

What Mineral Products & Metals Are Needed To Make Wind Turbines?



- **Aggregates and Crushed Stone (for concrete):** Mined in the United States.
- **Bauxite (aluminum):** Mined in Australia, China, Guinea, Brazil, India, Jamaica, Russia, Kazakhstan, Saudi Arabia and Greece.
- **Clay and Shale (for cement):** Mined in United States.
- **Coal (by-product coke is used to make steel).** Coal is mined world-wide, and constitutes 30.1% of the generation of U.S. electricity.
- **Cobalt (magnets):** Mined in Congo (Kinshasa), Russia, Australia, Canada, Cuba, Philippines, Madagascar, Papua New Guinea, Zambia, New Caledonia, South Africa and the United States.
- **Copper (wiring):** Mined in Chile, Peru, China, United States, Australia, Congo (Kinshasa), Mexico, Zambia, Indonesia and Canada.
- **Gypsum (for cement):** Mined in China, United States, Iran, Thailand, Turkey, Italy, Spain, Oman, Mexico, Japan, Russia, India, Brazil, France, Australia, Egypt, Algeria, Saudi Arabia, Germany, Pakistan, Canada, Argentina and United Kingdom.
- **Iron ore (steel):** Mined in Australia, Brazil, China, India, Russia, South Africa, Ukraine, Canada, United States, Iran, Sweden and Kazakhstan.
- **Limestone (for cement):** Mined in United States.
- **Molybdenum (alloy in steel):** Mined in China, Chile, United States, Peru, Mexico, Armenia, Iran, Canada, Russia, Mongolia, Turkey, Argentina, and Uzbekistan.
- **Rare Earths (magnets; batteries):** Mined in China, Australia, Russia, Brazil, Thailand, India, Malaysia and Vietnam.
- **Zinc (galvanizing):** Mined in China, Peru, India, Australia, United States, Mexico, Bolivia, Kazakhstan, Canada and Sweden.
- **Sand and Gravel (for cement and concrete):** Mined in United States, Italy, Malaysia, France, India, Turkey, Germany, Spain, United Kingdom, Australia, Japan, Poland, Canada, South Africa, and Mexico.

INTERESTING FACTS

The foundation may contain over a thousand tons of concrete and rebar. Dimensions are often between 30-50 ft. across and 6-30 ft. deep. The average tower height is 229 ft. 8 in. Shafts are sometimes driven down farther to help anchor it. The platform is critical to stabilizing the immense weight of the turbine assembly. Depending on the model, industrial wind turbines can weigh between 164-334 tons, or more. 2,585 turbines were installed in the U.S. in 2016.

Like old fashioned windmills, today's wind turbines use blades to collect the kinetic energy of the wind. The wind flows over the blades creating lift, like the effect on airplane wings, which causes them to turn. The blades are connected to a drive shaft that turns an electric generator to produce electricity.

When the wind isn't blowing, other types of power plants must be used to make electricity.

Wind turbines also use neodymium, boron and iron magnets in their construction and operation.

SOURCES

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