

## STUDENT WORKSHEET

Safety Smart® Science with Bill Nye the Science Guy®:  
Renewable Energy

# Wind Turbine Model Build

### Purpose:

Build a wind turbine model and change kinetic energy to electrical energy.

### Parts for Wind Turbine:

#### From KidWind.org

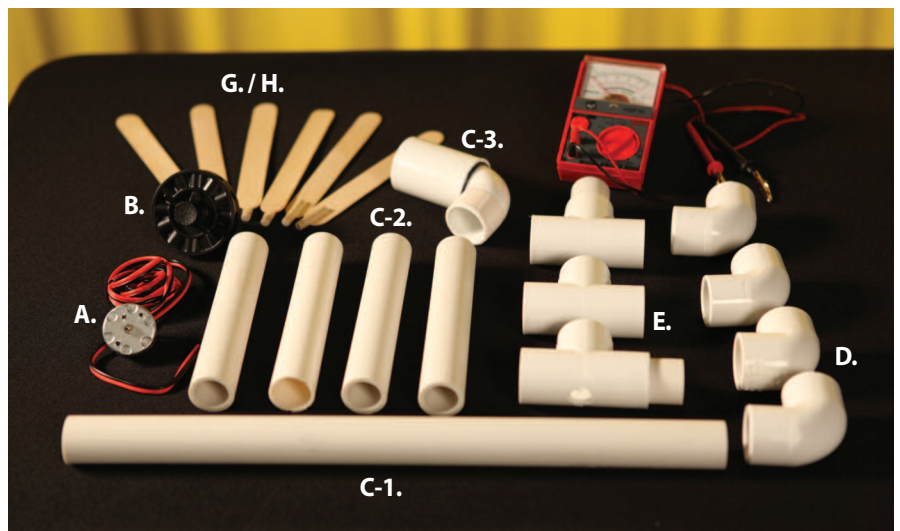
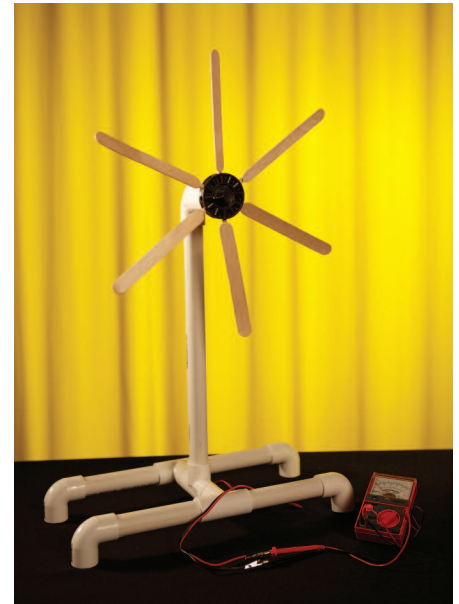
- A. Wind Turbine generator (Qty = 1)  
(Fits into 1 inch PVC coupler, shaft matches the Kidwind hub, comes with wires already attached)
- B. Hub (Qty = 1)

#### From hardware store

- C. 1 inch diameter (outside diameter) PVC pipe, approximately 43 inches long, cut into pieces of the following length:
  - C-1. One 14.5 inch long piece (for tower)
  - C-2. Four 6 inch long pieces (leg part one)
  - C-3. Two 2 inch long pieces (leg part two)
- D. PVC Elbow connectors (Qty. = 5)
- E. PVC Tee connectors (Qty. = 3)
- F. Duct tape (about 12 inches)
- G. Wooden Dowels, ¼ inch diameter, approximately 4 inches long (Qty. = 6)  
*Note: may be most practical to buy one long wooden dowel and cut it to 4 in. pieces. Also available from Kidwind.org.*

#### From craft store

- H. Blades – choose between wooden tongue depressors or cutting your own shapes from paperboard.  
In either case, the blades need to be attached to the dowels, with tape or glue. (Qty. = 6)



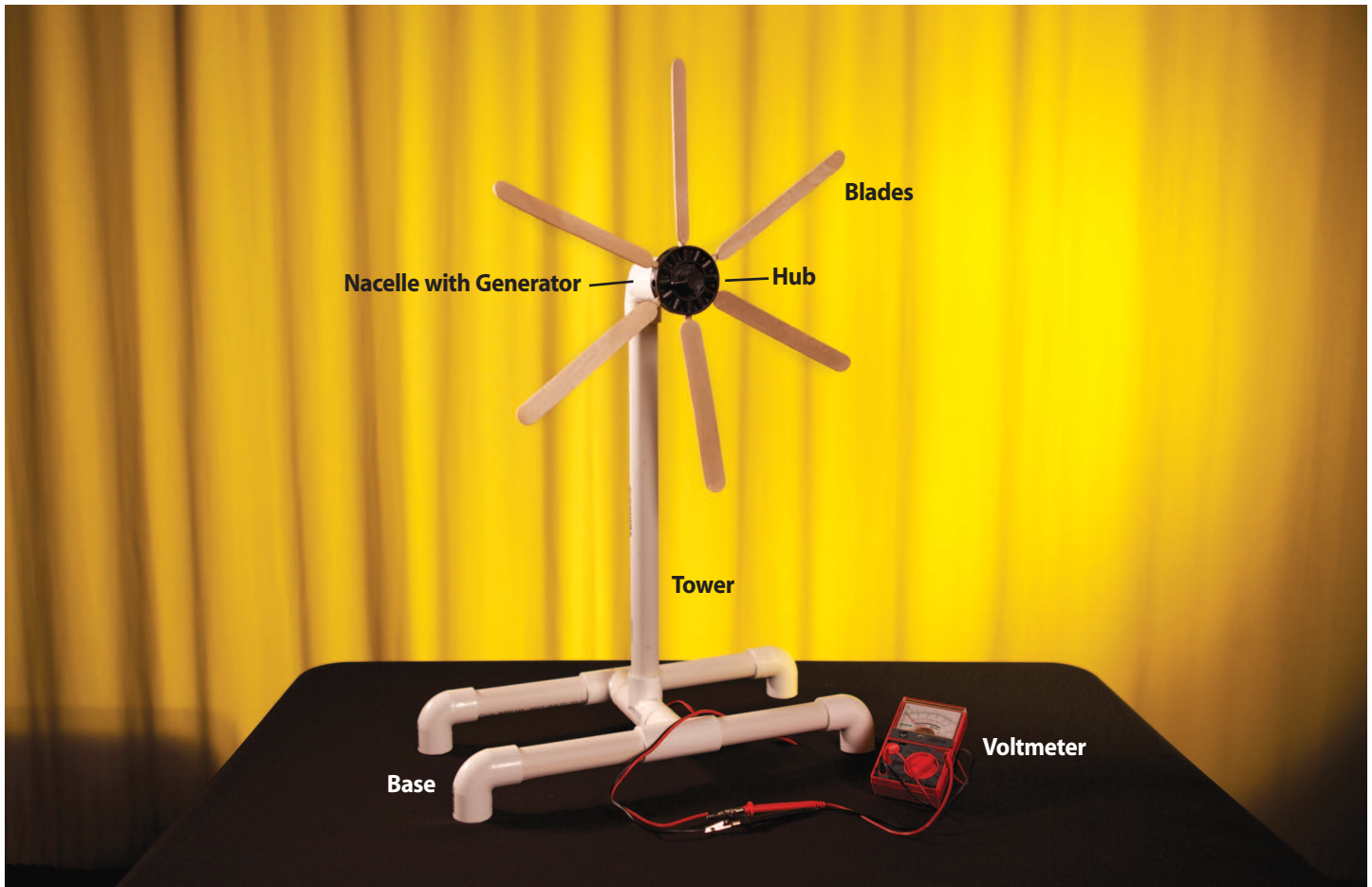
### Parts for the experiment:

- Household fan, at least 12 inch diameter, preferably with three speeds. (Qty. = 1)
- Extension cord for the fan (Qty. = 1)
- Alligator clip leads (for connecting the wind turbine motor output wires to the meter) (Qty. = 2)  
*Note: not needed if the voltmeter has clips on the end of its leads*
- Voltmeter with millivolt scale. (Qty. = 1)
- Yard Stick (Qty. = 1)

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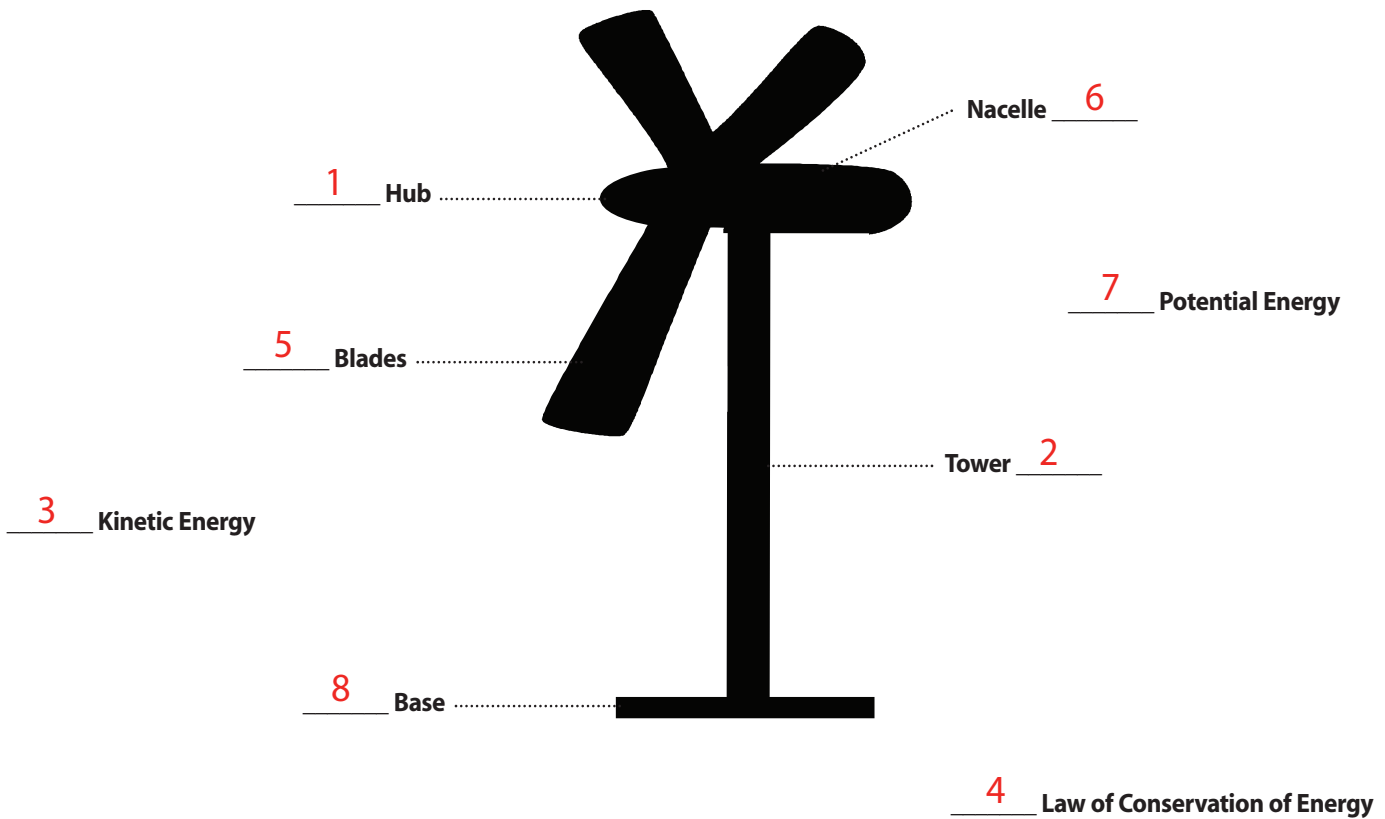
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**Instructions:**

*General:* Your group will assemble a wind turbine model, and then each group will place their wind turbine in front of a fan and record the electrical energy using a voltmeter.

1. Pass the wires from the nacelle through the tower, and then press the nacelle onto the tower for a tight fit.
2. Pass the wires through the hole in the bottom of the base, and then press the tower onto the base for a tight fit.
3. Press the pin on each blade into a hole on the hub.
4. Press the hub onto the generator and give the turbine a test spin.
5. Take your wind turbine to the front of the room where you will attach the output wires to a voltmeter.
6. Position a fan in front of the wind turbine. Measure the distance from the front of the fan to the wind turbine hub.
7. Turn on the fan and let the wind turbine blades turn.
8. What was your highest reading on the voltmeter?

## Wind Turbine Design Components Answer Key



- 1 – Holds the rotor together and drives the generator through the gearbox.
- 2 – Helps capture the most energy by elevating the wind turbine high above the ground and protects the wiring inside.
- 3 – Moving Energy.
- 4 – Energy cannot be created or destroyed, it can only be transformed into another type of energy.
- 5 – Device used for catching the wind.
- 6 – The cover and main compartment for the internal components.
- 7 – Stored Energy.
- 8 – Supports the tower.