

## DISTRIBUTED WIND FINANCE CASE STUDY: Opportunities for Including Distributed Wind in On-Bill Programs

### RADWIND Project

This is the first in a series of case studies on financing distributed wind projects at electric cooperatives and other rural utilities 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 website page at [www.cooperative.com/radwind](http://www.cooperative.com/radwind).

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### Finance Mechanism Snapshot

Measure Name	Program Types	Description	Target Audience	Typical Measures	Typical Term	Source of Capital
On-bill Programs	On-bill financing (OBF) program	Low-interest loan for energy upgrades at member location paid off through installments on utility bill	All members and/or consumer-owners	Weatherization, efficient appliances, solar, batteries	5 – 20 years	Utility, Rural Energy Savings Program (RESP), grants, local banks, green banks
	Tariffed on-bill (TOB) program	Monthly charge on utility bill to offset utility investment in energy upgrades at member location				

### Introduction

More than 110 electric utilities across the country, predominately electric cooperatives, offer on-bill programs, including on-bill financing (OBF) and tariffed on-bill (TOB) programs,<sup>1</sup> to encourage

<sup>1</sup> Sometimes referred as on-bill tariff (OBT) programs.

consumer adoption of energy-saving upgrades such as weatherization, ENERGY STAR® appliances and lighting, and some distributed energy resources (DER).<sup>2</sup> Distributed wind turbines are not yet incorporated into on-bill programs; however, they may be an untapped opportunity for some cooperatives and members. Distribution cooperatives can leverage member-sited small wind turbines to reduce wholesale peak power purchases, defer distribution upgrades, and improve grid reliability and resiliency, especially when distributed wind turbines are paired with other technologies like solar and battery storage. In addition, in some states, OBF and TOB program measures may help utilities meet DER and energy efficiency goals.<sup>3</sup> At the same time, distributed wind turbines financed through on-bill programs can be profitable investments for members.

This report provides an overview of on-bill programs, program financing sources, and scenarios for including small-scale (100 kW or less) wind equipment as a program measure. For simplicity, the report uses “on-bill programs” to refer to OBF and TOB programs together. The specific terms (OBF and TOB) are used where it is necessary to distinguish between the program types.

## OBF and TOB Program Background

The upfront cost of energy efficiency upgrades and new equipment is a known barrier to consumer adoption, particularly for low- to moderate-income (LMI) consumers. Utility rebates discount purchase prices by refunding consumers a portion of the expense; however, often consumers must first pay the full initial price before receiving the rebate later. To further address the upfront cost barrier, many utilities now also offer on-bill programs to eliminate or reduce upfront costs by enabling consumers to pay for the energy-saving measure over time through their utility bills.

On-bill programs have been offered by utilities since the early 2000s.<sup>4</sup> One of the first on-bill programs was at New Hampshire Public Service (now Eversource). This program began in 2001 and primarily targeted municipal customers. In South Carolina, the Help My House® program provides low-interest loans for weatherization and residential energy efficiency measures. The concept was initially developed by the South Carolina statewide organization, Electric Cooperatives of South Carolina (ECSC), and the state’s G&T, Central Electric Power Cooperative (CEPC), with support from the Environmental and Energy Study Institute (EESI).<sup>5</sup> Help My House ran a pilot in 2011-2012 that was soon thereafter converted into a full-fledged program offered by several distribution cooperatives in the state.<sup>6</sup> In North Carolina, Roanoke Electric Cooperative offers the Upgrade to Save TOB program for home weatherization, appliance upgrades, and LED lighting.<sup>7</sup> In Kansas, Midwest Energy offers the How\$mart TOB program—the co-op’s third iteration of its long-standing on-bill program.

Initially, co-ops designed on-bill programs to support weatherization and energy efficiency measures, and they continue to do so for good reason. These measures lower members’ bills and improve home comfort—benefits that may be particularly valuable to low- to moderate-income (LMI) members.

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<sup>2</sup> <https://www.eesi.org/obf/map>

<sup>3</sup> Stanton, S. and Sklar, S. January 2020. *Utility Tariff On-Bill Financing: Provisions and Precautions for Equitable Programs*, NRRRI Insights publication. Available from: <https://pubs.naruc.org/pub/0E0B2716-947E-B0A8-2899-3DCA0F0C8F16>

<sup>4</sup> Hummel, H. and Lachman, H. 2018. *What is inclusive financing for energy efficiency, and why are some of the largest states in the country calling for it now?* In the proceedings of the 2018 ACEEE Summer Study on Energy Efficient Buildings. Available from: [https://www.aceee.org/files/proceedings/2018/assets/attachments/0194\\_0286\\_000158.pdf](https://www.aceee.org/files/proceedings/2018/assets/attachments/0194_0286_000158.pdf)

<sup>5</sup> <https://www.eesi.org/obf/case-study/helpmyhouse>

<sup>6</sup> <https://www.epa.gov/statelocalenergy/help-my-house-program-profile>

<sup>7</sup> <https://www.roanokeelectric.com/save-energy-money/upgrade-to-ave-program-2/>

Weatherization and energy efficiency measures also help utilities by increasing a member's ability to pay due to lower bills, reducing load on individual feeders that may serve numerous inefficient residences, such as older manufactured homes, and flattening utility system peaks.

In response to member interest and, in some cases, to improve community resiliency, several on-bill programs have recently expanded to include solar, battery energy storage systems (BESS), and other new measures:

- **Orcas Power & Light Cooperative (OPALCO) (Washington distribution cooperative)**

The Switch It Up program includes rooftop solar, BESS, electric vehicle (EV) chargers, and high-speed fiber internet connections.<sup>8</sup> Members may secure tariffs to cover up to \$100,000 of upgrades at 2% interest for terms of up to 10 years.

- **Ouachita Electric<sup>9</sup> (Arkansas distribution cooperative)**

The long-standing HELP PAYS<sup>®</sup> program now includes solar arrays.<sup>10</sup>

- **Mountain Parks Electric, Inc.<sup>11</sup> (Colorado distribution cooperative)**

The Electrify Everything! Program (TOB) includes member-owned PV arrays up to 25 kW financed at 2% interest over 10 years. The program uses NREL's PVWatts<sup>®</sup> Calculator to estimate performance of proposed systems. The program requires a 10-year payback and bill neutrality. Participants may be required to pay a portion of the upfront system cost, so that the financed amount will meet these program requirements. For additional PV financing assistance, members may retire their capital credits early and apply them to their payments.<sup>12</sup>

- **La Plata Electric Cooperative (Colorado distribution cooperative) in partnership with 1<sup>st</sup> Southwest Bank, a regional community development financial institution (CDFI)**

The On Bill Financing Program offers loans up to \$35,000 for member-owned solar PV.<sup>13</sup>

- **Holy Cross Energy (Colorado distribution cooperative)**

The Power+ TOB program<sup>14</sup> purchases Tesla Powerwall BESS to be installed in participants' homes. Participants pay a 0% interest monthly tariff to offset the co-op's investment and allow the co-op to use a portion of the stored energy during high peak demand times. Participants also receive a monthly bill credit for granting the co-op access to the stored energy, which helps to offset the monthly tariff. This is a win for all parties as members ultimately pay for energy storage that both they and the co-op have access to.

More information on these and other programs is available on NRECA's Achieving Cooperative Community Equitable Solar Sources (ACCESS) webpage: <https://www.cooperative.com/programs-services/bts/access/Pages/default.aspx>, as well as EESI's Interactive Map of Utilities with On-Bill Financing Programs: <https://www.eesi.org/obf/map> (see Figure 1).

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<sup>8</sup> <https://energysavings.opalco.com/switch-it-up-2/>

<sup>9</sup> <https://www.oecc.com/help>

<sup>10</sup> <https://www.oecc.com/help>





<sup>11</sup> <https://www.mpei.com/electrify-everything-program>

<sup>12</sup> For additional information, see: <https://www.eesi.org/articles/view/mountain-parks-electric-launches-electrify-everything-on-bill-program>

<sup>13</sup> <https://lpea.coop/bill-financing-program>

<sup>14</sup> <https://www.holycross.com/powerplus/>



-  Rural electric cooperative
-  Investor-owned utility
-  Public utility
-  Video available

**Figure 1. Screenshot of Interactive Map of Utilities with On-Bill Programs, courtesy of EESI (2022)<sup>15</sup>**

Non-cooperative utilities are innovating in this space as well:

- **Vermont’s Green Mountain Power** offers its customers a TOB program for a variety of BESS—Tesla Powerwalls, Enphase IQ Batteries, or other vendors selected by customers under a “Bring Your Own Device” option. Participants share a portion of their stored energy with the utility when needed to offset system peaks.<sup>16</sup>
- In Hawaii, the **Green Energy Money Saver<sup>17</sup> (GEMS)** TOB program helps customers of Hawaiian Electric acquire site-located PV and other measures.

To the RADWIND project’s knowledge, no utilities currently include distributed wind in on-bill programs.<sup>18</sup> However, the inclusion of PV, BESS, and other high-cost appliances like heat pumps in several OBF and TOB programs suggests that small wind turbines could be a viable program measure in many regions. Distributed solar and BESS<sup>19</sup> are now vetted program measures; the per-kilowatt (kW)

<sup>15</sup> <https://www.eesi.org/obf/map>

<sup>16</sup> <https://greenmountainpower.com/rebates-programs/home-energy-storage/bring-your-own-device/>

<sup>17</sup> <https://gems.hawaii.gov/participate-now>

<sup>18</sup> If you are aware of an electric cooperative or other utility that includes distributed wind turbines in its OBF or TOB program, please email the RADWIND program at: [RadwindProject@nreca.coop](mailto:RadwindProject@nreca.coop)

<sup>19</sup> For more information on battery storage programs, see: <https://www.eesi.org/articles/view/home-battery-storage-programs-provide-grid-flexibility-and-save-customers-money>

purchase price for small wind turbines is now on par with PV in many regions; and, small wind turbines on a distribution grid can lower bills for members while supporting utilities as local generation assets that can reduce demand, and may be able to supply energy and frequency support to the distribution grid.

## Program Design Details

On-bill programs remove or greatly reduce upfront costs to members for energy efficiency upgrades and distributed energy resources, because these programs pay for some or all of the upfront costs of the upgrades. Then, co-ops collect monthly fees—either as tariffs or loan repayments—from program participants via monthly utility bills for the agreed-upon term, at which time the equipment costs are paid off.

### OBF versus TOB

According to EESI’s 2022 data, about 75 electric cooperatives offer OBF programs and 15 offer TOB programs. While both program types have similar goals, a key difference is that OBF programs involve loans to participants and TOB programs do not. Other comparisons are presented in Table 1. In TOB programs, the utility invests in upgrades at member locations, then recovers those investments through monthly tariffs added to program participants’ bills. Participants in TOB programs do not incur debt because they do not receive loans. This makes TOB programs a good fit for some LMI members. In general, OBF programs have lower barriers to lending than traditional personal or commercial bank loans.<sup>20</sup> Regardless of program type, at the end of the on-bill payment term, equipment ownership transfers to the property owner.

**Table 1. Characteristics of Loans versus Tariffs**

	Loan	Tariff
<b>Allowable repayment mechanism?</b>	On-bill or off-bill	On-bill only
<b>Can you attach financial obligation to individual?</b>	Usually yes; some states allow loans to be attached to meter	Usually no
<b>Disconnect for non-payment?</b>	Sometimes	Usually yes
<b>What laws are applicable?</b>	Federal and state consumer lending laws	Tariff regulations from state public utility commission or self-regulated
<b>Advantage</b>	Familiar to financial institutions	Less rigorous credit requirements

Source: Keegan, P., et al. (2016), *Financing Member Investments in Efficiency and Solar: A Solution for Cooperatives?*, NRECA TechSurveillance Report.<sup>21</sup>

<sup>20</sup> For a detailed comparison of OBF and TOB programs, see NRECA’s 2016 TechSurveillance report by Keegan, P. et al., *Financing Member Investments in Efficiency and Solar: A Solution for Cooperatives?*, available from: [https://www.cooperative.com/programs-services/bts/Documents/TechSurveillance/ts\\_obf\\_for\\_ee\\_and\\_re\\_february\\_2016.pdf](https://www.cooperative.com/programs-services/bts/Documents/TechSurveillance/ts_obf_for_ee_and_re_february_2016.pdf)

<sup>21</sup> Ibid

Pay As You Save (PAYS®) is a TOB program design developed by the Energy Efficiency Institute, Inc. and now used by several co-ops. The PAYS® program design caps a participant's monthly payment at 80% of the measure savings for 80% of the measure life, ensuring a positive financial outcome for the participant.

According to Brian Dreiling, manager of energy services at Midwest Energy, "There are advantages to both approaches." When Midwest Energy offered an OBF program, the co-op was able to finance 100% of the upfront costs, because the monthly installment was not capped by the energy savings. Loans were tied to individuals, and participants paid back the loans, often for large amounts, over 5-year terms. That cash flow worked well for the co-op. The current TOB program caps monthly payments to the estimated measure savings to ensure bill-neutrality. Dreiling noted that while the co-op's cash flow from the TOB program is not as favorable as the OBF program, the tariff program is easier for renters and LMI members to participate in. Reaching these members is part of the co-op's program goal.

### **Participant Qualification**

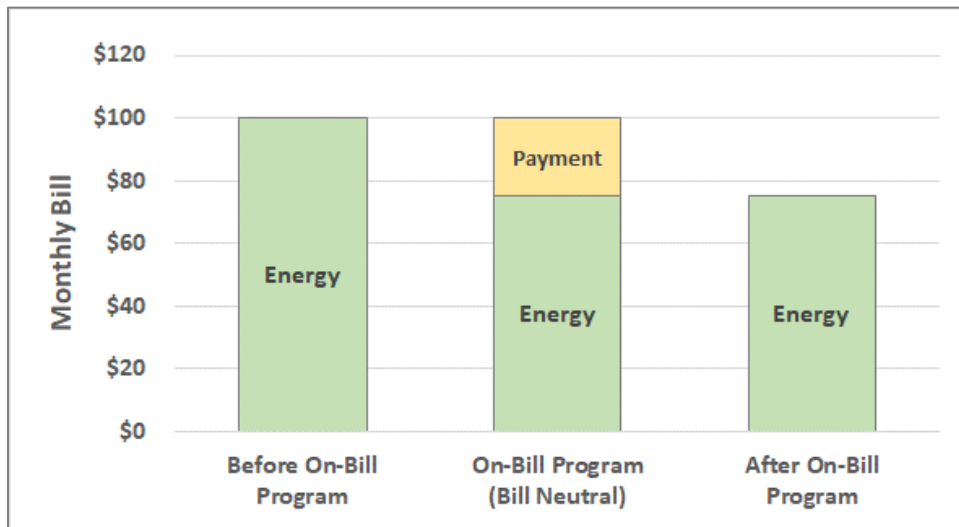
Co-ops typically make on-bill programs available to all members in good standing with the co-op. Some programs require 12 months of on-time payment and no disconnects within the past three years. Because credit checks are typically not used in these programs, even if an applicant does not qualify, there is no impact to their credit rating from a credit check.

In some cases, programs have approved participants who struggle to pay bills because payment is more likely under the program due to lower bills. Like standard weatherization and energy efficiency measures, distributed renewables can also reduce members' bills and improve ability to pay. However, sometimes a participant may qualify, but the program may determine that the building is unsafe or not in a condition that would allow the measures to be successful. In these cases, co-ops may refer homeowners to other sources of financial support, such as local weatherization assistance programs, for major repairs for failing roofs, mold, or structural problems.

For an on-bill program that includes distributed wind, the participant qualification process would also need to include screening for wind resource and acceptable site for the wind turbine. Qualifying participants should have sufficient wind to generate enough energy to be cost effective for the member in the long run.

### **Bill Impact**

Many, but not all, on-bill programs ensure that each approved measure is bill-neutral for the participant. This means that the monthly savings from the upgrade is greater than or equal to the monthly loan payment or tariff on the member's bill. By doing so, bill-neutral programs present little or no financial exposure to participants. At the end of the term, barring other changes in the home, the member benefits from further reduced bills as the monthly payments have ended but the energy savings persist. See Figure 2. Some programs do not have a goal of bill-neutrality; these may offer more traditional financing but with lower interest than typical personal or commercial loans. Other programs, such as PAYS®, aim to be cash flow positive for the participant, meaning that participants' monthly bills go down even as they pay the monthly on-bill charges.



**Figure 2. Example Bill Neutral On-Bill Program Progression**

### **Payment Responsibility**

Another important program consideration is who is responsible for the monthly payment. In some OBF programs, the loan is tied to the individual participant. This means that the individual participant incurs debt and has sole responsibility for repayment. If the participant moves before the end of the term, the remaining balance must be paid off at that time. However, where state laws allow, some OBF programs, including South Carolina’s Help My House program, tie the loan to the property’s electrical meter. If a participant moves, the new occupant assumes the monthly loans and receives the benefit of the monthly savings. Program disclosures at the time of sale or leasing are required. TOB programs tie the monthly tariff to the meter.

### **Local Contractor Program Partners**

To reduce risks for both the co-op and the member, some established programs train and qualify local installers and maintenance technicians. This helps protect the co-op and the participant investments by managing the quality of equipment used and installation practices. It is particularly important when promoting new or not commonly used technologies like heat pumps, because some HVAC installers may not know how to size and install these systems properly. Co-ops that establish contractor programs early may be able to prevent sub-par contractors from gaining significant market share in the community and negatively impacting members’ opinions of the new technology.

### **Bundling Measures to Optimize Cost-Effectiveness**

Ideally, program measures are bundled to save energy most cost-effectively. In general, weatherization should be completed before energy efficient appliances and HVAC systems are sized and installed. Roanoke Electric Cooperative’s Upgrade to \$ave Program<sup>22</sup> conducts in-home energy audits to prioritize the most cost-effective measures for each participating home. Given the cost-effectiveness of both weatherization and energy efficiency upgrades, both of these areas should be optimized prior to sizing

<sup>22</sup> <https://www.roanokeelectric.com/save-energy-money/upgrade-to-ave-program-2/>

renewable energy and battery storage systems. This kind of whole-system design directs program money appropriately to the most cost-effective measures for the co-op and the participant.

## Sources for Program Capital

Co-ops and other utilities finance OBF and TOB programs in a variety of ways. In some cases, co-ops self-finance the program. As loans and tariffs are paid over time, the co-op earns interest on their investment in members' energy upgrades. Co-ops may also borrow money at low or 0% interest rates and charge program participants slightly higher rates.

The USDA Rural Energy Savings Program (RESP)<sup>23</sup> is a funding resource for on-bill programs. To date, 30 rural utilities have borrowed more than \$100 million in 0% interest RESP loans to finance OBF and TOB programs for energy efficiency, beneficial electrification, and renewable energy measures. Programs that use RESP loans often have a 10-year term for the end-user due to RESP program rules.<sup>24</sup> Co-ops may apply for this funding on their own; however, the EESI offers free assistance to co-ops and other non-profit utilities with RESP applications and program design. RESP funding has been reauthorized through 2023.

Some co-ops work directly with their lenders, including local banks and credit unions, to finance on-bill programs. La Plata Electric Association (LPEA) partners with a local CDFI, 1st Southwest Bank, for its OBF program. In this model, LPEA markets the program, approves participants based on their standing with the co-op, and ensures participants plan to use the loan for an approved measure. After approval, the co-op provides the participant's name and requested amount to the bank. The bank then finalizes a low-interest loan directly with the participant. LPEA collects monthly installments on the bill and passes them through to the bank. While this program does not ensure bill-neutrality, the bank and participants have flexibility with the loan amount and term.

Green banks may also offer program finance options. According to the Coalition for Green Capital, "Green Banks are mission-driven institutions that use innovative financing to accelerate the transition to clean energy and fight climate change."<sup>25</sup> For example, Hawaii's GEM\$ program is financed by the Green Energy Market Securitization program, a state-run green bank.<sup>26</sup>

Default rates for OBF and TOB programs are extremely low—typically lower than the rate for co-ops' general billing. An analysis of 18 TOB programs showed a "cost recovery rate averaging above 99.9%, even in persistent poverty areas."<sup>27</sup> Other programs report cost recovery rates of 99.5% or more. In the rare case that a participant does not pay the tariff or loan repayment amount, some utilities have the ability to disconnect power, depending in part on state laws. However, utilities may still desire some type of protection from possible non-payment. Programs or lenders sometimes use a portion of program funding or match funding to establish a loan loss reserve or similar fund. A loan loss reserve is a dedicated fund set aside to cover non-payments. Several states make loan loss reserve funding available to energy savings programs, including Connecticut, California, and Michigan.<sup>28</sup> Similarly, the North Carolina Sustainable Energy Association (NCSEA) established the Energy Solutions Reserve Fund (ESRF), which is available

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<sup>23</sup> <https://www.rd.usda.gov/programs-services/electric-programs/rural-energy-savings-program>

<sup>24</sup> Personal communication, Miguel Yanez, EESI/Laura Moorefield, March 2022.

<sup>25</sup> <https://coalitionforgreencapital.com/what-is-a-green-bank/>

<sup>26</sup> For more information on Green Banks, see: <https://www.nrel.gov/state-local-tribal/basics-green-banks.html>

<sup>27</sup> Hummel & Toth, 2019, *Utility investment vs. consumer loans: Getting to yes on energy efficiency through inclusive financing for all*. <https://escholarship.org/uc/item/7ch5r7bj>

<sup>28</sup> <https://www.aceee.org/toolkit/2017/02/loan-loss-reserves-energy-efficiency-financing-programs>



to utilities within and outside the state. The first ESRF subscriber was Ouachita Electric Cooperative in Arkansas. North Carolina's Roanoke Electric Cooperative and Appalachian Electric Cooperative also subscribe to these funds.<sup>29</sup>

See the EESI's *How-to Guide: Launching an On-Bill Financing Program*, available from: <https://www.eesi.org/obf/howtguide> for an in-depth discussion of potential financing sources.

## Distributed Wind On-bill Program Scenarios

Given the many on-bill program design and funding options, distributed wind may be a viable program measure for members whose energy use is a good fit for a small wind turbine. Because an actual example of an on-bill program including distributed wind turbines does not exist, the RADWIND team developed and modeled two hypothetical scenarios. Shared assumptions for both are:

- The member/program participant owns a small farm (e.g., a few flocks of chickens) with an average energy use of 48,000 kWh/year.
- The member pays a flat retail rate of \$0.11/kWh with a 2.90% average annual inflation rate, making the existing *electricity* portion of their bill average \$440/month the year before the wind turbine installation.<sup>30</sup>
- The member installs a 15-kW wind turbine with financial support from their co-op's on-bill program, which could be either OBF or TOB in the scenarios.
- The member has a good wind site, with an average annual wind speed of 5.8 meters/second (13 miles/hour).
- The wind turbine produces an average of 42,000 kWh/year at this location.<sup>31</sup>
- The wind turbine is grid-tied, behind-the-meter, and net-metered.
- Total cost for the wind turbine, including equipment, installation, and tax, is \$90,000.<sup>32</sup>
- The wind turbine's useful life is at least 25 years.
- The member sets aside \$300/year for maintenance.
- The member has a tax appetite and takes the federal small-wind investment tax credit (ITC) for the turbine, which is 26% for a 2022 installation. (Note that this decreases to 22% for a 2023 installation.)
- The member depreciates the wind turbine over five years with the modified accelerated cost recovery system (MACRS),<sup>33</sup> which creates significant allowable tax deductions during those years.
- The on-bill program uses non-compounding interest for the participant's monthly payment.

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<sup>29</sup> <https://energyinc.org/ESRF/>

<sup>30</sup> For the purpose of illustration, this model uses a flat per kWh rate and does not include demand charges or other variable rate components. The monthly base rate is not included in the analysis because it is not likely to be impacted by net-metering unless a utility has a different net metering base rate. Each utility is encouraged to assess financials based on its own rate structure.

<sup>31</sup> <http://www.bergev.com/products/grid-tied-turbines/excel-15/>

<sup>32</sup> Personal communication, Mike Bergev/Laura Moorefield, May 2022

<sup>33</sup> <https://www.irs.gov/publications/p946>

### Scenario 1: 10-year Payment Term

The first scenario assumes that the co-op’s on-bill program will pay the entire upfront cost of the wind turbine and installation. The program participant will reimburse the co-op in monthly on-bill payments for 10 years at 2% interest. The result is that the participant’s electricity purchases decrease due to the wind turbine’s production, but their overall bill exceeds their pre-program (base case) during the 10-year program term due to the addition of the monthly on-bill fee.

In Figure 3, the orange line (“No DW (Base Case)”) represents the monthly electricity charge<sup>34</sup> for the base case, i.e., business as usual without a distributed wind (DW) turbine. The increase over time is due to retail rate increases; electricity use is assumed to be constant for the purposes of modeling. The blue dotted line (“DW (On-bill)”) shows the impact to the monthly bill of the distributed wind turbine acquired through the on-bill program. While electricity purchases decrease as soon as the wind turbine begins operating in year 1, in years 1 through 10, the monthly on-bill fee causes the new bill to exceed the base case bill. However, starting in year 11, when the program term ends and the participant has finished paying monthly fees, the electricity charge is \$500 to \$800 lower than the base case every month thereafter. The gray dashed line (“Amortized DW (On-bill)”) shows the bill impact of the distributed wind turbine on-bill program amortized over the 25-year equipment life. Comparing the amortized electricity and on-bill charges to the base case is another way to assess value to the member over time.

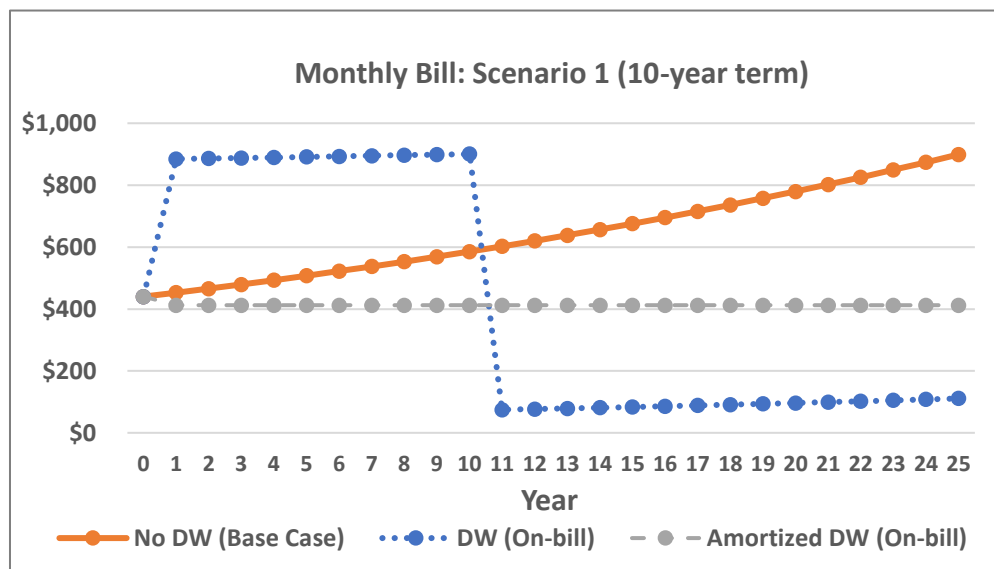


Figure 3. Scenario 1 - Monthly Bill Comparison (electricity and on-bill charges only)

Figure 4Error! Reference source not found. shows annual (light green dotted line) and cumulative net (dark green solid line) cash flow for a participant from the wind turbine acquired through an on-bill program. With the 2022 tax credit of \$23,400 taken in year 1, the 5-year MACRS depreciation, and the savings from the reduced energy expenses, the project’s cumulative cash-flow is positive every year except for years 9, 10, and 11. Over the 25-year equipment lifetime, the cumulative net cash flow (which includes electricity bill savings) to the participant exceeds \$106,000. If the wind turbine continued to operate beyond year 25, cash flow would increase year over year starting at roughly \$10,000 in year 26.

<sup>34</sup> Note that this analysis includes per kWh and on-bill fees only. Fixed costs and other variable costs like demand charges, are not included.

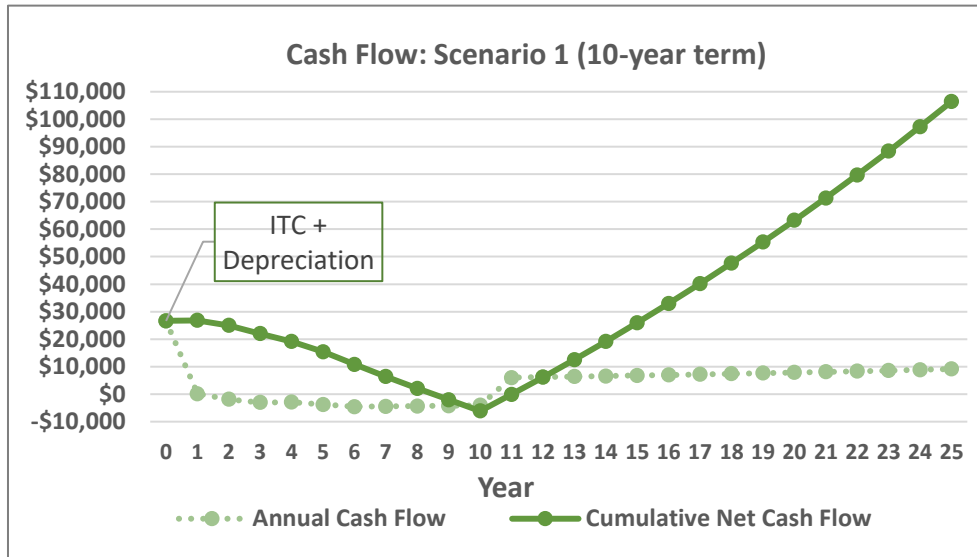


Figure 4. Scenario 1 - Annual and Cumulative Net Cash Flow from Wind Turbine On-Bill Program

### Scenario 2: Bill-Neutral Payments

The second scenario illustrates participant cash flow from a bill-neutral on-bill program. As with the Scenario 1, the on-bill program pays the entire equipment and installation cost up front. However, Scenario 2 was designed to be bill-neutral; the participant’s on-bill fee equals the amount they save in energy purchases each month. Thus, monthly bills with a distributed wind on-bill program (blue line, “DW (On-bill)”) are roughly the same as the base case (orange line, “No DW (Base Case)”), from year 1 to year 18, when the participant has reimbursed the co-op for the wind turbine. After that, bills drop precipitously (see Figure 5 **Error! Reference source not found.**).

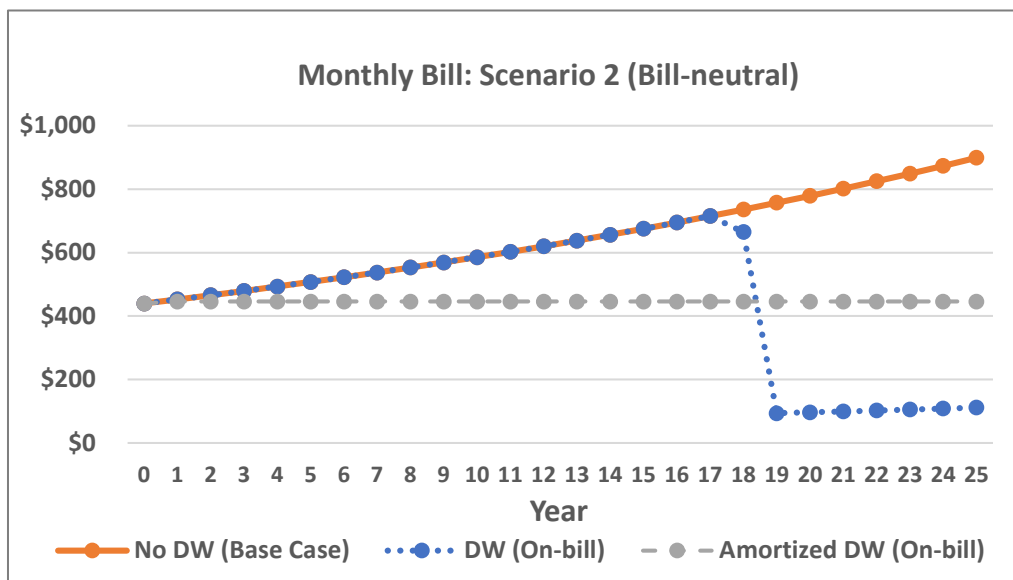


Figure 5. Scenario 2 - Monthly Bill Comparison (electricity and on-bill charges only)

Figure 6 **Error! Reference source not found.** shows annual and cumulative net cash flow for the participant. Cash flows in this scenario are always positive, starting at about \$26,000 from the ITC coupled with MACRS depreciation. Annual cash flow is zero (bill-neutral) until year 18, when the on-bill payments are complete. After that, annual cash flows increase from \$7,600 in year 19 to more than \$9,000 in year 25. Cumulative cash flow over the project lifetime totals more than \$96,000 by year 25. If the wind turbine lasted beyond 25 years, annual cash flow would continue to increase every year, starting at roughly \$10,000 in year 26.

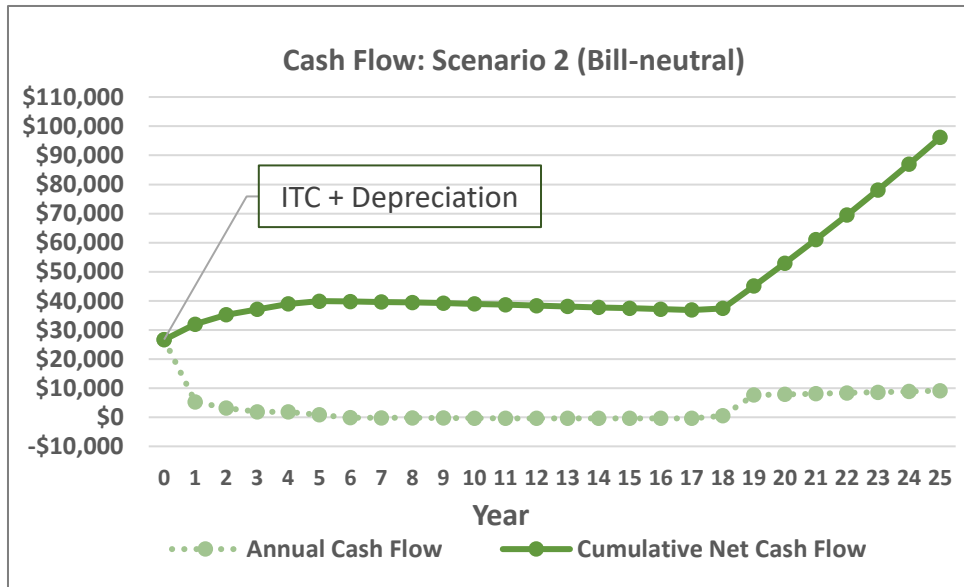


Figure 6. Scenario 2 - Annual and Cumulative Net Cash Flow from Wind Turbine On-bill Program

Both hypothetical scenarios illustrate how distributed wind can be a sound financial investment for certain members. Similar analyses using rate and other data specific to a co-op can help individual members determine if a distributed wind turbine would be a good fit for them.

Co-ops wishing to model on-bill program scenarios with their own data may contact the RADWIND project for access to the Hoss Consulting cash flow analysis model used here. Please email: [RadwindProject@nreca.coop](mailto:RadwindProject@nreca.coop)

### Benefits to Members and Community

In addition to the participant’s financial benefit over time, a primary advantage of the on-bill program approach is that it provides an avenue for the co-op to help members select reliable products from trustworthy vendors. For many members, investing \$50,000 to \$90,000 or more in a small wind turbine may feel like a financial risk. Having the co-op involved in and supportive of the entire process—rather than the interconnection phase only—will boost confidence for many. RADWIND has several existing and forthcoming resources on standards, certifications, and cybersecurity of distributed resources available at on the project website: [www.cooperative.com/radwind](http://www.cooperative.com/radwind).

On a monthly billing basis, members with wind generation will have lower electricity charges and may also see reduced demand charges. Properly-sited wind turbines typically generate electricity 90% of the

time in any given year, so some amount of generation is likely during both morning and evening peaks.<sup>35</sup> Seasonally, wind may enable a member to electrify some or all heating loads, because wind generation is typically greater in the colder months. In the long term, by owning a portion of the generation capacity that they need, the member and their home or business will be insulated from potential rate increases driven by higher power costs.

Over the measure life of 25 years, the distributed wind turbine scenarios modeled earlier save members about \$100,000 by offsetting electricity purchases after the monthly payment obligation has ended. This equipment and the resulting annual savings once the payment term ends are assets that can be passed along to heirs or other future property owners. If the member were to add a BESS, having back-up power could alleviate impacts of power outages to humans, animals, and farm operations.

For the broader community, a wind turbine purchase supported by the co-op may contribute to local goals to generate clean energy, lower rates for all, and support economic development. According to a 2020 report by the National Regulatory Research Institute (NRRI)<sup>36</sup>, “By reducing consumption [through on-bill programs], the market equilibrium will occur at lower levels of demand, requiring less supply, and thereby helping to reduce the cost of supplying electricity.”<sup>37</sup> While an individual small wind turbine may not have a large impact on its community, collectively, rural businesses with sound financial and energy investments bolster local economic development.

## Benefits and Challenges for Cooperatives

Benefits to the co-op go beyond member satisfaction, although that is an integral program component that is hard to determine a dollar value. On-bill programs are opportunities for co-ops to stay actively engaged with members as their primary trusted energy partner, rather than leaving a gap to be filled by third-party, direct-to-consumer energy vendors. On-bill programs also allow co-ops to influence what behind-the-meter infrastructure is installed at members’ homes, farms, and businesses—a benefit to the member (as noted earlier) as well as the co-op. For example, a BESS coupled with the wind turbine could make the system’s output more predictable for the interconnecting cooperative. Further, co-ops can finance these strategic investments with low- to zero-interest capital for which the co-op will ultimately be compensated, with interest, by members who participate.

On-bill programs are opportunities for co-ops to stay actively engaged with members as their primary trusted energy partner and to influence what behind-the-meter infrastructure is installed—a win-win for members and co-ops.

Including wind in on-bill programs is not as straightforward as many common measures like weatherization, energy efficient appliances, and increasingly, PV. The upfront cost of a small wind turbine is significant—in the range of a luxury pick-up truck—and therefore, depending on the program term, the monthly tariffs or installments may exceed the monthly energy savings at first. Participants would need to be carefully screened to ensure the benefit of long-term savings outweighs the near-term

<sup>35</sup> <https://cleanpower.org/facts/wind-power/#:~:text=Over%20the%20course%20of%20a,increase%2C%20so%20does%20electricity%20production.>

<sup>36</sup> NRRI is the research arm of the National Association of Regulatory Utility Commissioners (NARUC), but as of writing it was in the process of being absorbed into NARUC.

<sup>37</sup> Stanton, S. and Sklar, S. January 2020. *Utility Tariff On-Bill Financing: Provisions and Precautions for Equitable Programs*, NRRI Insights publication (p. 4). Available from: <https://pubs.naruc.org/pub/0E0B2716-947E-B0A8-2899-3DCA0F0C8F16>

financial commitment. Alternatively, programs could design the term to be bill-neutral, or participants could pay a portion of the upfront cost, so that the co-op's investment could be recouped during a shorter term while keeping the participant's bill neutral.

Another challenge may be the scarcity of small wind turbine installers and maintenance providers in some regions. The co-op may need to engage manufacturers to ensure that installers and technicians will be available to service the area. Some co-ops may feel that adding distributed wind turbines is too risky because they don't have experience with them. However, this gap presents an opportunity for learning about the technology in partnership with interested members. Co-ops may be able to test small wind turbines in their territories to assess their ability to support power quality, the value of demand reduction, or the extent to which adding a distributed wind turbine and possibly a BESS on a stressed line could defer maintenance needs. A member benefiting from the support of an on-bill program may be more willing to partner for technical research than if they had gone it alone.

## Resource List

There are many useful resources on this topic, many of which are geared towards electric cooperatives and other non-profit utilities. None of these sources discuss the distributed wind opportunity for on-bill programs, but they do provide information on general program design, opportunities, and financing options. These include:

- The Environmental and Energy Study Institute's (EESI) On-Bill Financing Project, which includes free support with RESP applications and a guidance for launching an on-bill program: <https://www.eesi.org/obf/main>
- NRECA Surveillance report on cooperative.com: *Financing Member Investments in Efficiency and Solar: A Solution for Cooperatives?* (2016), available from: [https://www.cooperative.com/programs-services/bts/Documents/TechSurveillance/ts\\_obf\\_for\\_ee\\_and\\_re\\_february\\_2016.pdf](https://www.cooperative.com/programs-services/bts/Documents/TechSurveillance/ts_obf_for_ee_and_re_february_2016.pdf)
- The North Carolina Sustainable Energy Association's Energy Solutions Reserve Fund, which is not restricted to North Carolina: <https://energync.org/ESRF/>
- The American Council for an Energy-Efficient Economy (ACEEE) has numerous OBF/TOB resources on its website, including: <https://www.aceee.org/blog/2019/04/bill-financing-gains-ground-faces>
- The National Regulatory Research Institute's report: *Utility Tariff On-Bill Financing: Provisions and Precautions for Equitable Programs*, available from: <https://pubs.naruc.org/pub/0E0B2716-947E-B0A8-2899-3DCA0F0C8F16>
- U.S. Department of Energy Better Buildings *Issue Brief: Low-income Energy Efficiency Financing through On-Bill Tariff Programs*, available from: [https://betterbuildingsolutioncenter.energy.gov/sites/default/files/IB%20L-1%20EE%20Financing%20through%20On-Bill%20Tariffs\\_Final\\_0.pdf](https://betterbuildingsolutioncenter.energy.gov/sites/default/files/IB%20L-1%20EE%20Financing%20through%20On-Bill%20Tariffs_Final_0.pdf)

## Contact for Questions

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### 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](http://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 voting members to join the project as advisors. Contact our team at: [RadwindProject@nreca.coop](mailto:RadwindProject@nreca.coop).