**Wind Turbine**

**Objective:** Students use problem-solving skills and apply engineering principles to improve energy output and efficiency.

* Explore how wind turbines turn.
* Predict variables that affect how fast a wind turbine turns.
* Investigate the effect of fan speed on the power output of a wind turbine.

**Introduction**

For thousands of years, people have been harnessing wind energy to do work—from traveling around the world on sailing ships to milling grain using windmills. Today, wind is becoming more common as a renewable energy source through the use of wind turbines.

Wind turbines have four basic parts–a tower, turbine blades, a gear box, and a generator–that function together to convert kinetic energy from the wind into electrical energy. As the blades turn, they cause the gear box to turn, via a shaft. The turning gear box causes the generator to turn via a second shaft. The turning of the generator generates electricity.

The amount of electrical power that can be generated by a wind turbine is affected by many variables. In this experiment, you will explore variables that affect how a turbine turns. You will then use data-collection equipment to quantitatively investigate the effect of fan speed on the power output of a wind turbine.

Questions to consider:

1. What are wind turbines and why do we want them?
2. Where do we see them in today’s world?
3. Is this an energy solution for the future?

Learning Resources:

Reading a Mutimeter: <https://www.youtube.com/watch?v=ciyWwcKmPC4> (7min) This is a homemade video that is pretty good for explaining the basics of reading a meter and

Energy Matters: <https://www.energymatters.com.au/components/wind-energy/>

GE Renewable Energy: <https://www.ge.com/renewableenergy/wind-energy/what-is-wind-energy>

Advantages and Challenges of Wind Energy: <https://www.energy.gov/eere/wind/advantages-and-challenges-wind-energy>

How does wind energy work? How do wind turbines work? <https://www.youtube.com/watch?v=qSWm_nprfqE>

**Project start**:

Review the scope doc or key aspects to the competition (see scope doc attached)

**The Build:**

Watch the wind turbine video:

Set up: <https://vimeo.com/114691934>

Skills Canada: <https://www.youtube.com/watch?v=4fPUT3m2MV0&feature=youtu.be>

**Explore and Test:**

Build Wind Turbines as a team

As a group, discuss how wind is generated. As a group, students will draw and cut blades. Then they will test each blade set to see which blade design generates the most amount of energy.