned (Raikar & Adamson, 2019).

Project finance has significant limitations compared to corporate finance, but the advantages of this method in renewable energy financing outweigh the drawbacks. Some of the risk inherent in large, capital-intensive projects is moderated by the structured, constrained interactions between participants in a project finance arrangement. Additionally, project finance allows an organization to acquire sufficient capital for a large project even though it lacks abundant collateral. Finally, keeping a failing project confined in an SPE prevents those losses from bankrupting the entire parent organization (Raikar & Adamson, 2019).

Equity, Debt, and the Capital Stack

(This section is adapted from *Wind Energy Finance in the United States: Current Practice and Opportunities* by Schwabe et al., 2017)

Once a SPE is formed, developers will begin courting investors. These investors will contribute a mix of equity and debt. At minimum, a project needs equity from a sponsor (the developer or an electric cooperative) and a debt provider. Many ownership structures also employ a tax equity investor to utilize tax incentives in exchange for capital.

Equity

Equity investment results in owning a portion of an asset through purchase of a share or by providing capital directly.

Sponsor equity resembles traditional equity investment. As a contribution by the owner, it faces the highest risk and demands the highest return, but it is usually backed by a loan (see "back-

[4] Sometimes referred to as a Special Purpose Company or Special Purpose Vehicle.

leverage" below), or it makes up a small part of the total capital. Returns to the sponsor are usually in cash instead of tax benefits.

Tax equity is capital provided to a project in exchange for use of tax benefits. Utilizing these benefits effectively requires that an entity have sufficient taxable income to depreciate, sufficient tax liability to warrant capturing credits, and sufficient capital to purchase the IRS-mandated project ownership stake. Thus, tax equity investors are almost always large financial institutions and corporations. To gain an ownership percentage in the project, these entities usually partner with a developer or sponsor to create the SPE that constructs, owns, and operates the asset. Allocations of tax benefits and cash are arranged in advance to maximize value for each partner. Tax equity investors usually leave the partnership when the tax benefits expire.

Debt

Debt investment must be repaid with interest by the borrower, but the lender is not entitled to ownership shares in the company or asset.

Construction debt is short-term, lower-cost debt used to finance the design, procurement, and construction phases of a wind project. Some of the risks inherent in the construction process are mitigated by allowing access to the funds as needed instead of immediately and in its entirety. By tying expenditure to project milestones, lenders limit improper spending and developers avoid paying interest on idle funds.

The construction debt is refinanced into *term debt* once the project reaches commissioning. Loans of this type are longer-term and priced to reflect the risk of an asset in its operational phase. Many term loans — called "mini-perms" — are designed to reach maturity over a period of five to ten years, at which time a single "balloon payment" is due or the loan is renegotiated (Raikar & Adamson, 2019). Different lenders can provide the construction loans and term loans, but often a single lender provides the short duration construction loan and converts it to a term loan with a longer maturity when construction is complete.

Term debt can come from a variety of sources and can be stationed at the project level (i.e., the SPE carries the debt) or at the sponsor level (i.e., the sponsor carries the debt). *Back-leverage* refers to the practice of placing the debt at the sponsor level using project ownership shares as collateral. Back-leverage debt may be more expensive than project-level debt, but it is often necessary to reduce project company debt to attract tax equity partners. Commercial banks typically provide back-leverage loans.

Bonds

At this point in time, wind energy development debt financing is dominated by bank lending as opposed to bonds. However, public utilities and non-profit entities such as electric cooperatives are uniquely able to issue non-taxable revenue bonds to fund infrastructure projects. These are tied to the revenue of the project and do not require voter approval. In 2019, bonds issued by public utilities and cooperatives had an average of 4.1% interest and 16.6 years to maturity (Feldman et al., 2020). While these bonds are attractive to investors due to their tax-exempt nature, the extra cost, time, and complexity that issuing municipal bonds require are not usually warranted unless the amount to be raised is very large (Raikar & Adamson, 2019).[5]

Capital Stack

When blended, these sources of capital in a wind project are referred to as a "capital stack." Figure 2 demonstrates the relative risk and expected return of each type of capital. Equity sources assume the most risk — and expect a higher return — as their investment is inherently tied to the project's financial performance. For that reason, debt is considered a "cheaper" form of capital and will typically carry a lower interest rate. If and when federal tax incentives phase out and tax equity investors leave the market, it will have a significant impact on project financing considerations. Co-ops may soon find debt financing inexpensive enough to own more projects outright (see the "Developments in Distributed Energy Financing" section).

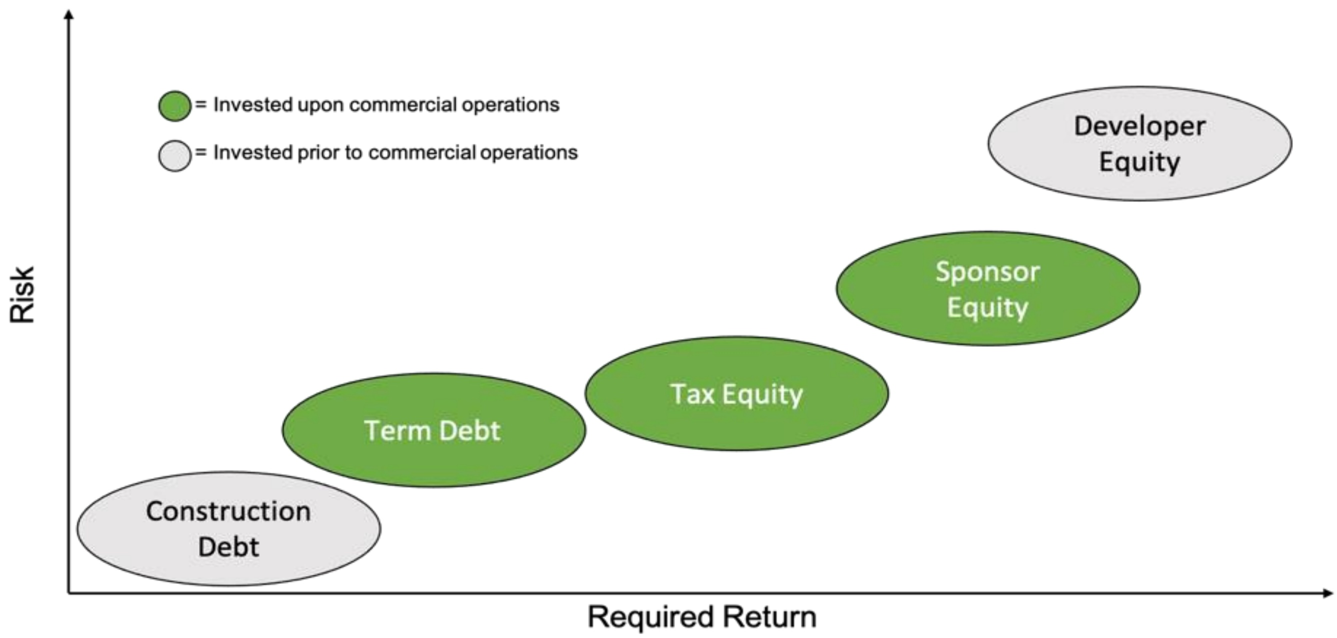

Figure 2: Risk and required return for categories of capital used in distributed wind financing. (Adapted from Schwabe et. al. 2017)

Evolution and Current Status of Renewable Energy Incentives

Renewable energy incentives such as state and federal tax credits, grants, and loans have historically supported renewable energy projects by subsidizing installation and equipment costs. The history of U.S. investment in wind energy dates back to the early 1980s when the U.S. federal government invested in wind turbine research and development (R&D) following calls for alternative sources of energy in the wake of the oil shortages of the 1970s. Federal and state policies incentivized wind projects, which led to thousands of wind turbines being installed,

[5] The federal Clean Renewable Energy Bond program, on the contrary, was a valuable financial tool to develop distributed wind projects of many sizes. It was established in 2005, updated in 2008, and eliminated in the 2017 Tax Cuts and Jobs Act, but a version of these bonds may be reincarnated through upcoming legislation.

mostly in California, in the 1980s. Throughout the 1990s and 2000s, increased government R&D funding aimed to reduce the cost of wind turbines, while policies such as the federal Renewable Electricity Production Tax Credit (PTC), Business Energy Investment Tax Credit (ITC), and state renewable energy mandates significantly increased the amount of wind-generated electricity in the U.S. (U.S. Energy Information Administration, 2021b).

Over the years the PTC and ITC have been modified and extended, helping to spur further development in the growing wind sector. While the future of the PTC and ITC are uncertain with current policy expiration dates approaching, identifying new and innovative financing mechanisms for distributed wind will support future deployment.

Renewable energy incentives such as the federal ITC and PTC, and state tax credits have supported the distributed wind industry's growth and maturity by reducing project costs and providing additional sources of revenue. While beneficial to the return on investment, incentives are not always necessary to make projects cost-effective. This is especially the case in regions with strong wind resources where wind-generated electricity can offset higher-cost electricity and/or reduce the need for building additional non-renewable generation capacity.

Although rural electric cooperatives operate as tax-exempt non-profit organizations and are not eligible to take advantage of federal tax credits directly, there are ways for cooperatives to utilize tax credits for distributed wind projects by establishing taxable subsidiaries or through partnerships with for-profit, taxable entities.

Co-ops Can Access Incentives Using Taxable Subsidiaries and Outside Partnerships

Even for electric cooperatives and other non-profit utiliites, exploring all methods to realize the benefit of tax incentives is worthwhile since these incentives bring down total project costs. To do so, a co-op must either create a taxable subsidiary to act as the asset's owner and/or operator,[6] or it must partner with a company that can utilize the tax incentives. Though some co-ops will finance a project with a taxable subsidary, most will partner with an investor that has a larger tax appetite in order to take advantage of tax credits early in the project's life cycle when taxable income is low (Raikar & Adamson, 2019).
Many renewable energy financing and ownership options are structured to take advantage of federal and state tax incentives. Depending on market conditions and project economics, incentivized and non-incentivized project costs may end up being similar in the end. This is especially true for smaller projects where the administrative burden of investigating and implementing incentives may not be beneficial for the long-term return on investment. It is imperative for the co-op to carefully consider multiple financing alternatives – with and without incentives – before deciding on the ownership structure for a wind project.

[6] For a more comprehensive view of taxable subsidiaries in the non-profit space, see https://www.americanbar.org/groups/business_law/publications/blt/2014/06/03_levitt/

Renewable Electricity Production Tax Credit

The federal Renewable Electricity Production Tax Credit, first enacted in the Energy Policy Act of 1992, provides a per kilowatt-hour corporate tax credit included under Section 45 of the U.S. tax code for electricity generated by qualified renewable energy resources. The owner-operator earns credit for ten years after the asset enters service. A single entity must be both owner and operator of a wind asset to utilize the PTC, and the power must be sold to another entity. The amount of the PTC is reduced for wind facilities financed entirely or in part with some government grants, tax-exempt bonds, subsidized energy financing, or other tax credits. If an entity lacks sufficient income tax liability to use the entire credit in a particular year, the unused portion can be carried back one year and carried forward several years. Refunds for excess credit are not available (Jenner et al., 2018).

The PTC for onshore wind was extended through December 31, 2021 under the Consolidated Appropriations Act of 2021. Projects that begin construction by the end of 2021 will be eligible for a PTC at 60% of the full rate (or $0.015/kWh) over 10 years (Orrell et al., 2021).

Investment Tax Credit

The federal Business Energy Investment Tax Credit was established by the Energy Policy Act of 2005 and provides mechanisms to offset some of the capital costs of qualified renewable energy projects. Entities can get a percentage of their initial investment as a one-time tax credit. There is no credit reduction for using government grants like the PTC. The tax basis of the ITC-related property is reduced by half of the ITC percentage, however, for other tax purposes like depreciation and gain from sale. The credit is non-refundable, but excess credit can be applied to the previous year or carried forward. Additionally, the credit is subject to recapture by the IRS if the asset is sold or used in a disqualifying way within 5 years of entering service (Jenner et al., 2018). There are non-obvious conditions that trigger recapture, so partnership and sales agreements must be carefully designed to avoid it.

The Residential Renewable Energy Tax Credit, or Residential ITC, allows for a one-time personal income tax credit calculated as a percentage of the project’s cost. It applies to wind energy systems on existing homes, new homes, principal residences, and secondary residences, but it does not apply to rental properties.

Under the Consolidated Appropriations Act of 2021, small (<100 kW) wind turbines’ eligibility for the business ITC of 26% of qualified expenditures has been extended through 2022, with a scheduled phasedown to 22% for properties that begin construction by the end of 2023, after which the credit expires. Mid-sized and large turbine projects can receive a tax credit in the amount of 18% of expenditures if the project begins construction before the end of 2021. The residential ITC will remain at the current 26% rate through 2022 and reduce to 22% for property placed in service through 2023, after which the credit ends (Consolidated Appropriations Act of 2021, 2020).

Small Wind Turbine Certification and the ITC

In order to be eligible to receive the federal ITC, small wind turbines must meet either the American Wind Energy Association (AWEA) Small Wind Turbine Performance and Safety Standard 9.1-2009 or the International Electrotechnical Commission (IEC) 61400-1, 61400-12, and 61400-11 standards (Garcia, n.d.).

The U.S. Department of Energy's National Wind Technology Center and its regional test centers, along with other approved test centers, test and evaluate small and medium wind turbines, and an accredited third-party certification body then verifies test results and provides certificates to manufacturers.

Wind turbine certification provides assurance that turbine designs have been evaluated for safety, performance, power quality, functionality, sound, and durability by independent, accredited certification bodies. Certifications allow wind turbine manufacturers and project developers to demonstrate compliance with regulatory and incentive program requirements, and certified ratings allow end-users to directly compare wind turbine models for suitability (Orrell et al., 2019)

Tax Credit Summary and Comparison

Table 1: Federal wind energy tax credit summary

Source: U.S. Department of Energy, 2021 https://www.energy.gov/sites/default/files/2021-07/us-wind-industry-federal-incentives-funding-partnership-opportunities-fact-sheet-v2.pdf

**For the Residential Renewable Energy Tax Credit, the system must enter service by this date.*

	Renewable Electricity Production Tax Credit (PTC)	Business Energy Investment Tax Credit (ITC)		Residential Renewable Energy Tax Credit (Residential ITC)
Type	Corporate Tax Credit	Corporate Tax Credit		Personal Tax Credit
Disbursement	• Tax credit for every kilowatt-hour of electricity generated annually • Taken for a period of 10 years after a facility is placed into service	• One-time credit • Equal to percentage of investment amount • Earned when the equipment is placed into service		• One-time credit • Equal to percentage of qualifying expenditures for the wind system
Turbine Size	Any	Medium or Large	Small	Small
Amount if construction begins* by Dec. 31, 2019	1.0 ¢/kWh	12%	30%	30%
“, 2020	1.5 ¢/kWh	12%	26%	26%
“, 2021	1.5 ¢/kWh	18%	26%	26%
“, 2022	N/A	N/A	26%	26%
“, 2023	N/A	N/A	22%	22%
“, 2024 and beyond	N/A	N/A	N/A	N/A

Developers or owners of qualifying distributed wind projects can elect to take either the PTC or ITC, and they must weigh the decision based on the specifics of the project. A cash flow analysis can assist in this matter by determining the present value of the credits compared to the project’s overall cost. Relative value depends on two factors: installed project costs and expected capacity factor, or production (Bolinger et al., 2009). *Capacity factor* is the percentage of total possible power a turbine generates annually. For example, a turbine rated at 1.5 MW would generate 13,140,000 kWh of energy if it ran at full power — 1,500 kWh each hour — for an entire year. If it generated 4,075,000 kWh, it would have a capacity factor of: $\frac{4{,}075/000}{13{,}140{,}000} = 31\%$

.

Intuition suggests that projects with low installations costs per kW and high capacity factors would get more value from the PTC, which is based on energy production. Conversely, projects with higher upfront costs and lower production would get more value from the ITC's one-time lump sum early in the project's lifecycle. Indeed, data analysis shows this to be the case, though the exact tipping point between the two credits is sensitive to the discount rate (Bolinger et al., 2009). Per the *2018 Distributed Wind Market Report*, large, medium, and small distributed wind turbines had three-year 31%, 25%, and 17% capacity factors, respectively, and small turbines had higher installation costs per kW. Thus, it is more common for owners to elect the PTC on larger projects and the ITC on smaller projects. Only the ITC is available for residential (usually small) turbines.

There are other important, qualitative factors involved in choosing the PTC or the ITC as well. For example, any entity electing to take the PTC must be confident that their project will produce well over a 10-year period and that they will also have sufficient tax appetite over 10 years to utilize the credit. In addition, certain ownership structures, such as leases, cannot utilize the PTC because the owner and operator will be different entities (Bolinger et al., 2009).

Accelerated Depreciation

The Modified Accelerated Cost Recovery System (MACRS) is an IRS income tax deduction that allows a business to depreciate, or recover the cost basis of, certain assets over time. Under MACRS rules, a business may deduct larger depreciations of its assets during the first few years of the asset's life and relatively less later, improving cash flow. Wind property is generally depreciated over 5 to 7 years (DSIRE, 2018b). Bonus depreciation allowing 100% deduction in the asset's first year is available under certain conditions, but most owners opt to spread their depreciation over the first five years of operation.

Clean Renewable Energy Bonds

Prior to the Tax Cuts and Jobs Act of 2017 which repealed section 54C of the Internal Revenue Code, Clean Renewable Energy Bonds (CREBs) were an important financing mechanism for renewable energy projects by not-for profit electric cooperatives and public power utilities. CREBs could be issued by electric cooperatives, government entities, and certain lenders. The bondholder would receive federal tax credits in lieu of a portion of the traditional bond interest, resulting in a lower effective interest rate for the borrower (DSIRE, 2018a).

Renewable Energy Certificates

Renewable energy certificates (also known as renewable energy credits, or RECs) are transferable commodities that represent the environmental and other non-power attributes of renewable energy (U.S. Environmental Protection Agency, 2008). RECs can be used as a mechanism for compliance with renewable portfolio standards and in the voluntary green power market to enable purchasers to claim the environmental benefits. Typically, power purchase agreement (PPA) contracts include the RECs generated by a distributed wind project, allowing cooperatives that do not have or have already met a state renewable energy mandate to sell off their RECs. Selling RECs from co-op owned renewable energy projects to power users who wish to offset their carbon emissions is an additional mechanism that allows co-ops to recover their clean energy investments (National Rural Electric Cooperative Association, n.d.). It is imporant to note that power generated from a distributed wind project cannot be claimed as renewable once the RECs have been sold, and power cannot be sold as renewable without the rights to the RECs.

State-Level Incentives

Incentives for distributed wind projects at the state level include grants, low-cost loans, and tax incentives among others. These offerings vary widely by state. The Database of State Incentives for Renewables & Efficiency (DSIRE, https://www.dsireusa.org) maintained by North Carolina State University is a comprehensive, searchable resource for finding incentives by state, type, or technology.

USDA Grants and Loans

Grants and low-interest loans from the U.S. Department of Agricuture (USDA) have historically been vital tools for funding rural development projects. Below are descriptions of some of the more common programs that can provide capital for distributed wind projects.
If a cooperative or one of its members is seeking USDA funding they should contact their state office for more information on applications, available amounts, and timelines: USDA State Office Contacts.

Rural Utilities Service Electric Program

The USDA Rural Utilities Service (RUS) Electric Program provides funding to cooperatives, corporations, states, territories, subdivisions, municipalities, utility districts and non-profit organizations for rural electric infrastructure maintenance, expansion, and modernization. The construction or improvement of rural electric distribution, transmission and generation facilities can be financed with loans and loan guarantees. Demand-side management, energy efficiency and conservation programs, and on-and off-grid renewable energy systems can also be supported with funding through the Electric Program. RUS financing options include:

- *The Electric Infrastructure Loan and Loan Guarantee Program*: Enables a rural utility or rural cooperative to borrow capital for the investment in and operation of renewable energy facilities as part of their generation portfolio.
- *Distributed Generation Energy Project Financing*: Provides loans to project developers who have PPAs with electric cooperatives or other rural utilities or communities. USDA requires a minimum of 25% equity and specific underwriting requirements for feasibility and loan security.
- *The Rural Energy Savings Program (RESP)*: Provides zero-percent loans to rural utilities who provide loans for renewable energy and energy efficiency projects to qualified

consumers. Current and former RUS borrowers, subsidiaries of current or former RUS borrowers, and entities that provide retail electric service needs in rural areas are eligible for loans. On-bill financing programs where energy investments are repaid via the utility bill with no upfront costs can help rural utility members/customers afford these projects. The Environmental and Energy Study Institute (EESI) is a nonprofit that provides no-cost assistance to rural electric co-ops for all aspects of a RESP application. EESI also assists utilities to develop on-bill financing programs – for more information, visit https://www.eesi.org/Rural-Energy-Savings-Program.

- *The Energy Efficiency and Conservation Loan Program (EECLP)*: EECLP provides loans to finance energy efficiency and conservation projects for commercial, industrial, and residential consumers. Eligible utilities, including existing Rural Utilities Service borrowers, can borrow money tied to Treasury rates of interest and re-lend the money to develop new and diverse energy service products within their service territories. On-bill financing programs are one mechanism borrowers can set-up to allow customers in their service territories to deploy behind-the-meter distributed wind projects and repay the loan to the distribution utility through their electric bills.

Rural Energy for America Program

USDA also provides grant funding and loan guarantees to agricultural producers and rural small businesses for the purchase and installation of renewable energy systems. Through the Rural Energy for America Program (REAP), USDA issues loan guarantees for renewable energy projects for up to 75% of the project's eligible cost or a maximum of $25 million. USDA also issues REAP grants for up to 25% of the project's cost, or a maximum of $500,000 for renewable energy projects. A project can have both a REAP loan and grant, in which case these awards could cover a maximum of 75% of total eligible project costs. It is important to note that obtaining federal funding for a distributed generation project triggers a review under the National Environmental Policy Act (NEPA) to assess the environmental effects of a proposed project.

High Energy Cost Grants

USDA's High Energy Cost Grants program offers grants to power providers serving rural areas with customers or communities facing very high household energy costs (275% of the national average or higher). Eligible uses include the construction or improvement of renewable energy facilities aimed at reducing the energy cost burden for these populations. These grants can be used as primary or supplemental funding for projects in eligible areas. Grants become available each fiscal year, and applications are generally due around the middle of the year.

Distributed Wind Ownership and Financing Cases

There are many financing options available to co-ops and other rural utilities for distributed wind projects, and the option most suitable for a particular project depends on several factors including the size (capacity) of the turbine(s), location on the grid (front-of-meter, behind-the meter, or off-grid), and the asset's ownership structure.

Any co-op considering a distributed wind power system in their territory must choose the ownership and financial arrangement that best advances their objectives while complementing their corporate structure. Exploring finance options and modeling their outcomes will help the co-op find the particular combination of cost, simplicity, and expediency that makes sense for all involved parties.

Electric distribution cooperatives that are affiliated with G&Ts or another primary wholesale power provider must examine and understand their contractual arrangements for power purchasing. Long-term wholesale purchasing contracts are often "all-requirements" contracts that restrict or set limits on distributed energy generation by their member distribution co-ops. Distribution cooperatives should work together with their wholesale provider to explore ways in which the value of the distributed wind project can be maximized within these contracts. See the "Minimizing Risk and Maximizing Value" section for business models that can meet the needs of both distribution and G&T cooperatives.

Every project has unique details. As such, the financial relationships outlined here are meant to show broad frameworks that have worked well historically. Co-ops across the country have found numerous ways to modify these structures for their members' benefit. Examples of these modifications are presented throughout this review of finance mechanisms and in the RADWIND Case Study Series.

Case 1: Full Utility Ownership

One way for the co-op to acquire a distributed wind asset is through direct ownership by the cooperative itself. The co-op can pay for the project using a combination of its own equity, any available grants, low-interest debt financing and/or issuing bonds. It then develops the project in-house or hires a developer to build the project. Once the project is complete, the utility operates and maintains the turbines and, if financed, pays the lender back over the project's useful life. Direct ownership allows the cooperative to maintain control of the project’s development and construction; external partners can be avoided if desired.

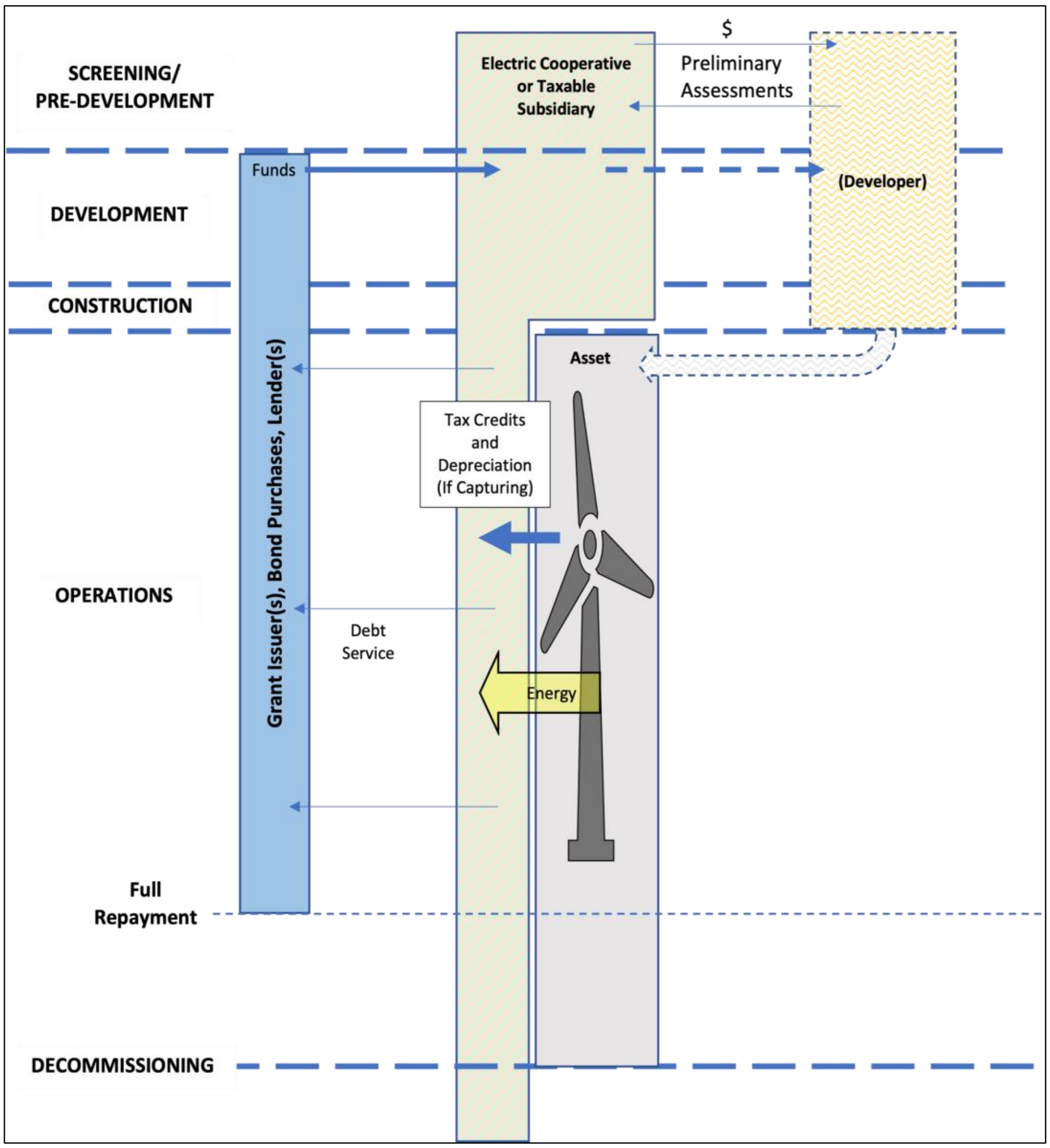

Figure 3: Financial relationships among entities while developing and operating a cooperative-owned distributed wind asset.

Example of Full Utility Ownership:

GobNob Wind Project, Rural Electric Convenience Corporation (RECC), Illinois

RECC financed the $1.8 million GobNob Project in 2009 with a variety of public and private financing sources; they will own the turbine outright by the end of 2023. Of the total, $750,000 came from USDA grants, state-level development grants, and upfront REC sales. The remaining funds were secured from CoBank via 15-year financing with Clean Renewable Energy Bonds. These bonds accrue no interest, and the co-op pays the bank less than a 0.5% issuance fee (Moorefield, 2021c). Case study available on the RADWIND landing page.

Image 1: GobNob wind turbine site. Courtesy of RECC.

Case 2: Partial or Delayed Utility Ownership

Tax Equity Partnership Flip

The "flip" structure is a widely used method for developers to finance wind projects with large capacities. Cooperatives may also use it to fund single distributed generation projects or multiple, aggregated projects.

Partnership flips are an efficient way to harness tax incentives. The cooperative establishes a taxable subsidiary and seeks a tax equity investor (TEI) with a tax appetite sufficient to utilize tax credits and depreciation. Using available funds or debt financing, the co-op's subsidiary creates a Special Puropose Entity in partnership with the TEI. The partners typically contribute close to equal amounts of equity to the partnership, though it varies with each project. The SPE builds, owns, and operates the asset, and it sells energy to the co-op through a PPA.

Nearly all allocations of tax credits, distributable cash, and taxable gains and losses go to the TEI for enough years to utilize tax benefits or until the investor reaches an agreed upon return on investment. At that point, the allocations "flip" and the co-op's subsidiary is awarded most allocations. In most cases the co-op will opt to buyout the TEI shortly after the flip point and reorganize the SPE-subsidiary ownership to minimize any future tax obligations.

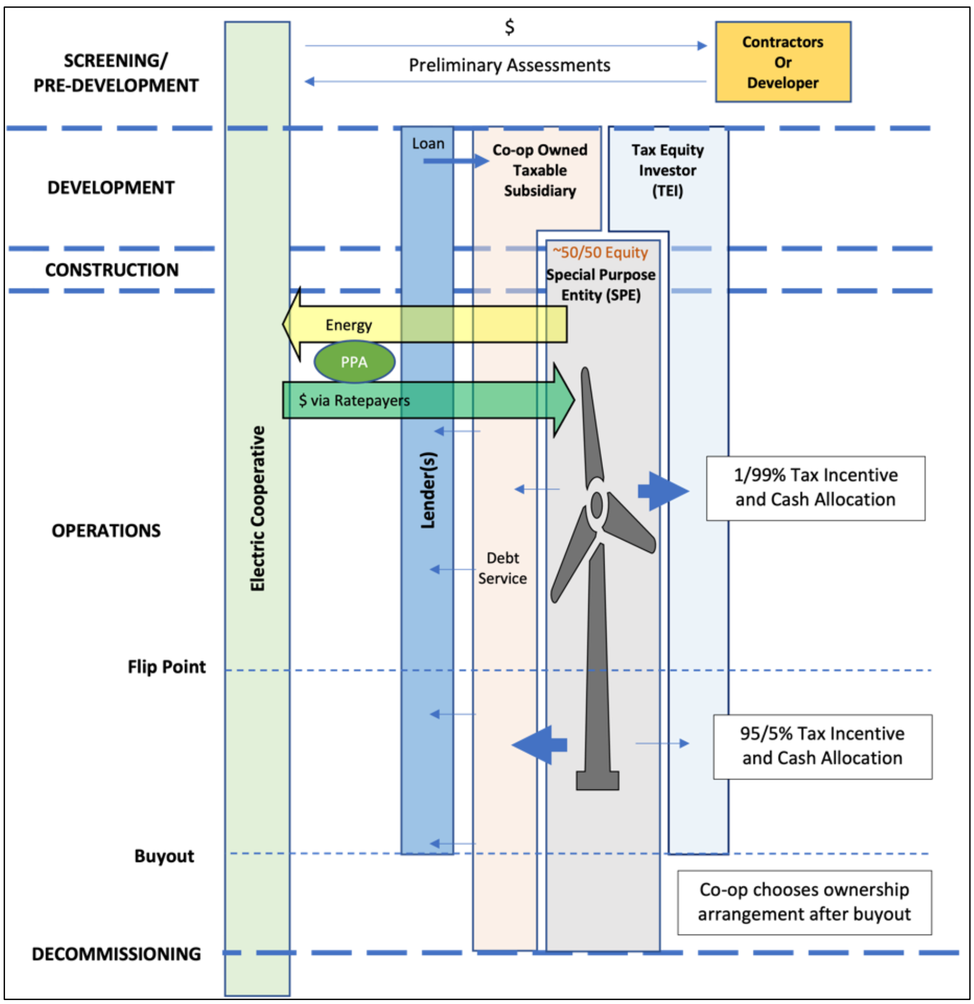

Figure 4: Financial relationships among entities while developing and operating a distributed wind asset within a tax-equity partnership flip ownership structure.

Example of Partial or Delayed Utility Ownership:

Fox Islands Wind Project, Fox Islands Electric Cooperative (FIEC), Maine

A taxable subsidiary of FIEC — Fox Islands Wind LLC (FIW) — was created to be part owner of the wind project. A local media company contributed $5 million dollars in exchange for rights to the ITC while FIW secured a $9.5 million, 20-year loan from RUS for the remaining capital needs (Moorefield, 2021d). National Rural Utilities Cooperative Financial Corporation (CFC) lent the $9 million construction loan (Lassiter III et al., 2017). FIEC bought out the media company TEI in 2014. Case study also available on the RADWIND landing page.

Image 2: Fox Islands Wind turbines from the water.
Source: www.foxislandswind.com/energy

Tax-Advantaged Leasing

Utilizing the PTC requires that a single entity both own and operate the wind asset. Thus, leasing arrangements prohibit using the PTC because the owner and operator will be different organizations. The ITC, however, can be harnessed in tax-advantaged leasing. Visit CoBank's Farm Credit Leasing Program for examples of infrastructure leasing by electric cooperatives: https://www.cobank.com/corporate/services/leasing.

Sale Lease-Back

To initiate this financial arrangement, a project developer builds the asset using a construction loan. The developer could be a private developer or the co-op itself. When the project is complete but before commissioning, the entire project is sold to a tax equity investor. Proceeds from the sale are used to pay off any remaining construction debt. Simultaneous to the sale, the TEI and co-op enter into a lease arrangement where the TEI is the owner/lessor entitled to tax benefits and the co-op is the lessee. As the co-op will not be claiming any tax benefits, a taxable subsidiary is not necessary.

Lease contracts should not extend past 80% of the project's useful life. At the lease's end, the parties can agree to a new lease, to a buyout by the co-op, or to terminate the lease with the assets going to the TEI.

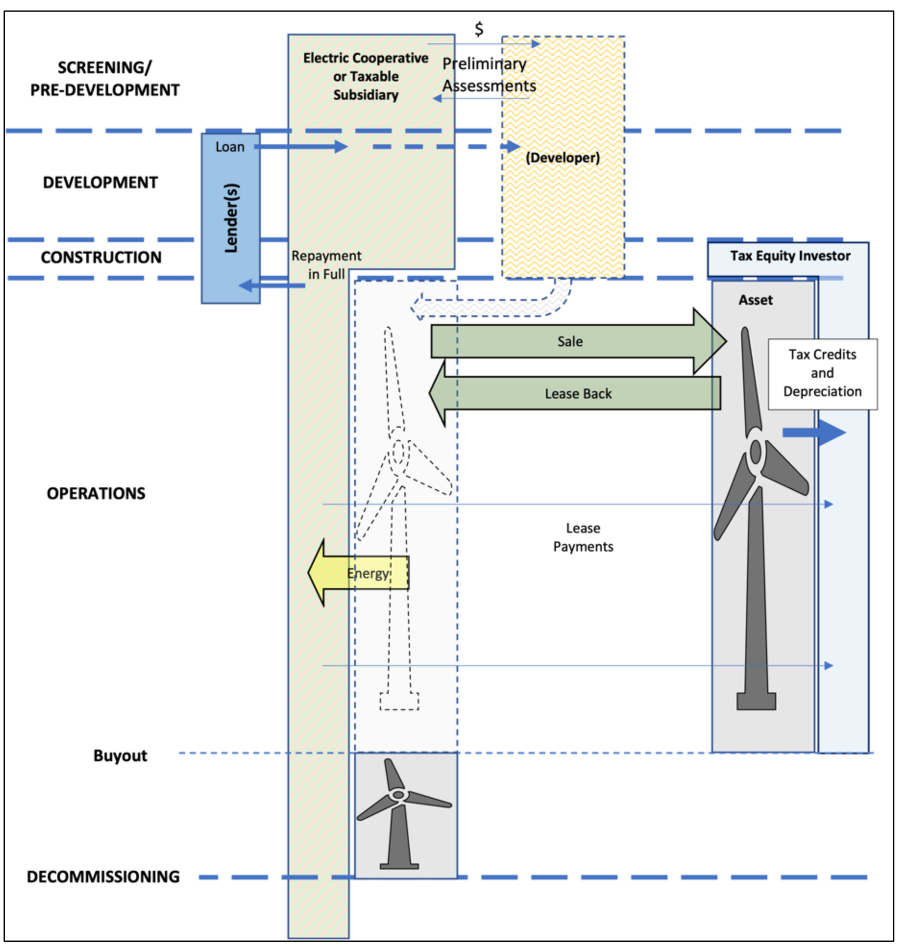

Figure 5: Financial relationships among entities while developing and operating a distributed wind asset within a sale lease-back ownership structure.

Pass-through Lease

In what amounts to a reverse of a sale lease-back arrangement, a pass-through lease is structured so that the developer — the co-op or a private entity — retains ownership of the asset while leasing it to a tax equity investor. Investment tax credits can pass-through to the TEI, but accelerated depreciation benefits (MACRS) must stay with the owner. Then, the TEI negotiates a PPA with the co-op such that the utility reclaims its PPA payments in the form of the TEI's lease payments. A taxable subsidiary is required to take advantage of MACRS.

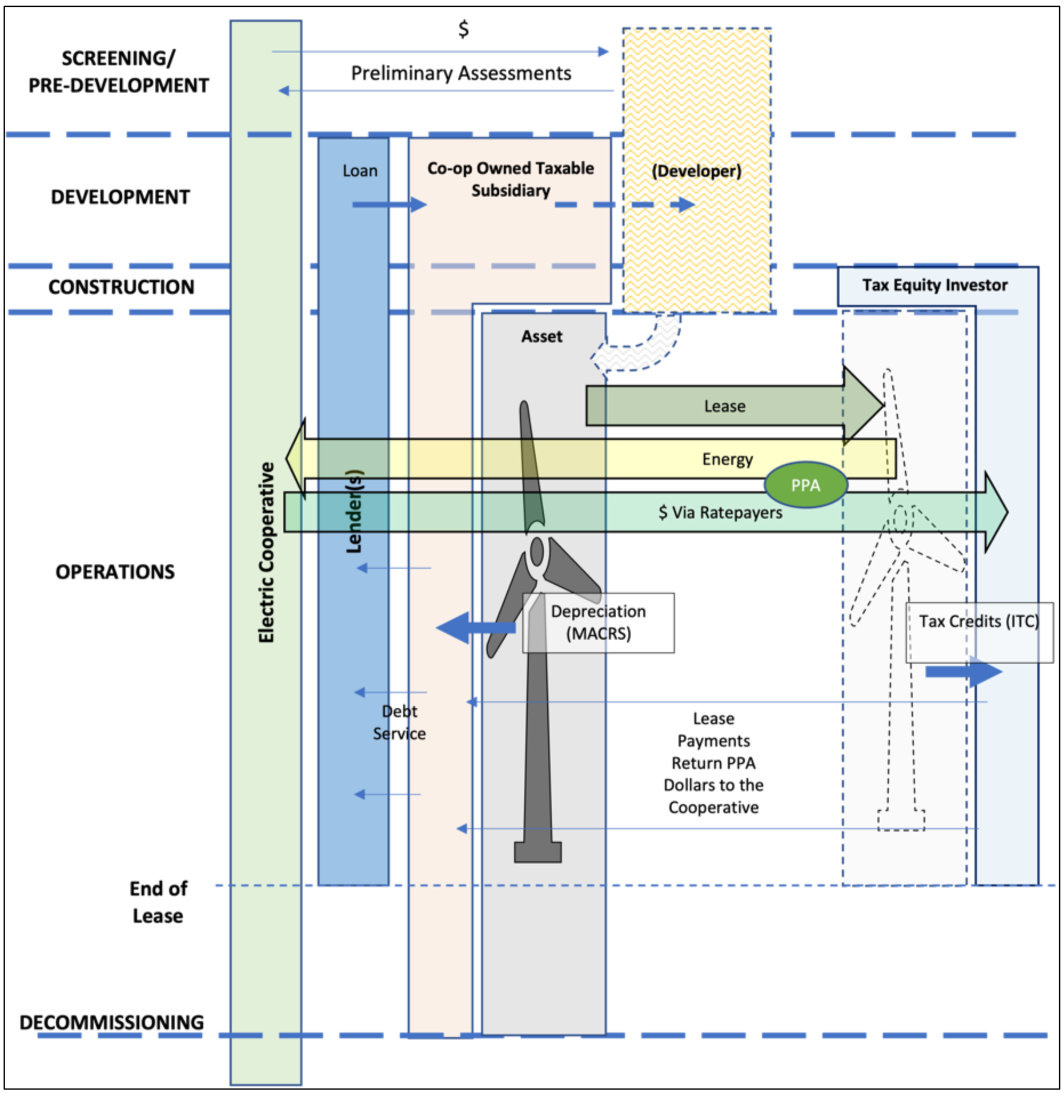

Figure 6: Financial relationships among entities while developing and operating a distributed wind asset within a pass-through lease ownership structure.

Case 3: Third-Party Ownership (Non-Member)

Power Purchase Agreement with Owner-Operator

By seeking a third party to develop, build, own, and operate a distributed wind project in their territory, a co-op can avoid financing altogether. In this scenario, the utility submits a Request for Proposal (RFP) to developers, and they respond with project designs that meet the co-op's technical requirements. The chosen developer is responsible for finding the necessary financing. Inevitably the developer will seek to utilize tax incentives to lower the project's cost, and the co-op can benefit indrectly from these savings in the form of a lower power purchase agreement rate subject to the terms of the contract. PPA contracts are generally long term, commonly lasting 10-25 years.

The co-op might have the opportunity to buy out the developer and any equity partners after the tax incentives have been fully utilized. The co-op may seek debt financing to provide the capital at that time.

Example of Third-Party Ownership:

Wind-Solar Hybrid Project, Lake Region Electric Cooperative (LREC), Minnesota

LREC worked with a local developer to build and commission a pioneering renewable hybrid project that combines a 2.3 MW wind turbine with 500 kW of solar PV on one inverter. Given the uncertainty of the new technology platform, the co-op decided that signing a PPA with a third-party owner reduced risk for their membership. The owner — Juhl Energy, a taxable entity — was able to take advantage of the PTC for the wind portion and the ITC for the solar portion (Moorefield, 2021b). Case study available on the RADWIND landing page.

Image 3: Lake Region's wind-solar hybrid project. Courtesy of LREC.

Case 4: Member Ownership

Behind the Meter, Grid-Tied

Cooperatives play a key role in advising and planning projects behind a customer meter, even if they plan to have no financial involvement, because they will need to approve the interconnection.

The financial structures members may use for their distributed wind project will vary as much as the nature of the members themselves. Projects meant for residential use will likely be financed directly by debt in the member's name, but there are also state and federal tax incentives, rebates from co-ops, and a variety of other instruments that co-ops use to help members own generation assets. See NRECA's ACCESS Project Report Series for a detailed review of these programs. Hosts of larger projects at agricultural, commercial, and industrial sites may utilize third-party owners or available liquid assets to pay for the project up front. If the member is a business that lacks the tax appetite to take advantage of tax incentives, they should discuss other ways to leverage the credits with a tax professional.

Cooperatives may also take advantage of USDA's Rural Energy Savings Program (RESP) to help members finance distributed wind and other energy-related projects on their property. If a co-op is awarded one of the 20-year, 0% interest RESP loans, they can re-lend that money to qualifying members for up to 5% interest (U.S. Department of Agriculture, n.d.). The program may act as a funding source for a co-op with on-bill financing (see the "Developments in Distributed Energy Finance" section). Additionally, members are eligible for USDA REAP grants.

Example of Member Ownership:

Net Metering Program, Homer Electric Association (HEA), Alaska

In 2010, Homer Electric Association became the first Alaska utility to initiate a net metering program. More than 400 members of the cooperative now participate. The program has had a positive impact on the participating members and the community as a whole, but maintaining the growth of distributed wind installations — especially relative to solar PV — has been a challenge. There are a variety of hurdles to DW deployment within the program including a rigorous wind resource data collection requirement and a lack of qualified maintenance technicians working nearby, but there is also great opportunity for DW growth if some of those issues are addressed (Moorefield, 2021e). The HEA case study on the RADWIND landing page outlines the program's details and suggests how to reduce barriers to distributed wind adoption in a net metering program.

Image 4: Net metered wind turbine near Homer, AK. Courtesy of HEA.

Off-Grid

Members who seek off-grid distributed wind platforms present a unique situation for electric cooperatives. Since their turbines do not require interconnection, the co-op has no clear role in the project's development or financing. How the co-op wants to get involved and to what degree is a case-by-case decision, but partnering with members and advising them has clear benefits. Collaborating with members supports a co-op's goal of being the first contact and trusted resource on energy-related matters. Helping a member develop an off-grid distributed wind asset may be an option to avoid a costly line extension to serve a remote load as well.

Table 2: Advantages and Challenges of Distributed Wind Ownership and Financing Cases

		Advantages	Challenges
Full Utility Ownership		• Lower transaction costs • Project, assets, benefit streams, and administration completely within co-op control • Local visibility, PR, member engagement • Low-cost capital available specifically to co-ops • Workforce development	• All financial and operational responsibility and risk lies with the co-op • May require tax equity partner or other incentive to remain cost competitive • Hurdles to taking advantage of external expertise (third-party owners, design-build-operate contractors, etc.).
Partial or Delayed Ownership	**Tax Equity Flip**	• Harnesses tax incentives with savings resulting in lower PPA rate • Lower cost esp. for larger projects or for aggregated smaller projects • Ability to leverage expertise of ownership partner	• Demand for tax equity partners outpaces supply, so they may demand higher rates of return for investment • Requires a co-op-owned taxable subsidiary • Transaction costs can be prohibitive for a small project • Higher legal complexity • Typically provides ~50% of financing and thus requires additional financing streams • Asset underperformance may delay reaching investment hurdle and buyout
Partial or Delayed Ownership	**Tax Advantaged Lease**	• Simplified implementation due to standardized documents and procedures • Efficiently harnesses tax incentives • Potential to be lowest cost • Can provide 100% of financing • Flexibility at term end	• Lease stipulations can be onerous • Buyout may be more expensive than flip option • In pass-through, MACRS won't be monetized unless the taxable subsidiary has sufficient taxable income • PTC not available • Investors tied to project longer than a flip option

(Table continued)

<table>
<tr><th></th><th></th><th>Advantages</th><th>Challenges</th></tr>
<tr><td colspan="2">Third Party Ownership</td><td>Typically, a fixed PPA price for 20 to 30 years – the known quantity is an advantage over fluctuating wholesale prices
Avoids co-op undertaking construction or operational risks
Simpler implementation
Harnesses tax incentives indirectly (no need for a taxable subsidiary)
Additional staff/training for O&M not required</td><td>Relinquishes control over the project
Members may have concerns about intentions of an outside entity/developer, making land leases, etc. more difficult</td></tr>
<tr><td rowspan="2">Member Owned</td><td>BTM, Grid-Tied</td><td>Member typically finances the project
Opportunity for energy services relationship and on-bill financing</td><td>Design and upkeep of a net-metering program.
Billing errors are a rare but significant challenge that can arise for a variety of reasons</td></tr>
<tr><td>Off-Grid</td><td>Little to no responsibility on the cooperative's part (if preferred)</td><td>Projects may happen without the co-op's knowledge or advice
As battery storage technology improves, co-ops in some areas may face member defection if they lose the trusted-partner connection with members</td></tr>
</table>

Developments in Distributed Energy Financing

Federal Tax Incentive Phaseouts

Tax incentives for renewable energy have always been a moving target. Over the past few decades, they have expired and been extended several times. During the COVID-19 pandemic Congress extended the PTC through the end of 2021 amid concerns that health and safety measures and supply chain disruptions would delay renewable project development. As of today, wind energy facilities that begin construction before the end of 2021 will receive 60% of the baseline PTC value for the next ten years. It is not clear what will happen to the PTC after that (See “Developments to Watch”).

Federal incentives have played an important role in supporting the wind industry’s growth and maturation, but they will not last forever. If the incentives currently enhance project financing, what will happen when they disappear? Certainly, there will be a period of volatility as the market adjusts, but eventually equipment prices, PPA rates, and lending rates will stabilize in the new financial environment. Many experts predict that when tax equity investors no longer have a market to exchange capital for tax benefits developers will turn to lenders with the goal of financing projects with a greater proportion of debt. Debt is usually cheaper than equity, so this shift will lower overall financing costs and partially make up for the loss of tax benefits to for-profit entities (Feldman et al., 2020). Furthermore, the tax incentive phaseout may end up incentivizing direct cooperative ownership of distributed wind assets. Third-party owners have higher capital costs than private or government-issued debt, but a third-party entity is currently needed to utilize tax incentives efficiently. If tax incentives are no longer in the picture, the greater proportion of debt in financing a project may make electric cooperative ownership cost competitive with PPAs offered by third-party owners (Varadarajan et al., 2021).

On-Bill Financing

On-bill financing (OBF) is a simple, elegant way for utilities to help members perform energy-related property improvements. In an on-bill financing program, a co-op acts as a conduit for channeling public or private funds to members. This capital then pays for energy efficiency, distributed generation, or weatherization (among other upgrades), and the member repays the investment directly on their utility bill. The funds can be clasified as a loan in the member’s name, a loan associated with the customer’s meter, or an additonal tariff on the bill for the customer’s meter.

Co-ops were early adopters of this mechanism, yet only about 100 currently utilize it and there are many ways to expand its use. Growing demand for on-site generation from commercial/industrial end-users presents an intriguing target for on-bill financing programs. On-bill tariff structures — where repayments are tied to the meter instead of to a specific member — are especially appealing for business clients who may be able to treat distributed wind project repayments as operating expense instead of debt (State and Local Energy Efficiency Action Network, 2014). The Environmental and Energy Study Institute (EESI) provides guidance for co-ops interested in starting an on-bill financing program: *How-to Guide: Launching an On-Bill Financing Program*.

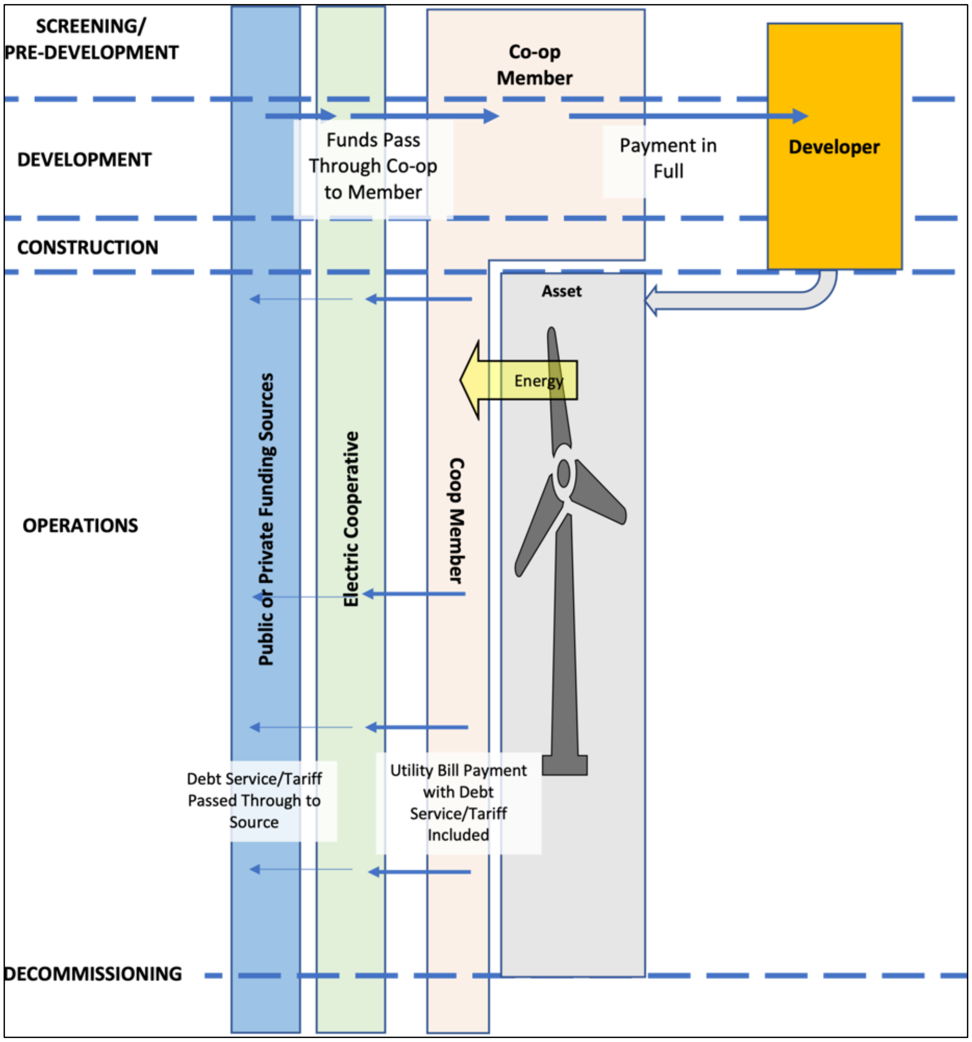

Figure 7: Financial relationships among entities in an on-bill financing program.

A primer on on-bill financing along with examples from around the country can be also be found in the first report of NRECA's ACCESS Project Report Series: *How Cooperatives Are Supporting Their Members In Need*. Billing mechanisms, funding sources, and program objectives vary, but all on-bill systems serve to eliminate the upfront capital costs for energy upgrades on a member's property. Such capital is often difficult or impossible for the end-user to come by on their own. OBF programs can serve any or all demographics, but they are especially beneficial to low-to-middle income members who do not have extra resources, may not have a strong credit record, and are more likely to live in an inefficient home (Moorefield, 2021a). Seeking to help local banks be the primary lenders for local energy projects in OBF programs, First Southwest Bank in Alamosa, CO is piloting a program to link small banks to larger entities that can act as a financial backstop (First Southwest Bank, n.d.).

Corporate Renewable Energy Purchasing

Customer demand, policy imperatives, and corporate goals are some of the factors that compel corporations to take specific steps toward decarbonizing their electricity consumption. Globally, large-scale corporate energy buyers have played an increasingly important role in driving the expansion of clean energy markets through PPAs for on-site generation and "virtual" PPAs for renewable energy generated away from corporate facilities (Schwabe et al., 2017). Smaller businesses and institutions have joined the market through buyer aggregation strategies (Abbott, 2018).

Cooperatives host many corporate-owned facilities within their service areas, and rural areas often have productive wind resources to harvest. A business may wish to erect a BTM wind turbine on their property within co-op territory (Example: Honda manufacturing plant in Russells Point, OH). Additionally, if a co-op is interested in developing a FTM distributed wind asset they should explore business partnerships with corporate buyers for some or all of the energy (Example: Arkansas Electric Co-op and an Aerojet Rocketdyne plant near East Camden, AR). The legal and financial contracts involved may be complicated, but the arrangement could be highly beneficial.

Thus far, corporate purchasing of wind energy through virtual PPAs has focused on utility-scale wind farms located far away from their facilities, so it is not yet clear where distributed wind will fit in that market. A single, small wind turbine project is unlikely to attract the interest of a distant corporate buyer. Co-ops interested in partnering with non-local corporations to develop distributed wind projects may consider aggregating several projects together into one agreement. Projects could be spread around a single cooperative's territory or dispersed among several cooperatives; even non-adjacent co-ops could participate because the contract is for "virtual" energy. Clearly a deal with this many moving parts would need strong incentives to exist. In this case, a coporate buyer would enjoy the energy production stability of a geographically-diverse collection of assets — sometimes referred to as the "portfolio effect" (Bolinger et al., 2009). The involved co-ops would have an external entity pay for clean energy that serves their members and reduces the demand for wholesale energy purchases.

BTM Utility Ownership or Asset Transition

Reflecting the recent increase in corporate PPAs at the utility scale, companies have also increased their on-site renewable generation, often in accordance with corporate sustainability goals. According to the *2018 Distributed Wind Market Report*, commercial and industrial wind installation grew from 5% of capacity installed during 2016 to 29% of the capacity installed during 2018. BTM projects, for C&I members or others, present unique opportunities for electric cooperatives to explore innovative ownership structures. Since C&I, government, or institutional clients often have available land and existing grid tie-in infrastructure, it may make sense for the co-op to finance and ultimately own an asset on private land.

Medium to large BTM turbines present a challenge to co-ops if the member's electric load decreases significantly or the business leaves the location. The turbines continue to produce electricity, but without an on-site load, the energy can backfeed into the distribution system. Co-ops should plan ahead and develop protocols for these events; decommissioning the turbines or repurposing them as front-of-meter community projects are options to consider.

Developments to Watch

Direct Pay Options

Future federal infrastructure investments in transportation electrification and grid resiliency may provide new opportunities for distributed wind in co-op territories. For example, a provision in newly-introduced bills in Congress would make not-for-profit electric co-ops eligible to directly access the ITC and PTC. Co-ops cannot capture tax benefits directly, so they would receive direct payments equal in amount to the PTC or ITC they would otherwise be eligible for as for-profit wind energy project owners. NRECA has actively lobbied for this type of direct payment plan on behalf of their members (Kelly, 2021). Bills under consideration in both houses of Congress have direct-pay provisions, so this development has promise.

Direct payments would make new financing and asset ownership models possible for the first time. Co-ops who don't have a taxable subsidiary rely on private sector developers and investors to utilize tax credits, but the capital costs for these entities are higher than the government debt cooperatives can access (Varadarajan et al., 2021). The premium paid for the more costly debt reduces the cost benefit from new clean energy assets. Thus, non-profit cooperatives often see less economic benefit from switching to clean energy than for-profit utilities. Direct pay options would eliminate this issue and allow co-ops to pass cost savings to their members while making a transition to carbon-free electricity (Varadarajan et al., 2021).

The Clean Energy for America Act under consideration in the U.S. Senate would reincarnate CREBs in the form of Clean Energy Bonds (Schapitl, n.d.). CREBs were canceled in 2017 despite being a valuable tool for co-ops that undertook distributed wind development. They are less likely to be reinstated if the direct pay options described above are passed.

Tax Incentive Updates

Clean energy legislation proposed by President Biden, the U.S. House of Representatives (GREEN Act), and the U.S. Senate (Clean Energy for America Act) all extend the ITC and PTC, but the extension horizon, payment amounts, and phase out strategies differ (KPMG, 2021). While co-ops cannot use these credits directly, developers and investors who interact with cooperative members and leadership will continue to utilize them. A concise summary and comparison of these plans can be found at: https://assets.kpmg/content/dam/kpmg/us/pdf/2021/05/21197.pdf

Continued…

Developments to Watch (continued)

National Rural Utilities Cooperative Finance Corporation Sustainability Bond

In the fall of 2020, CFC issued their inaugural Sustainability Bond to raise $400 million (CFC Solutions News Bulletin, 2020). The proceeds are meant to fund both renewable energy projects and access to essential services in rural and underserved populations (Cooperative Financial Corporation, 2020). While CFC has established a framework for evaluating projects and distributing funds, they have not set a timeline for applications.

U.S. Green Infrastructure Bank

Green Banks are financial institutions focused on maximizing clean energy adoption. By attracting and leveraging private capital, they can offer reduced interest rates, extended term lengths, and low or no money down financing in both traditional and underserved markets (National Renewable Energy Laboratory, n.d.). Several Green Banks have been established at the state and local level in the U.S., and they are widely used internationally.

The Coaltion for Green Capital provides an explainer and an update on current legislative progress: https://coalitionforgreencapital.com/accelerator/.

Strategies and Analysis

Minimizing Risk and Maximizing Value

The proper valuation of a distributed wind project encompasses more than just a levelized cost of energy calculation, though that is an essential component in the final value statement. A thorough feasibility study should be done before making large investments, and the co-op should consider both the project's value and how a new distributed wind asset could enhance their entire system's value. Additionally, some values beyond simple energy cost might be of great importance to co-ops and their members, but they can be more challenging to quantify. The *Value Case Report* from RADWIND explains this conundrum in detail.

Here, we list some strategies that can improve the value proposition for a distributed wind project.

G&T Involvement

Having G&T cooperatives engaged in development of distributed wind in their member co-ops has many advantages. Due to their larger size, tangible assets, and credit history, G&Ts are often afforded lower borrowing rates; thus, having the G&T become a project's sponsor can bring down costs. Furthermore, G&Ts with tax appetite may be able to harness tax incentives. A G&T can also facilitate lower cost PPAs if they are contracting for multiple projects on behalf of their members. In the absence of an ownership stake, G&Ts may still be able to furnish assitance with engineering, procurement, marketing, and legal issues, among other things (Cotter, 2017).

Working together on distributed wind projects, distribution cooperatives and G&Ts can forge partnerships and business models that benefit both parties. Negotiating a modified wholesale power purchase contract that allows distribution co-ops to develop their own renewable power projects is one possibility. If the wholesale power purchase contract remains unchanged, there are ways to work within its constraints. Here are two possible arrangements:

1. A distributed wind asset is owned by the G&T but located within the distribution cooperative's territory. The energy from the asset enters the distribution co-op's grid, and the G&T is paid for that energy as part of the wholesale power purchasing contract. In this way, the distribution co-op is not adding generating capacity to its portfolio and it does not risk exceeding its contracted limit.

2. A distributed wind asset is owned and operated by a distribution cooperative within its territory, but the G&T purchases the energy and sells it back via a PPA (see Figure 8).

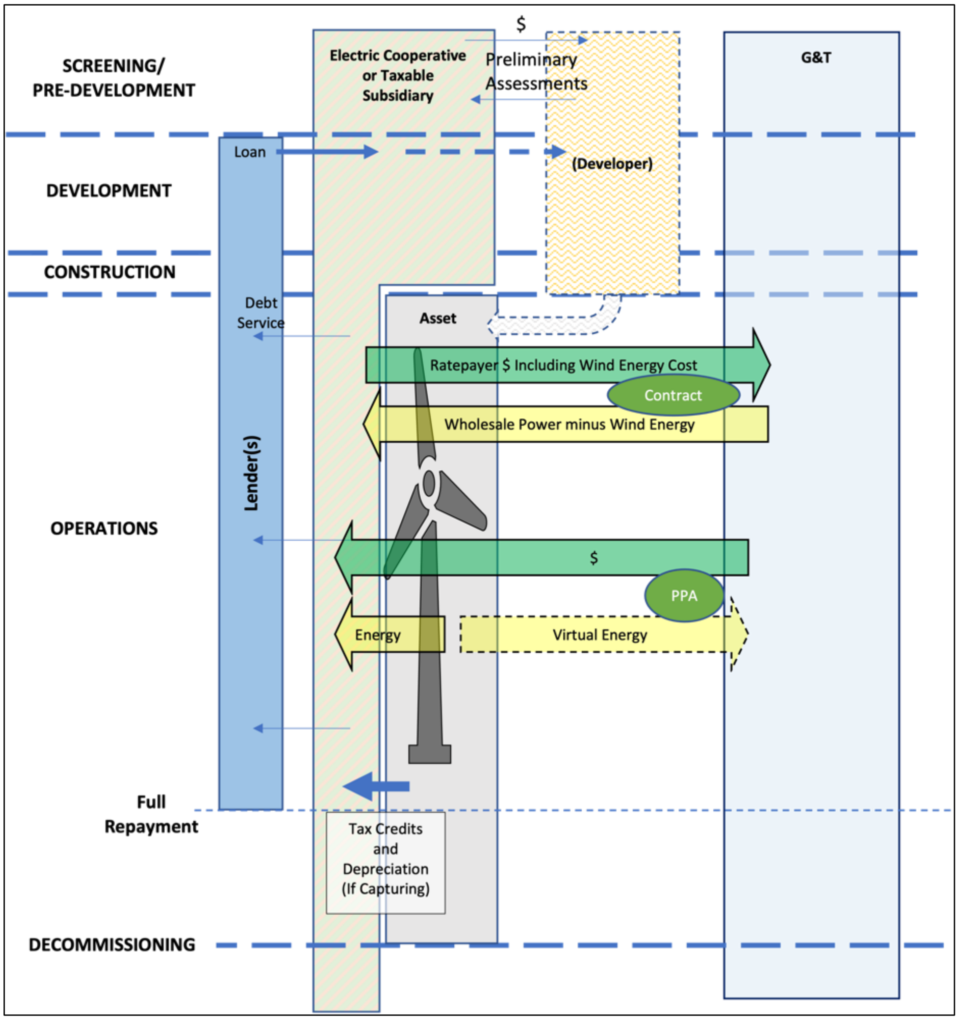

Figure 8: Power Purchase Agreement between a distribution co-op with a distributed wind asset and a G&T cooperative.

Risk and Wind Energy Finance

Lenders and equity investors evaluate every project for risks. Statistical estimations of risk play a vital role in determining how a wind project is financed and at what cost. Mitigating those risks can be accomplished by establishing contingency plans for common negative risk events and by properly pricing that risk into the cost of capital. This section first outlines how annual energy production, or AEP, is estimated early in the development phase. Then, risk categories are described followed by some suggested strategies a co-op can use to reduce a project's risk profile.

LCOE — a ratio of lifetime costs to produced energy — is one way to compare value across different energy generation technologies. Before the project begins operations, however, the LCOE cannot be more than a statistical estimation. The project's predicted total cost over its lifecycle is based on known values from similar projects. The total energy produced by a project can be estimated using nearby benchmark projects or referencing wind resource maps, but an approximation produced by these methods is not sufficiently accurate for strong LCOE comparisons nor for investors seeking to understand a project's bankability.

A wind resource assessment (WRA) results in a predicted value for annual energy production as well as a characterization of the production value's uncertainty. The WRA process consists of the following steps (Bailey, 2014) (Karlina-Barber, 2017):

1. Acquire on-site meteorological data
2. Estimate the wind resource over a long time horizon using current and historical data
3. Extrapolate the resource to the proper turbine hub height and over the entire project area
4. Calculate the gross AEP by applying the wind resource data to the turbines' power curves
5. Subtract known energy losses like wake effects, turbine down time, etc.
6. Determine net AEP estimated value
7. Perform uncertainty analysis

The likelihood that a wind project will produce a certain amount of energy closely follows a normal distribution (see Figure 9). The most probable value is labeled P50 because there is a 50% chance that AEP will exceed that value each year. Similarly, P90 and P99 values are those that will be exceeded 90% and 99% of the time, respectively. These outcomes are *probabilities of exceedance* or *exceedance probabilities*, and they are essential for investors as they size their capital contributions to a project.

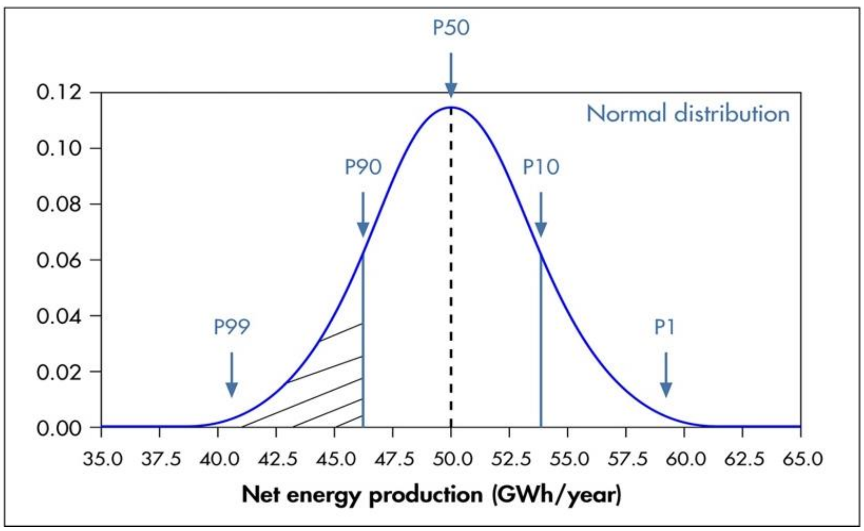

Figure 9: Sample AEP probability distribution.
Source: https://aws-dewi.ul.com/implications-resource-assessment-uncertainty-project-finance/

To minimize risk, lenders usually size project debt such that it can be serviced even during a low production year. At a Debt Service Coverage Ratio (DSCR) of 1.0 at the P99 level, a lender is nearly guaranteed to have its debt payments covered because such a low revenue year is only predicted to happen 1% of the time (Vaisala, 2014). An accurate WRA with low uncertainty leads to higher P99 values, a larger debt offering, and a lower proportion of expensive equity capital in the capital stack. Equity investors, on the other hand use P50 to determine a project's likely rate of return.

Over time, a wind asset's AEP becomes more predictable, and the amount of production uncertainty goes down. Figure 10 shows that while the P50 value does not change in 20 years of a wind turbine's life, the P99 increases. The distribution's narrowing is most pronounced in the asset's first five years (Bolinger, 2017). Cooperatives with wind assets may wish to reevaluate the project's financial contracts after that amount of time. If the asset is performing well and production uncertainty has decreased sufficiently, there may be an opportunity to refinance at a lower rate or to displace equity with more low-cost debt.

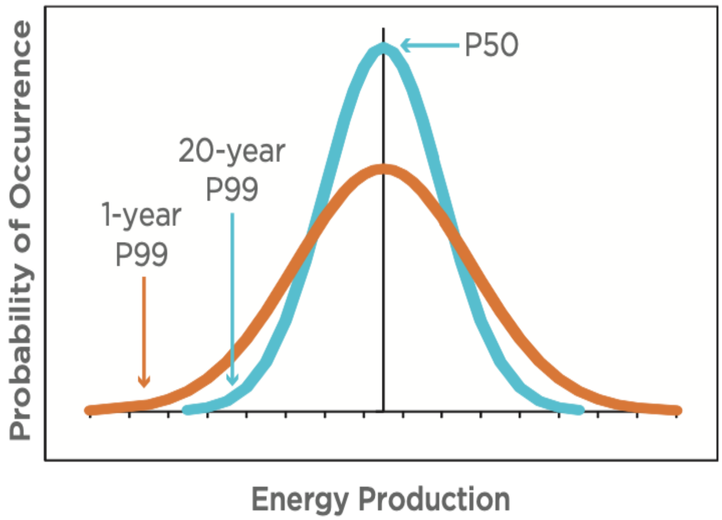

Figure 10: Illustration of the 1-year and 20-year energy production probability distribution for a wind power project. Source: https://www.vaisala.com/sites/default/files/documents/Triton-DNV-White-Paper.pdf

Risks in developing and operating a distributed wind asset can be broken down roughly into these categories (Schwabe et al., 2017):

Project Development Risk: Uncertainty that a project reaches commercial operation, generates electricity, and has revenues to repay obligations. An undeveloped project has incurred development costs, yet it has little asset value and likely zero revenue possibilities.

Construction Risk: Once turbine pricing is secured, construction risk is minimal outside of supply chain and weather-related delays.

Regulatory Risk: Uncertainty that supportive policies (such as tax incentives) will be available as they were when terms were agreed upon. This can often be managed by establishing safe harbor.

Market or Selling Price Risk: This category encompasses the risks associated with a variable or unknown selling price (in the case of a merchant agreement), the lost opportunity that may come with locking in long-term rates when market rates increase, and the unusual event that contracted off-takers cannot fulfill their obligations.

Pre-Construction Energy Estimate Risk: AEP is one of the most important inputs to a wind project's financial model, and there is risk associated with inaccurate forecasting.

Technology and Energy Production Risk: This category encompasses many events that can happen during the wind farm's operation including unexpected maintenance and force majeure events such as unusual weather.

Whether a cooperative is seeking to purchase distributed wind energy from a third-party owner operator or planning to participate in the asset's development and ownership, there are strategies it can use to decrease risk, bring down upfront costs, and decrease the overall cost of capital for the project. Any savings the co-op provides to a developer can be used in negotiating the PPA price.

Broadly speaking, an electric cooperative can ease the pre-development and development process by taking on tasks that it can perform better or less expensively than a private developer. The more a developer knows about the project in advance, the less money they need to put in up front to guarantee a bankable outcome. Making some decisions in advance of starting development also gives the co-op more control over the project's size and location, and the savings could be significant. The following categorized list contains some suggested strategies:

Interconnection: Identify prospective interconnection points and perform an interconnection study.

Land Acquisition: Cooperatives can be enormously helpful by facilitating land acquisition in the development process; their trusted partner role with members is invaluable in identifying and consulting with potential wind project hosts. Evaluate options early; offer co-op land; build relationships with prospective hosts; maintain relationships with hosts that have already shown interest.

Wind Resource: Perform a resource assessment.

Siting: Provide current images (drone video, photos) for FTM or BTM sites; notify the developer of environmental risks for site development; notify the developer of obstruction issues; perform a site soil analysis for large turbines; undertake a topographical analysis and produce a digital terrain model for multi-turbine projects.

Permitting: Begin addressing jurisdictional and regulatory issues ahead of time; speak with zoning commissioners; start FAA evaluation; start environmental permitting procedures.

Development Plan: Establish clear criteria for choosing a developer or determining a winning bid; work with the developer to find the right turbine and rotor for the co-op's wind resource and rate structure; determine if the co-op can lend construction financing to the developer at a lower rate than other lenders.

Financial Analysis

Every project is developed in a unique financial environment. Capital quantity, annual energy production, interest rates, availability of investment partners, and incentive structures — among many other variables — fluctuate across regions, states, and localities. Constructing a cash flow model that matches a co-op's specific setting is crucial when deciding among the financing and ownership options for a distributed wind project. In this way, the cooperative can compare options with uniform metrics and assumptions.

Cooperative leadership may seek outside financial consultation from local banks or institutions to analyze their options. If the analysis will take place in-house, the co-op will need to provide specific financial and project information as input into the cash flow model. These inputs may include:

- Current wholesale power supply contract terms
- Equipment costs
- Development costs
- Transport costs
- Site prep and construction cost
- Interconnection cost
- Land cost
- Insurance cost
- Loan interest rates
- TEI expected IRR
- Discount rate
- System life span
- System AEP and degradation rate
- O&M costs
- PPA pricing, escalation, and duration
- Retail electricity rate (if selling retail)
- Expected wholesale purchase price
- Lease payments
- General and administrative expense
- Avoided cost

Some financial model outputs that may facilitate the co-op's decision include:

- LCOE
- NPV of investment
- IRR
- Cost per member
- Lifetime expenditures and lifetime savings
- Tax revenue
- Land lease revenue
- Payback year

Highly valuable information such as locational and grid services values may require more than financial modeling to quantify.

See Appendix A for a table of financial modeling tools and resources.

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Appendix A: Analysis Tools

The table below shows some of the resources available for estimating a project's financial performance and/or economic impact.

Tool	Developer	Description
Co-op's Proprietary Cash Flow Model	N/A	• Likely the most accurate forecast since it is built on the co-op's specific financial environment
NREL LCOE Calculator	NREL	• Basic web tool to estimate LCOE with simple inputs
NREL Cost of Renewable Energy Spreadsheet Tool (CREST)	NREL	• Download "Wind" • Provides financial summaries and cash flows for a wind project with basic inputs. • Complex inputs available. • Can save multiple "runs" to test financial options.
System Advisor Model (SAM)	NREL	• SAM can model the performance of a variety of technologies along with different business and financial models (i.e., PPA, residential owner, merchant plant). • Wind resource data and turbine options are built in or can be added manually.
Jobs and Economic Development Impact (JEDI) Model	NREL	• Download distributed wind model • Thorough analysis of the wind system's finances and local economic impact • Economic reference values are being updated

Appendix B: List of Acronyms

ACCESS Project	Achieving Cooperative Community Equitable Solar Sources Project
AEP	Annual Energy Production
AWEA	American Wind Energy Association
BTM	Behind-the-Meter
C&I	Commercial and Industrial
CFC	National Rural Utilities Cooperative Finance Corporation
CREBs	Clean Renewable Energy Bonds
DER	Distributed Energy Resource
DSCR	Debt Service Coverage Ratio
DSIRE	Database of State Incentives for Renewables & Efficiency
DW	Distributed Wind
EESI	Environmental and Energy Study Institute
EIA	Energy Information Administration
FAA	Federal Aviation Administration
FIEC	Fox Islands Electric Cooperative
FIW	Fox Islands Wind
FTM	Front-of-Meter
G&T	Generation and Transmission
HEA	Homer Electric Association
IEC	International Electrotechnical Commission
IRR	Internal Rate of Return
IRS	Internal Revenue Service
ITC	Investment Tax Credit
LCOE	Levelized Cost of Energy
LLC	Limited Liability Corporation
LREC	Lake Region Electric Cooperative
MACRS	Modified Accelerated Cost-Recovery System
NEPA	National Environmental Policy Act
NPV	Net Present Value
NRECA	National Rural Electric Cooperative Association
NREL	National Renewable Energy Laboratory
O&M	Operations and Maintenance
OBF	On-Bill Financing
PNNL	Pacific Northwest National Laboratory
PPA	Power Purchase Agreement
PTC	Production Tax Credit

PV	Photovoltaic
R&D	Research and Development
RADWIND	Rural Area Distributed Wind Integration Network Development
REAP	Rural Energy for America Program
REC	Renewable Energy Certificate
RECC	Rural Electric Convenience Corporation
RESP	Rural Energy Savings Program
RFP	Request for Proposal
RUS	Rural Utilities Service
SPE	Special Purpose Entity
TEI	Tax Equity Investor
USDA	United Stated Department of Agriculture
WRA	Wind Resource Assessment