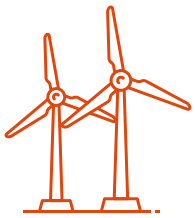
Wind Turbine Recycling

TYPES OF RECYCLING PROCESSES AND FACILITY LOCATIONS IN THE MIDWEST

End-of-life (EoL) disposal strategies for wind turbine parts are important to understand at the outset of a new project. There are recycling methods available at several facilities across the Midwest that can process thousands of turbine blades annually. Also, turbine materials are non-toxic and can be landfilled without contaminating soil or groundwater.

Looking ahead, the DOE recently announced a $20 million investment to improve wind energy recycling technologies. The DOE also recently released a report with recommendations that can increase the recyclability of decommissioned wind turbine parts. [1]

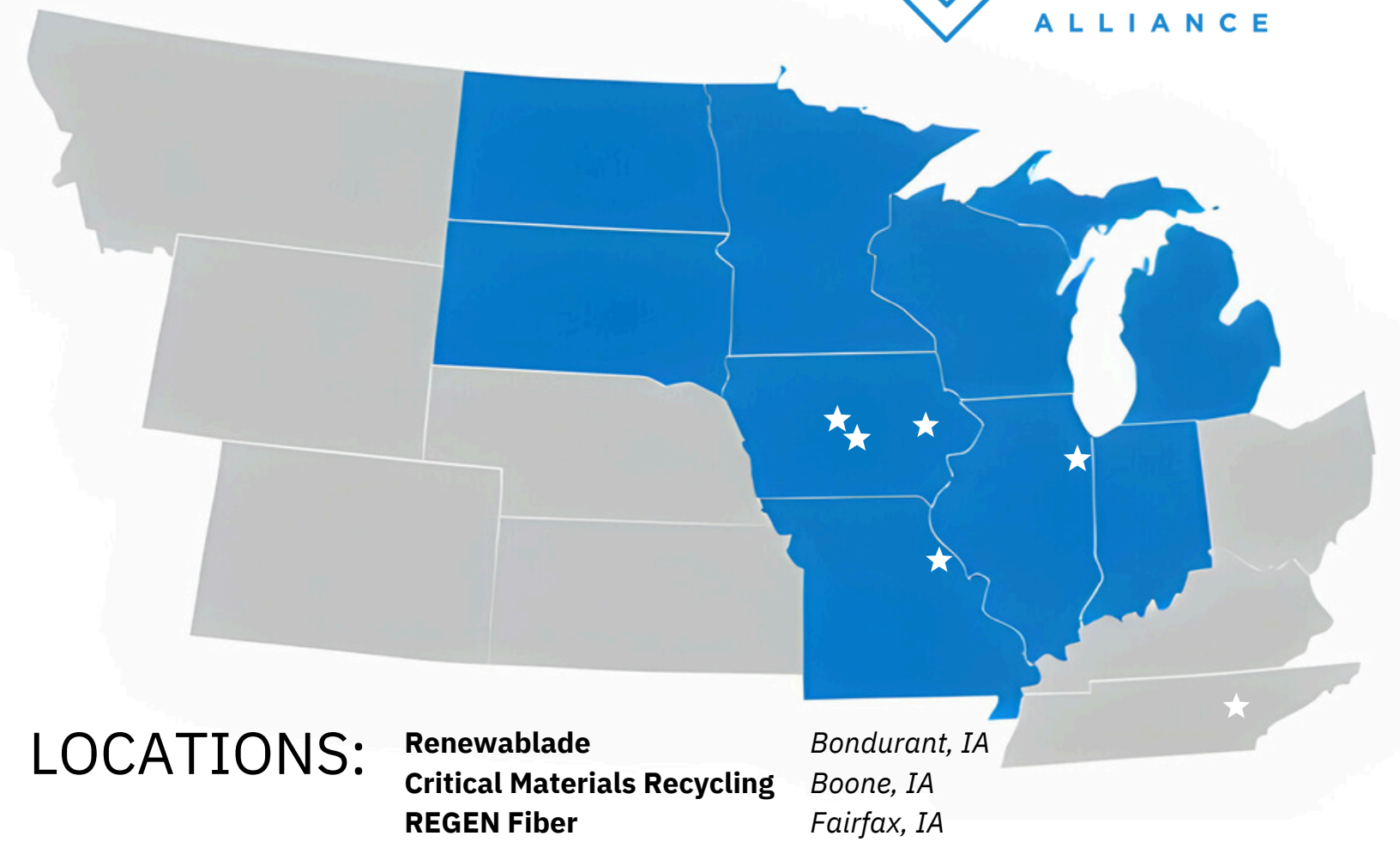


90%

of a wind turbine's mass can be recycled[1]

CURRENT RECYCLING FACILITIES

CLEAN GRID ALLIANCE



LOCATIONS:

Renewablade	*Bondurant, IA*
Critical Materials Recycling	*Boone, IA*
REGEN Fiber	*Fairfax, IA*
Belson Steel Center Scrap	*Bourbonnais, IL*
Veolia North America	*Louisiana, MO*
Carbon Rivers	*Knoxville, TN*

CleanGridAlliance.org

RECYCLING PROCESSES[2]

Cement Co-Processing

Cement co-processing is currently the most cost-effective, scalable, and commercially viable recycling option. Cement co-processing involves mechanical shredding of the blade and feeding the shredded pieces into a cement kiln. The resin and core components of the blade provide energy for the chemical reaction. According to GE, a 7-ton blade recycled through co-processing enables a cement kiln to avoid consuming 5 tons of coal, 2.7 tons of silica, 1.9 tons of limestone, and approximately one ton of other raw mineral-based materials. **Veolia North America** uses cement co-processing.

Mechanical Process

Mechanical grinding takes decommissioned blades and breaks them down to small fragments and pellets through shredding, crushing, or milling. The pellets can then be used as fillers or reinforcement in other composite and cement products. **REGEN Fiber** uses a mechanical process that converts wind turbine blades into fiber-reinforced polymer (FRP) fibers, micro-fibers, and chopped glass fibers for use in concrete, asphalt, mortar applications, soil stabilizer, and other composite materials. **Renewablade** also uses a mechanical process and can recycle a wind turbine blade in 45 minutes.

Pyrolysis

Pyrolysis is a form of thermal recycling of composites that separates the resin from the fiberglass and carbon fibers by heating the material in a vacuum at very high temperatures. This process converts the polymer matrix into gas, oil, and char, leaving the fibers that can be later recovered. A DOE-funded collaboration between **Carbon Rivers** and the University of Tennessee, Knoxville has recycled a few thousand metric tons of blades using this process with plans to expand capacity at a new facility. The new facility is expected to process approximately 200 metric tons of blade waste (equivalent to 5,000–7,000 fiberglass wind turbine blades) per year, depending on blade size and generation. The recovered fiberglass can then be reused in new composites production.

Sources

1 "America Can Recycle 90% of Wind Turbine Mass, According to New DOE Report", Jan. 6, 2025

2 The information for this section was originally published in the American Clean Power Association's Whitepaper on the subject: "Decommissioned Wind Turbin Blade Management Strategies", September 2024.