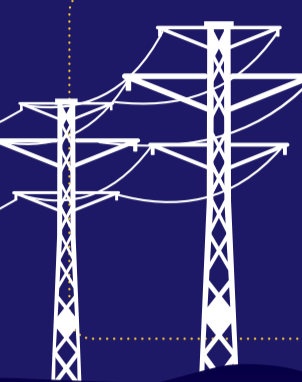


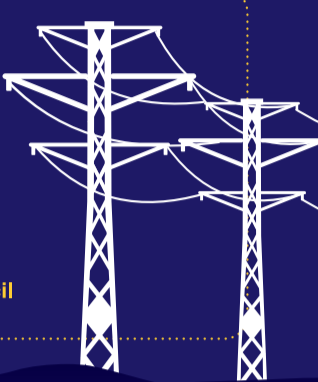
Molybdenum in... Wind power

Renewable technologies are essential in meeting the world's energy needs. In this infographic, we explore the importance of wind power in the green energy mix and the critical role molybdenum plays.

Renewable energy and the role of wind power



80%
of energy production could come from renewables by 2050, transforming the global energy landscape.
Source: International Energy Agency




20-30%
of global electricity is projected to be provided by wind power by 2050.
Source: Global Wind Energy Council

Molybdenum in wind power generation

As an alloying element, molybdenum provides the mechanical properties needed in steel to withstand the massive forces at play in wind power generation. As the size of wind turbines increases, so will the amount of molybdenum required.

Wind power is a metal-intensive green technology. By 2050, wind turbines are expected to directly use up to **400 million metric tons of steel** and **65 million metric tons of cast iron**.

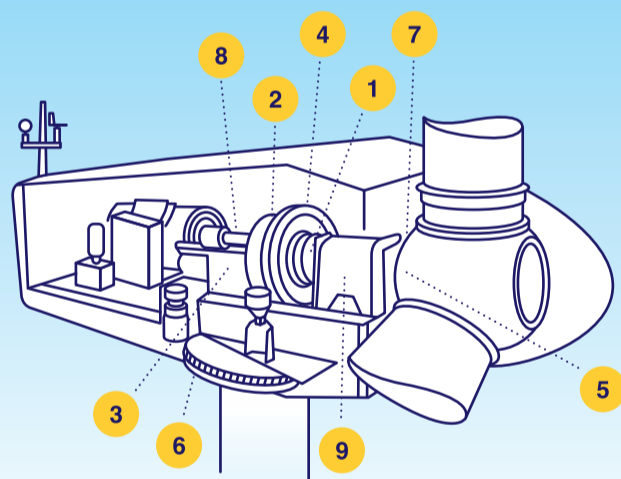


100-120 kg
of molybdenum is used per rated megawatt of power in current wind turbines, according to detailed analysis.
Professor Hardy Mohrbacher, Niobelcon

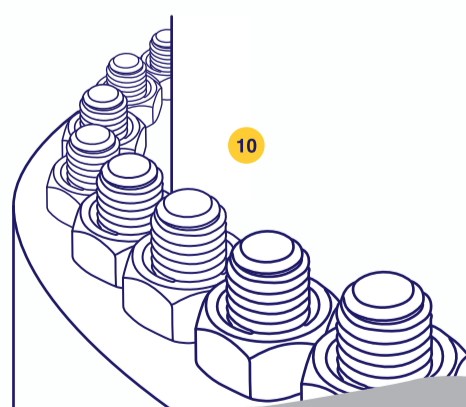


300,000 tons*
of molybdenum will be needed for wind power between now and 2050—more than a year's global production.
Professor Hardy Mohrbacher, Niobelcon
*based on IEA's 'Beyond 2 degrees scenario', 3,500 GW of additional wind capacity is needed by 2050.

Where molybdenum is found in wind turbines



- 1 **Rotor shaft (low speed):** CrMo steels or ADI, 0.2-0.3% Mo
- 2 **Gear box:** CrNiMo carburizing steels, 0.2-0.5% Mo
- 3 **Intermediate and high speed shafts:** CrMo or CrNiMo steels, 0.2-0.3% Mo
- 4 **Bearing rings:** CrMo or CrNiMo steels, 0.2-0.3% Mo
- 5 **Pitch drive:** CrNiMo carburizing steels, 0.2-0.5% Mo
- 6 **Yaw drive:** CrNiMo carburizing steels, 0.2-0.5% Mo
- 7 **Slew bearing rings:** CrMo or CrNiMo steels, 0.2-0.3% Mo
- 8 **Couplings:** CrMo steels, 0.2-0.3% Mo
- 9 **Break disc:** heat resistant steel or grey cast iron, max. 0.3% Mo
- 10 **Bolts:** CrNiMo steels, 0.15-0.5% Mo



DID YOU KNOW?

Molybdenum is also used in the equipment used to install wind turbines. As the size of wind turbines increases, the cranes needed to install them must be able to lift more weight to greater heights, requiring higher-strength steels. Mobile hoisting systems are made from ultra-high strength quenched and tempered steels, containing up to 0.8% Mo. Lifting barges and jack-up platforms for offshore installation use heavy gage thermo-mechanically controlled processed (TMCP) or quenched and tempered steel plate, containing up to 0.5% Mo.

Further information on the use of molybdenum in wind turbines can be found [here](#).