Decommissioning Wind Energy Systems Resource Guide

A report by Cora Hoffer,
Center for Rural Affairs

Center *for* Rural Affairs

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I. Introduction

Wind electricity generation has grown significantly, with total annual U.S. electricity generation from wind energy increasing from about 6 billion kilowatt hours (kWh) in 2000 to about 380 billion kWh in 2021.[1] Decreasing wind turbine installation costs over the past decade have created more opportunities for wind development. With advances in technology, the cost of wind turbine installation is down more than 40% since the peak in 2010, which means lower installation and energy production costs. Wind energy provided 10% of total electricity nationwide in 2022.[2] This included more than 60% of the power in Iowa and more than 40% of power in South Dakota, Kansas, and Oklahoma.[3] Additionally, with the passage of the Inflation Reduction Act in 2022, forecasts for land-based wind energy installations in 2026 have increased nearly 60% from about 11,500 megawatts (MW) to 18,000 MW, which is enough to power an added two million homes.[4]

Wind energy offers numerous benefits to rural communities. Wind development provides tax revenue for local communities, new job opportunities, and a low-cost, reliable energy source. Land for large wind projects is typically leased, which can provide an important source of rental income to landowners. In 2021, wind projects delivered $2 billion in state and local tax payments and land-lease payments.[5] Additionally, wind turbine service technician is one of the fastest growing jobs in the country with the amount of people in this position expected to increase by 45% over the next decade (2022 to 2032).[6]

Wind energy also provides production tax payments to counties. Each year, the Minnesota Department of Revenue releases a report detailing production taxes paid by wind and solar projects to the counties that host them. In 2022, the report shows that 28 Minnesota counties received more than $16.8 million in wind production tax revenue. Lincoln County, Minnesota, was the leader, receiving $3.8 million from 640 towers in the county.[7]

Wind energy projects can make a positive economic contribution by offsetting energy costs. Distributed wind turbines can be used to directly offset customer electricity usage, a concept called net metering,[8] which allows customers to receive money back on their electricity bills when their solar or wind power systems generate more electricity than is used on-site.[9] Wind development also provides additional tax revenue to fund county services like schools, infrastructure, and emergency medical services.

To take advantage of the potential benefits of wind energy, county officials are responsible for enacting siting or zoning standards that help capture the benefits of new development while ensuring projects are built in a way that works best for local communities. One way this can be done is through planning for decommissioning. With the rise in wind development, it is prudent for counties to create a plan for decommissioning projects once they reach the eventual end of their life. A well-balanced ordinance will provide clear expectations and guidance for when and how decommissioning projects will take place.

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1 "Wind explained, Electricity generation from wind." U.S. Energy Information Administration, Independent Statistics and Analysis, Dec. 27, 2023, eia.gov/energyexplained/wind/electricity-generation-from-wind.php. Accessed April 2024.

2 Wiser, Ryan, et al. "Land-Based Wind Market Report: 2023 Edition." Lawrence Berkeley National Laboratory, U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, 2023, energy.gov/sites/default/files/2023-08/land-based-wind-market-report-2023-edition.pdf. Accessed April 2024.

3 Ibid.

4 "U.S. Department of Energy Projects Strong Growth in U.S. Wind Power Sector." U.S. Department of Energy, Aug. 24, 2023, energy.gov/articles/us-department-energy-projects-strong-growth-us-wind-power-sector. Accessed April 2024.

5 "Wind Power Facts." American Clean Power, cleanpower.org/facts/wind-power. Accessed April 2024.

6 "Occupational Outlook Handbook: Fastest Growing Occupations." U.S. Bureau of Labor Statistics, Sept. 6, 2023, bls.gov/ooh/fastest-growing.htm. Accessed April 2024.

7 "County Energy Production." Minnesota Department of Revenue, 2023, mndor.state.mn.us/ReportServer/Pages/ReportViewer.aspx?%2FProperty+Tax%2FProperty_Tax_Energy_County. Accessed April 2024.

8 "Land-Based Wind Energy Economic Development Guide." U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office: WINDExchange, windexchange.energy.gov/economic-development-guide. Accessed April 2024.

9 "Net Energy Metering Explained." Clean Energy Alliance, thecleanenergyalliance.org/net-energy-metering-explained. Accessed April 2024.

To take advantage of the potential benefits of wind energy, county officials are responsible for enacting siting or zoning standards that help capture the benefits of new development while ensuring projects are built in a way that works best for local communities. One way this can be done is through planning for decommissioning.

II. Understanding wind project end-of-life options

As projects reach the end of their operational life-spans—estimates range between 25 and 40 years—owners may seek to cease generation at a facility and decommission the system.[10] Various alternatives to decommissioning are available as end-of-life options for wind energy systems. Extending the life cycle, reducing waste, and enhancing the recycling of wind turbine materials are important strategies to promote sustainability and reduce the environmental impact of wind energy systems.[11] Thanks to technological advances, an alternative to decommissioning by extending the life and performance of wind energy systems, called repowering, also exists.

A. Extending the performance period: repowering

Repowering can extend the operational life of a project by updating or replacing equipment. Repowering may also increase the efficiency and capacity of a project. Two options for repowering projects are:

- Full repowering. This method involves a total replacement of turbines and related equipment. The process requires the removal of existing systems and construction of new turbines, often at the same location.
- Partial repowering. This method replaces select parts or equipment. Typically the tower and foundation of a turbine remain, while the rotor—hub and blades—or generation components are replaced with newer systems.[12]

From a wind energy facility owner's perspective, repowering has several advantages. The method is an investment opportunity to enhance existing

10 Wiser, Ryan, and Mark Bolinger. "Benchmarking Anticipated Wind Project Lifetimes: Results from a Survey of U.S. Wind Industry Professionals." Berkeley Lab: Electricity Markets and Policy Group, September 2019, eta-publications.lbl.gov/sites/default/files/wind_useful_life_report.pdf. Accessed April 2024.

11 "Wind Turbine Sustainability." U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, Wind Energy Technologies Office, energy.gov/eere/wind/wind-turbine-sustainability. Accessed April 2024.

12 Lantz, Eric, et al. "Wind Power Project Repowering: Financial Feasibility, Decision Drivers, and Supply Chain Effects." National Renewable Energy Laboratory, nrel.gov/docs/fy14osti/60535.pdf. Accessed April 2024.

Recycling the metal components of a wind turbine is easy, but challenges exist for composite components. Several innovative processes allow wind turbine raw materials to be used in other building materials or repurposed entirely in new structures.

sites with new and/or refurbished technology and an opportunity to use existing grid connections and infrastructure.[13] The updates increase the cost-saving advantages compared to vacant, decommissioned lots.

Moreover, a study published in 2020 found that replacing old wind turbines had benefits beyond cost and productivity gains, including decreased noise and the potential to lessen impacts to local wildlife.[14]

The cost of repowering depends on factors such as the size of the turbines, the type of components being replaced, the location of the project, and labor and material costs.[15] Repowering may also require new siting permits, which will vary by location, and possibly applications to the public utility commission if the power output exceeds a specific threshold (which varies by state).[16]

B. Full decommissioning: repurposing, recycling, and disposal of wind turbines

Full decommissioning indicates the removal of a wind energy project—both wind turbines and associated infrastructure—and the restoration of any land.[17]

As part of the decommissioning process, wind turbine blades are required to be repurposed, recycled, or disposed of when they are at the end-of-use stage, or when a wind farm is being upgraded. Here are the options.

Repurposing opportunities for end-of-life are becoming more widely available.[18] Several innovative processes allow wind turbine raw materials to be used in other building materials or repurposed entirely in new structures. While feasibility of repurposing may be lacking in some cases, repurposing does offer financial and environmental benefits. For example:

- Using decommissioned blades in civil engineering projects as part of powerline structures, noise barriers for highways, playgrounds, or roofs for emergency or affordable housing.[19,20]
- Refurbishing blades to be reused within a wind local plant or resold on secondary markets.[21]

13 Tri, Brian, and Wes Karras. "Time to repower your wind energy site?" Barr Engineering Co., April 20, 2023, barr.com/Insights/Insights-Article/ArtMID/1344/ArticleID/536/Time-to-repower-your-wind-energy-site. Accessed April 2024.

14 Kitzing, Lena, et al. "Multifaceted drivers for onshore wind energy repowering and their implications for energy transition." Nature Energy, Nov. 2, 2020, nature.com/articles/s41560-020-00717-1. Accessed April 2024.

15 "For investors, wind turbine repowering offers efficiency and lifespan benefits." ICF, April 26, 2023, icf.com/insights/energy/investors-wind-turbine-repowering-efficiency-lifespan. Accessed April 2024.

16 Wyatt, Jessi. "Repowering and Decommissioning: What Happens in Communities When Solar and Wind Projects End?" Great Plains Institute, April 1, 2020, betterenergy.org/blog/repowering-and-decommissioning-what-happens-in-communities-when-solar-and-wind-projects-end. Accessed April 2024.

17 "Wind Energy End-of-Service Guide." U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office: WINDExchange, 2023, windexchange.energy.gov/end-of-service-guide.pdf. Accessed April 2024.

18 "Can wind turbine blades be recycled?" National Grid, April 28, 2023, nationalgrid.com/stories/energy-explained/can-wind-turbine-blades-be-recycled. Accessed April 2024.

19 Martini, Ryan, and George Xydis. "Repurposing and recycling wind turbine blades in the United States." Environmental Progress and Sustainable Energy, American Institute of Chemical Engineers, June 12, 2022, aiche.onlinelibrary.wiley.com/doi/10.1002/ep.13932. Accessed April 2024.

20 Gignac, James. "Wind Turbine Blades Don't Have to End Up in Landfills." The Equation, Oct. 30, 2020, blog.ucsusa.org/james-gignac/wind-turbine-blades-recycling. Accessed April 2024.

21 Cooperman, Aubryn, et al. "Wind turbine blade material in the United States: Quantities, costs, and end-of-life options." Science Direct, May 2021, sciencedirect.com/science/article/abs/pii/S092134492100046X?via%3Dihub. Accessed April 2024.

Recycling the metal components of a wind turbine is easy, but challenges exist for composite components. Composition varies by manufacturer; typically 85% to 95% of a wind turbine is made from recyclable materials, but the rotor blades are made of composite materials.[22] Composite materials pose a more significant challenge to the wind industry because they are more difficult to recycle.[23] Recycling techniques used on wind turbine components include:[24]

- Mechanical recycling. Physically breaking down wind turbine blades. Shredded materials are easier to transport, and some shredded decommissioned blades are used to produce alternatives to standard cement. This has the added benefits of reducing raw materials needed for cement and lowering greenhouse gas emissions by as much as 27%, compared to the traditional manufacturing process.[25]
- Chemical recycling. Breaking down the composite materials in wind turbine blades into their core components through a chemical process. This process allows valuable materials, such as glass fibers and carbon fibers, to be extracted and repurposed for other industries.
- Thermal recycling. Using high temperatures in the absence of oxygen to break down the blades and convert them into useful energy or fuel. The fuel produced can be used for energy generation, while the gas can be used as a feedstock for industrial processes.

Recycling is the best option but is not widely available due to the lack of processing facilities to separate blade materials. Advancements in technology and the availability of recycling are expected to increase in the future.

Disposal of wind turbine parts usually involves putting them into landfills. An estimated 10,000 to 20,000 blades annually are expected to be at the end of their lifespans between 2025 and 2040.[26] Representing approximately 1% of the remaining landfill capacity by volume, blade waste is projected to reach 2.2 million tons in the U.S. by 2050. Wind turbine blades pose a challenge to many landfills, as their size and composition require specific equipment for processing and disposal.[27,28]

In 2022, the average rotor diameter of wind turbines was more than 130 meters (430 feet), which is almost twice the wingspan of a Boeing 747.[29] Longer blades are good for capturing more wind to produce more electricity, but disposing of the blades in landfills is costly. The size of the blades makes them difficult and expensive to transport. The increasing size of wind turbines adds another challenge to the truck transportation infrastructure.[30] Additionally, the further from a landfill the wind site is, the higher the transportation costs.

Landfill disposal is generally the most accessible and least expensive method to decommission wind turbine blades, but it has environmental drawbacks and may not be allowed or available in certain places.

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22 "Can wind turbines be recycled?" Ørsted, us.orsted.com/renewable-energy-solutions/offshore-wind/seven-facts-about-offshore-wind/recycling. Accessed April 2024.

23 "Decommissioned Wind Turbine Blade Management Strategies." American Clean Power, January 2023, cleanpower.org/wp-content/uploads/2023/01/ACP_BladeRecycling_WhitePaper_230130.pdf. Accessed April 2024.

24 Ibid.

25 "Concrete Benefits: Recycling Old Wind Turbine Blades Could Help Cement Industry Cut CO2 Emissions." General Electric, Dec. 23, 2020, ge.com/news/reports/concrete-benefits-recycling-old-wind-turbine-blades-could-help-cement-industry-cut-co2-0. Accessed April 2024.

26 Hicks, Wayne. "NREL Researchers Point to Path for Improved Wind Blade Recycling Rates." National Renewable Energy Laboratory, Aug. 30, 2022, nrel.gov/news/program/2022/nrel-researchers-point-to-path-for-improved-wind-blade-recycling-rates.html. Accessed April 2024.

27 Ibid.

28 Stella, Christina. "Unfurling The Waste Problem Caused By Wind Energy." National Public Radio, Sept. 10, 2019, npr.org/2019/09/10/759376113/ unfurling-the-waste-problem-caused-by-wind-energy. Accessed April 2024.

29 Hartman, Liz. "Wind Turbines: The Bigger, the Better." U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Aug. 24, 2023, energy.gov/eere/articles/wind-turbines-bigger-better. Accessed April 2024.

30 "Wind turbine blade sizes and transport: A guide." Utility Dive, May 16, 2022, utilitydive.com/spons/wind-turbine-blade-sizes-and-transport-a-guide/623444. Accessed April 2024.

III. Planning for decommissioning

While relatively few systems are decommissioned each year, many communities are concerned about the possibility of projects being abandoned. To address this, it is prudent for local governments to plan ahead for decommissioning and create ordinances that spell out expectations and obligations. This ensures that financial responsibility for decommissioning falls to the project owner and not the county and landowners.

Requirements frequently set a timeline for removal of a project once it is no longer producing electricity. This timeframe should be considerably longer than minor disruptions to energy production, such as a system taken offline while repairs are being made. Decommissioning activities can take 6 to 24 months, depending on the size of the turbines and the number of turbines involved in the project.[31]

The process of decommissioning requires several steps, including:

- Preparing for cranes and other equipment required for the removal of systems. This includes ensuring roads are in a condition that will allow for heavy equipment traffic and that stable pads are in place for cranes.
- Dismantling the turbines and removing their parts. The blades, nacelle—or housing for components related to the generation of electricity, and the tower are all fully removed from the site. Cables that are part of the collection system, as well as transformers, are also removed.
- Removing turbine foundations so any remaining portion is below a certain level—often below tillable ground so land can be returned to agricultural use.
- Repairing and restoring land and roadways to their previous condition after removal of the parts and equipment.

31 "Wind Energy End-of-Service Guide." U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office: WINDExchange, 2023, windexchange.energy.gov/end-of-service-guide.pdf. Accessed April 2024.

A. Components of a decommissioning plan

Decommissioning plans often include:[32,33,34,35,36,37]

- Defined conditions upon which the process will be initiated, such as the end of the lease, notification from the developer of its intent to stop using the facility and to fully retire the system, or a pre-identified end date.
- Description of any agreement made with a landowner regarding decommissioning.
- Statement defining how notification will be made of intent to start the decommissioning process.
- Decommissioning tasks and timing, including:
    - » Removal of all equipment, structures, roads, and foundations.
    - » Transportation and disposal or salvage of decommissioned materials.
    - » Land use and site restoration of property to condition prior to wind development.
    - » Setting a timeframe for completion of decommissioning activities.
- Detailed cost estimate prepared by a knowledgeable independent party. This may or may not include the salvage value of wind equipment and infrastructure.

32 Ibid.

33 "Wind Project Decommissioning Plan PrairieWinds SD1 (Crow Lake Wind Project)." South Dakota Public Utilities Commission, May 2021, puc.sd.gov/commission/dockets/electric/2009/el09-028/DecommissioningPlan.pdf. Accessed April 2024.

34 "Wind Farm Decommissioning Plan." Burns & McDonnell Engineering Company, Inc., March 17, 2022, leecountyil.com/DocumentCenter/View/3192/E---128389---Leeward---Lee-County-GSG-Wind-Decommissioning-Plan---v0. Accessed April 2024.

35 Steinhauer, Suzanne. "Energy Environmental Review and Analysis (EERA) Recommendations on Review of Solar and Wind Decommissioning Plans." Minnesota Commerce Department, March 16, 2020, edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7b1024E570-0000-CD11-98E8-4EC4D05E58E7%7d&documentTitle=20203-161292-01. Accessed April 2024.

36 "State Requirements For Decommissioning End-Stage Renewable Energy Projects." Lewis Roca, 20416171. fs1.hubspotusercontent-na1.net/hubfs/20416171/LR_Renewable%20Energy%20End-Stage%20Planning%20Report_FIN.pdf. Accessed April 2024.

37 "Nobles Wind Repowering Project: Decommissioning Plan." Minnesota Public Utilities Commission, Northern States Power Company, February 2021, mn.gov/eera/web/project-file/11701. Accessed April 2024.

Table 1. Estimated cost comparison of five wind decommissioning projects

Location	Year	Net cost per turbine (USD)*	Number of turbines in wind project
Nobles County, Minnesota	2021	$285,555	134
Mitchell, South Dakota	2021	$139,928	108
Brookings and Deuel counties, South Dakota	2021	$103,529	105
Lee County, Illinois	2021	$58,300	30
Washington County, Maine	2022	$56,923	13

*Net cost per turbine is the cost per turbine using the salvage value estimate.

- Financial surety, which may be established through different financial instruments, such as trusts or escrow accounts, bonds, letters of credit, or other types of agreements.

B. Estimating decommissioning costs

The cost of decommissioning will vary depending on several factors and the salvage value of project materials. Data from a limited review of eight decommissioning estimates for wind energy projects proposed from 2019 to 2021 showed the average cost of decommissioning is between $114,000 and $195,000 per turbine. When salvage estimates were included, decommissioning costs were reduced to a net range of $67,000 to $150,000 per turbine.[38]

Common decommissioning activities contributing to the cost of decommissioning include:[39]

- Dismantling and removal of all turbines and towers.
- Removal of above-ground facilities (turbine generators, transformers, foundations, buildings, and ancillary equipment to a depth of 4 feet).
- Removal of overhead and underground cables.
- Removal and restoration of access roads based on community or state standards.
- Restoration of the soil and vegetative conditions to previous conditions.

1. Decommissioning cost examples

See Table 1 for a cost comparison of five wind decommissioning projects.[40,41,42,43,44] Table 2 on page 7 reflects an estimated cost breakdown comparison of two wind decommissioning plans.

C. Financial assurance mechanisms

Due to the cost of removal, officials may require financial assurance of some kind from project owners. Generally, project owners commit to being responsible for the cost of wind turbine disassembly, off-site disposal, site restoration, and/or recycling of project-related components and materials.

38 "Wind turbine blade sizes and transport: A guide." Utility Dive, May 16, 2022, utilitydive.com/spons/wind-turbine-blade-sizes-and-transport-a-guide/623444. Accessed April 2024.

39 Christol, Corrie, et al. "Land-Based Wind Energy Siting: A Foundational and Technical Resource." National Renewable Energy Laboratory, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office: WINDExchange, August 2021, nrel.gov/docs/fy21osti/78591.pdf. Accessed April 2024.

40 "Nobles Wind Repowering Project: Decommissioning Plan." Minnesota Public Utilities Commission, Northern States Power Company, February 2021, mn.gov/eera/web/project-file/11701. Accessed April 2024.

41 "Wind Project Decommissioning Plan: PrairieWinds SD1 (Crow Lake Wind Project)." South Dakota Public Utilities Commission, May 2021, puc.sd.gov/commission/dockets/electric/2009/el09-028/DecommissioningPlan.pdf. Accessed April 2024.

42 "Wind Project Decommissioning Plan: Buffalo Ridge II Wind Project." Barr Engineering Co., South Dakota Public Utilities Commission, March 2021, puc.sd.gov/commission/dockets/electric/2008/EL08-031/plan.pdf. Accessed April 2024.

43 "Wind Farm Decommissioning Plan." Burns & McDonnell Engineering Company, Inc., March 17, 2022, leecountyil.com/DocumentCenter/View/3192/E---128389---Leeward---Lee-County-GSG-Wind-Decommissioning-Plan---v0. Accessed April 2024.

44 "Section 29. Decommissioning Plan." Downeast Wind, LLC, Maine Department of Environmental Protection, maine.gov/dep/ftp/projects/downeast-wind/applications/site/Section%2029_Decommissioning%20Plan.pdf. Accessed April 2024.

Table 2. Estimated cost breakdown comparison of two wind decommissioning plans

Project	**Washington County, Maine**		**Lee County, Illinois**	
Number of turbines	**30**		**13**	
Activity	**Total cost ($USD)**	**Scrap value ($USD)**	**Total cost ($USD)**	**Scrap value ($USD)**
Wind turbine removal	$2,028,000	($1,271,000)	$799,000	($1,671,000)
Wind turbine foundation removal	$174,000	--	$418,000	--
Collection system removal	$36,000	--	$13,000	--
Substation removal	$158,000	($80,000)	--	--
Transmission line removal	--	--	$161,000	($11,000)
Civil works removal	$187,000	--	$467,000	--
Operation and maintenance (O&M) facility removal	$56,000	($3,000)	$85,000	($33,000)
Met tower removal	$10,000	--	$11,000	($1,000)
Other costs	$50,000	--	$11,000	--
Total costs	**$3,103,900**	**($1,354,000)**	**$1,965,000**	**($1,716,000)**
Owner indirects (5%) cost		**$135,000**		**$98,000**
Contingency (20%) cost		**$269,900**		**$393,000**
Total net cost		**$1,749,900**		**$740,000**

These commitments often take the form of financial assurance mechanisms.[45]

The amounts are meant to cover the cost of decommissioning systems and create a guarantee that funds will be available for the removal of projects no longer in operation. Different financial instruments may be considered for decommissioning requirements, including a letter of credit, various types of bonds, or other agreements between project owners and local governments.

45 Christol, Corrie, et al. "Land-Based Wind Energy Siting: A Foundational and Technical Resource." National Renewable Energy Laboratory, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Energy Technologies Office: WINDExchange, August 2021, nrel.gov/docs/fy21osti/78591.pdf. Accessed April 2024.

IV. Recommendations

We recommend that counties:

- Include a requirement for decommissioning plans in their ordinances. These plans should outline the methods developers will use to decommission projects, remove materials, and restore sites, as well as local infrastructure like roads.
- Determine if there are existing standards for decommissioning of wind energy systems at the state level prior to county officials drafting any requirements and if there are any additional issues related to decommissioning that should be addressed through an ordinance.
- Require project developers to submit a decommissioning plan that defines the obligations of the project developer to remove the wind energy system and restore the land when the project is retired.

Due to the cost of removal, officials may require financial assurance of some kind from project owners. Generally, project owners commit to being responsible for the cost of wind turbine disassembly, off-site disposal, site restoration, and/or recycling of project-related components and materials. Different financial instruments may be considered for decommissioning requirements, including a letter of credit, various types of bonds, or other agreements between project owners and local governments.

- Work with developers or a knowledgeable independent party to determine the real projected cost of decommissioning for a project in their area and use that to set amounts for financial assurances.
- Require the project developer to notify the county of its intent to stop using the facility once it has been determined the system will be fully retired. This notification should serve as the trigger for decommissioning to begin. Both the manner of notification and the deadline for decommissioning to occur once notification is given should be defined within the original decommissioning plan.
- Ensure that decommissioning plans include expected timelines for completion of tasks.
- Consider how they want to regulate disposal into landfills.
- Counties may choose to limit the number of blades a local landfill may accept, or ban them from local landfills entirely. A county should not place additional requirements on disposal, however, as any requirement in an ordinance should be primarily focused on removal or disposal within a county's jurisdiction.
- Developers should seek out facilities or organizations that may be able to recycle or repurpose blades to reduce the amount of materials sent to landfills after decommissioning or repowering.

About the Center for Rural Affairs

Established in 1973, the Center for Rural Affairs is a private, nonprofit organization with a mission to establish strong rural communities, social and economic justice, environmental stewardship, and genuine opportunity for all while engaging people in decisions that affect the quality of their lives and the future of their communities.