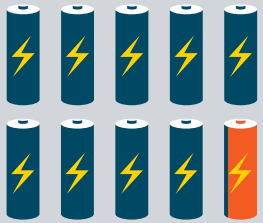
COPPER'S ROLE IN WIND GENERATION

Copper Development Association Inc.
Copper Alliance

Generators use 1,900 pounds of copper in the 1.5MW Wind Turbine. The shaft from the wind-driven blades is connected to the nacel-located generator, and drives the generator to produce electricity. The generator is then connected by cables to the switchgear, and to the step-up transformer.



Renewables — including hydropower — powered 10% of the country's total energy supply and 13% of electricity generation in 2013.

= 10% of energy supply

The U.S. onshore wind energy program has grown 30% on average for the past five years.

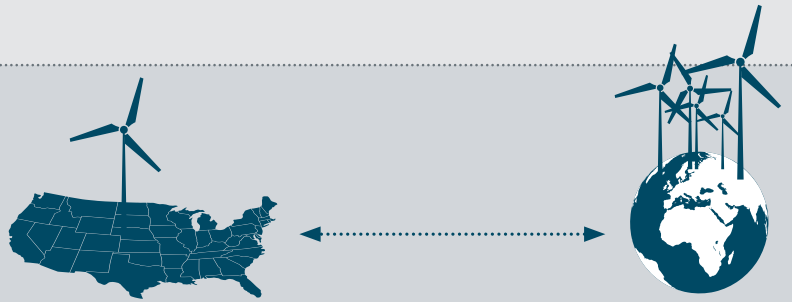
Renewables, which have copper wiring, tubing, and cable, offer a potential for copper usage up to five times greater than traditional electrical generation. There are approximately 5.5 tons per MW of copper in renewable systems.

61 GW

Total installed wind power capacity in the United States now stands at 61 gigawatts (GW) which meets nearly 4.5% of electricity demand in an average year.

The U.S. has sufficient offshore wind energy resources to enable installation of at least 54 gigawatts of offshore wind capacity—enough to power nearly 17 million homes.

Step-up transformers are used to power wind turbines and contain 2,000 pounds of copper magnet wire, plus feeder DLO cables from the nacel to tower base and switchgear and connector lugs. Transformers are usually located at the base of the tower.



According to the American Wind Energy Association, the U.S. installed more wind capacity than any other country in 2012.

"Business Case for Energy Efficiency in Support of Climate Change Mitigations, Economics and Societal Benefits in the United States." Environmental Energy Technologies Division, Ernest Orlando Lawrence Berkeley National Laboratory U.S. Department of Energy. (June 2, 2011). Bloomberg: Sustainable Energy in America 2013 Fact Book, Bloomberg Finance L.P. and The Business Council for Sustainable Energy, the U.S. Energy Information Administration and the Department of Energy's 2013 Wind Technologies Market Report.