



STEM KIT

BUILD & LEARN
GUIDE

WIND TURBINE



WIND TURBINE OVERVIEW:

This project is all about wind energy! Wind energy is a type of renewable energy, which means we can keep using it without running out. You'll get to build your own wind turbine and use it to power a small LED light. Wind turbines work by turning the wind's motion (called kinetic energy) into electricity. When the blades spin, they turn a rotor connected to a generator that makes power. Wind turbines are different from windmills—windmills use wind to do jobs like pump water or grind grain. There are two main types of wind turbines: horizontal-axis (which look like big spinning fans and are the most common in the U.S.) and vertical-axis turbines.

⚠ SAFETY WARNINGS:

Please read all safety warnings before use.

- Choking Hazard – This kit contains small parts. Not suitable for children under 6 years of age or any individual who may place non-food items in their mouth.
- Keep your fingers and hands away from the spinning blades at all times. Always handle your wind turbine with care and turn it off or stop the blades before making any adjustments.
- Adult Supervision Required – An adult must be present during assembly and use.

MATERIALS:



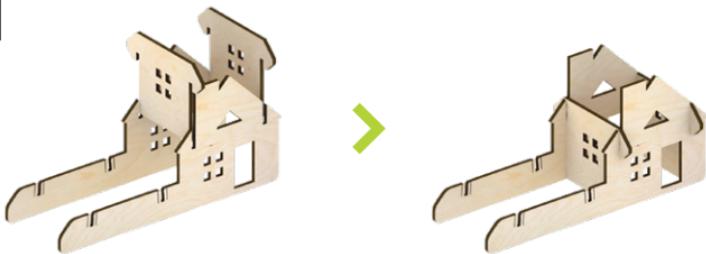
Disclaimer: Colors and parts may vary slightly from those shown in images or instructions, depending on available materials. All variations function the same and do not affect the performance or assembly of the kit.

1



NOTE: If any wooden pieces are hard to remove, use a blunt tool to carefully punch them out, and ask an adult for help if needed. Use the sanding stick included in your kit (it looks like a small nail file) to smooth out any rough edges or spots where pieces don't fit together easily. Just find the tight spot and gently sand the edge until it fits just right.

2



3



4



5



6



7



8



9



10



11



12



13

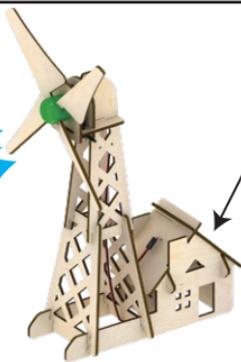


HOW TO USE

FAN REQUIRED*



*Fan not included with STEM Kit



LED will light up when the turbine spins at the proper speed/s.

Set Up the Fan: Testing of the BrainStorm Wind Turbine STEM Kit requires the use of a medium to high-powered fan in order for the generator motor to produce enough voltage to illuminate the LED light inside the house.

If you enjoyed this STEM Kit, check out some of our other Kits!



CIRCUIT
SWORD



AIR-POWERED
ROCKET



SOLAR
OVEN



AND
MORE!

TERMINOLOGY

Kinetic energy - energy something has as it is in motion.

Potential energy - energy that is stored in an object due to where it is in relation to other objects.

Wind energy - energy generated through harnessing the power of the wind.

Climate change - the change to an area's weather and temperature, over a period of time

Emissions - greenhouse gases released into the atmosphere, or a specific area, over a period of time.

Wind turbine - a machine, powered by wind, that generates electricity

Renewable energy - all energy that comes from a source that can be generated faster than it is consumed.

Nonrenewable energy - all energy that comes from a source that will one day be depleted.

Sustainability - meeting the needs of the current population without putting future populations at risk.

Wind vane - also referred to as a weather vane, this instrument shows which direction the wind is flowing.

Windsock - textile "sock" which is used to measure wind speed and direction.

Atmospheric pressure - the air pressure within Earth's atmosphere.

Rotor - a part that rotates in a stationary machine.

LED - light emitting diode; semiconductor diode that produces light when given a power source.

ENERGY & SUSTAINABILITY

RENEWABLE ENERGY

Renewable energy often referred to as “clean energy” is any form of energy that comes from a source that can be replenished faster than it is used. There are several types of renewable energy, these include wind, solar, geothermal, biomass, tidal and hydroelectric. Renewable energy has lower emissions than nonrenewable energy. Emissions are greenhouse gases that are released into the atmosphere, or specific area, over some time.

NONRENEWABLE ENERGY

Nonrenewable energy often referred to as “dirty energy” is any form of energy that comes from a source that will eventually be depleted. Nonrenewable energy produces more emissions and contributes to climate change. There are several sources of nonrenewable energy, these include coal, natural gas, oil, and nuclear power. Coal, natural gas, and oil are often referred to as fossil fuels. Fossil fuels are sources of energy that are composed of dead plants and animals that, with the help of heat and pressure, have fermented, for millions of years, below the Earth’s surface. The use of these types of energy sources is substantially contributing to climate change, regionally and globally.

SUSTAINABILITY

Sustainability consists of meeting society’s needs without causing future generations to be unable to meet their needs. Sustainability always considers three things: the environment, the economy, and society. Sustainable practices are those which focus on the value of the physical environment and use it wisely. Choosing to be sustainable may be impacted by community, personal beliefs and morals, and cultural practices.



WHAT IS WIND?

Wind is the movement of air. Wind is caused by three main things:

1. The uneven heating of Earth's surface.
2. Differences along the surface of the Earth.
3. The Earth's rotation.

Air contains an enormous amount of particles, such as nitrogen and oxygen, that have weight. The weight of these particles pushing down on Earth's surface causes atmospheric pressure. These particles react to how hot or cold the air becomes. When heated, particles will move away from the Earth's surface and spread out, causing lower pressure. When cooled, they will fall closer to Earth's surface and compress, creating higher pressure. The movement of these particles in the atmosphere causes wind.

Wind transports heat, dust, moisture, and pollutants over considerable distances. Wind is specified by its speed and direction. Wind speed is determined by differences in air pressure:

Slow Wind = High Air Pressure

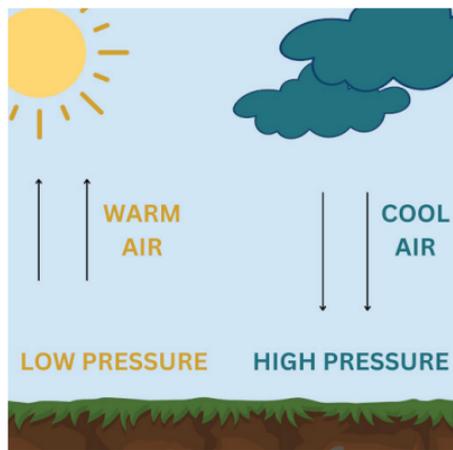
Fast Wind = Low Air Pressure



Wind sock - basic tool for measuring wind speed and direction

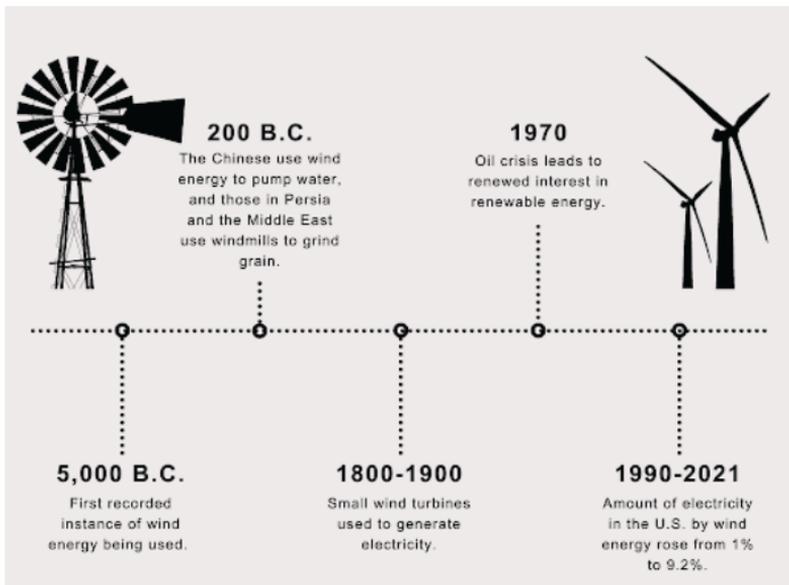


Anemometer - tool used to measure wind speed and direction



THE HISTORY OF WIND TURBINES

Wind energy has existed for thousands of years. By the 11th century, it was used widely by those in the Middle East for food production. As trade between nations grew, wind energy technologies were brought to Europe and eventually to the Western Hemisphere. As the U.S. wilderness became more populated, individuals dealing with the land built thousands of wind pumps across the West. By the 1930s much of the U.S. was electrified, causing a decline in the use of wind energy. With the oil crisis of the 1970s came a renewed interest in renewable energy. This led the U.S. government to fund research and development of these types of energy. By the 1980s, thousands of wind turbines were built along the length of California. In the 1990s and 2000s, incentives were established for renewable energy source production. Countries across Europe have invested in wind energy, also creating incentives for its use. China has also invested in wind energy, becoming the largest generator of wind energy electricity.





STEM KIT

WIND TURBINE BUILD & LEARN BOOKLET

For more information on our STEM Kits visit:

SHOP.BRAINSTORMEDU.COM


BrainStorm
 **STEM EDUCATION**

©2025 Brainstorm Studios LLC. All Rights Reserved.