



This is the print version of the [Skeptical Science](#) article '[Wind turbines will generate an unsustainable amount of waste](#)', which can be found at <http://sks.to/windwaste>.

How does waste from wind turbines compare to waste from fossil fuel use?

What The Science Says:

Roughly 85% of the mass of a wind turbine, including the tower, gearbox, and generator, consist of metals that are easily recycled.

Climate Myth: Wind turbines will generate an unsustainable amount of waste

"This clean, green energy is not so clean and not so green . . . [i]t's just more waste going in our landfills." ([Des Moines Register](#))

Roughly 85% of the mass of a wind turbine, including the tower, gearbox, and generator, consist of metals that are easily recycled¹ (also Khalid et al. 2023). The remaining 15%, including the blades, consist of composite-based materials, such as fiberglass, that are more difficult to recycle (Khalid et al. 2023). However, new technologies are in development for recycling turbine blades, and turbine blades are in fact being recycled in some facilities² (also Jensen & Skelton 2023). A recent breakthrough supported by the Department of Energy enabled all turbine components to be recycled³, and private companies in the United States have begun developing turbine blade recycling plants.⁴

One study from 2017 estimated that global annual waste of turbine blades will reach 2.9 million metric tons per year by 2050, with a total of 43 million metrics tons in cumulative waste generated between 2018 and 2050 (Liu & Barlow 2017). This is not insignificant. However, Nature Physics has projected that global cumulative waste from fossil fuel-based power generation between 2016 to 2050 is expected to produce roughly 45,550 million metric tons of coal ash alone, along with 249 million metric tons of oily sludge (Mirletz et al. 2023). In other words, the cumulative waste from coal ash is expected to be roughly 1,000 times greater than that of turbine blades, and the cumulative waste of oily sludge is expected to be about 5-6 times greater than that of turbine blades. Importantly, both coal ash and oily sludge are known to be toxic. For further context, in the United States alone, roughly 600 million short tons, or 544 million metric tons, of construction and demolition debris were generated across all sectors in 2018.⁵ In effect, the annual construction and demolition waste in the United States alone is roughly 187 times greater than the anticipated annual waste from wind turbine blades across the globe in 2050.

Footnotes:

[1] Alejandro de la Garza [This Group Is Helping Find New Ways to Recycle Old Wind Turbine Blades](#) Time, Sept. 25, 2023.


[2] [Recycling & recovery of wind turbines](#), Roth International (last visited June 4, 2024).

[3] Wind Energy Technologies Office, [Carbon Rivers Makes Wind Turbine Blade Recycling and Upcycling a Reality with Support](#) From DOE, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy (October 17, 2022).

[4] Dave Downey, [Here's How One Iowa Company is Taking Wind Turbine Blades Out of the Landfill](#) We Are Iowa (January 24, 2023).

[5] [Construction and Demolition Debris: Material-Specific Data](#), United States Env'tl Protection Agency (last visited Apr. 1, 2024).

This rebuttal is based on the report '[Rebutting 33 False Claims About Solar, Wind, and Electric Vehicles](#)' written by Matthew Eisenson, Jacob Elkin, Andy Fitch, Matthew Ard, Kaya Sittinger & Samuel Lavine and published by the [Sabin Center for Climate Change Law](#) at Columbia Law School in 2024. Skeptical Science sincerely appreciates Sabin Center's generosity in collaborating with us to make this information available as widely as possible.

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