How does production of wind turbine components compare with burning fossil fuels?

What The Science Says:
The average lifecycle emissions of coal is 77 times greater than wind energy.

Climate Myth: Producing and transporting wind turbine components releases more carbon dioxide than burning fossil fuels
"[W]indmills are perhaps the worst boondoggle . . . because they require much more high quality energy to manufacture, install, maintain, and back up than [they] will ever produce." (Interstate Informed Citizens Coalition, Inc)

On a lifecycle basis, wind power emits far less carbon dioxide than fossil fuels per kilowatt-hour of energy generated (Dolan & Heath 2012, Wang et al. 2019). According to the National Renewable Energy Laboratory (NREL), the average lifecycle emissions of offshore and onshore wind turbines is 13 g CO2-eq/KWh.[1] Lifecycle emissions for fossil fuels are much higher, with natural gas and coal releasing 486 g CO2-eq/KWh and 1001 g CO2-eq/KWh emissions, respectively.[1] In other words, the average lifecycle emissions of wind energy is roughly 1/77th that of coal.[1]

Manufacturing accounts for only a small percentage (2.41%) of the lifecycle emissions for wind power turbines (Wang et al. 2019). Most turbine emissions come from transportation, which accounts for over 90% of emissions for both offshore and onshore operations. Once operational, wind turbines create clean, emissions-free energy that offsets the carbon dioxide emissions associated with production and transportation.[2]

Footnotes:

[1] Nat'l Renewable Energy Laboratory, Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update (Sept. 2021) (Table 1). NREL calculates emissions intensity using grams of carbon dioxide equivalent per kilowatt-hour.

[2] Sara Peach, What's the Carbon Footprint of a Wind Turbine? Yale Climate Connections (June 30, 2021).

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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