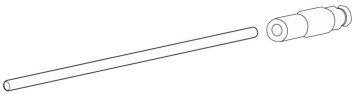# Renewable Energy Kit (ST-7611)
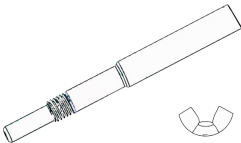
What's included

- 6 inch blade (6x)

- 8 inch blade (6x)
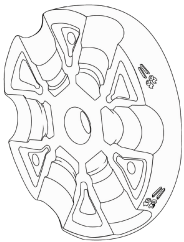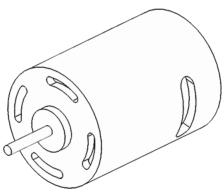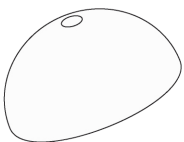
- STEM blade adapter and dowel (6x)
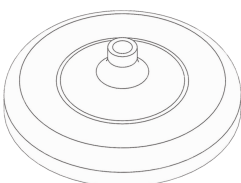
- Shaft with wing nut
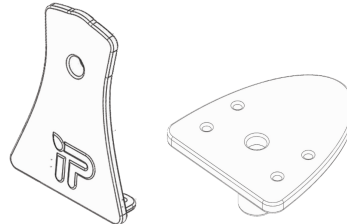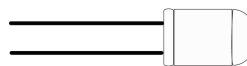
- Hub (2x)

- DC motor

- Nose cone

- Base

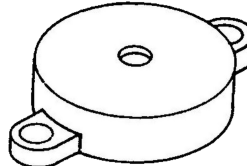- DC motor stand (with 2x small screws and 2x small nuts)

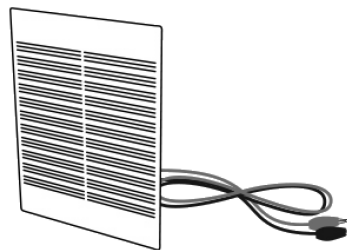- Nacelle, front and base (with 4x large screws and 4x large nuts)
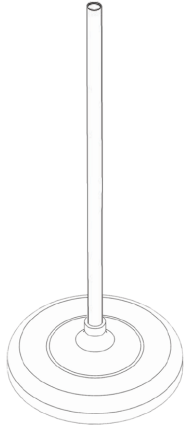
- LED

- Buzzer

- Resistor (30 Ω, 1/4 W)

- Tower

- Solar panel (2 W)

- Alligator clips (pictured with solar panel)

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Assembly Instructions

Step 1: Assemble the base

Insert the tower into the base. Ensure the tower is fully inserted to minimize the chance of wobble when the blades rotate at high RPMs. (Wobbling may still occur, especially with the larger blades, but will settle down after a few seconds.)

Step 2: Assemble the nacelle
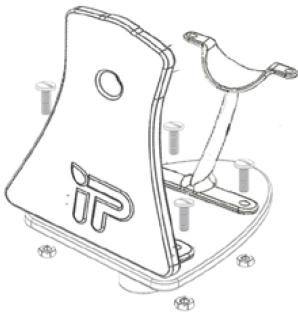
1. Connect the nacelle front to the nacelle base, securing it in place using the long screws and nuts.
2. Connect the DC Motor Stand to the nacelle base, again using the long screws and nuts.

## Step 3: Assemble the generator
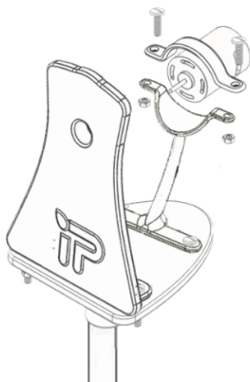
1. Connect the nacelle to the tower.
2. Place the DC motor into the curve of the motor stand, with the motor shaft facing towards the nacelle front.
3. Using the small screws and nuts, secure the DC motor in place.

Step 4: Assemble the blades
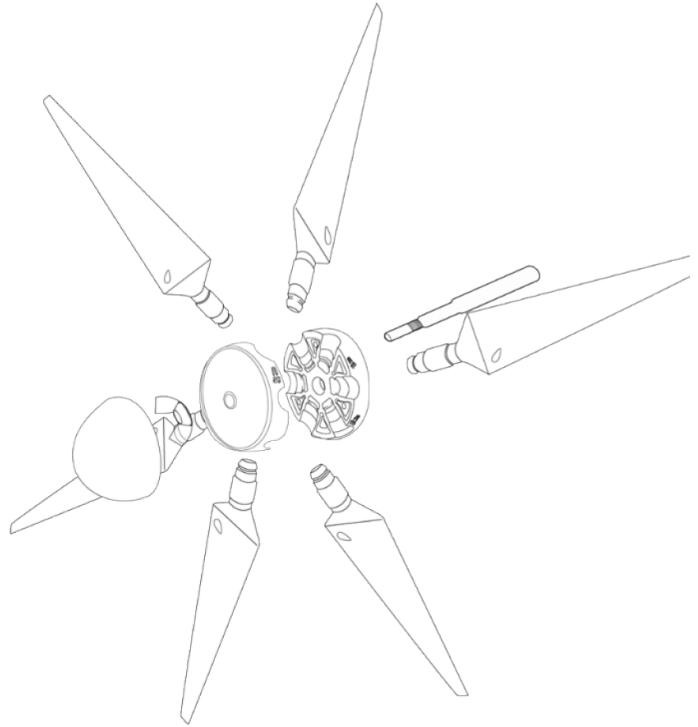
1. Place the blades into the indentations of one of the hub pieces, with the blade leaf facing forward, then place the second hub piece on top so that the blades fit into its indentations as well. Press the two hub pieces together so that the blades are held in place.
2. While compressing the pieces together with your fingers, insert the shaft into the hubs.
3. Place the wing nut onto the shaft and tighten it to compress the blade assembly.
4. Connect the nose cone to the side of the hub with the wing nut.

Step 5: Assemble the rotor
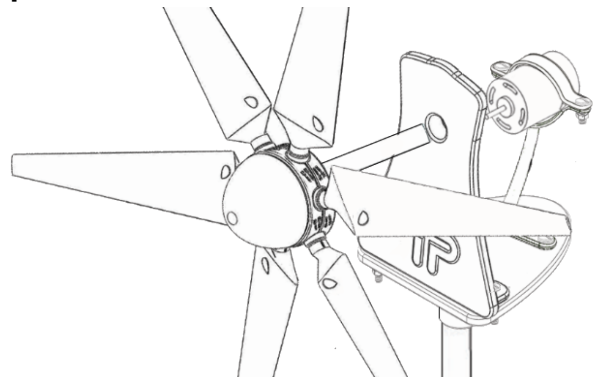
1. Insert the blade assembly shaft into the hole in the nacelle front.
2. Connect the blade assembly shaft to the motor shaft.
3. Adjust the blades to the desired pitch angle.

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Step 6: Set up the power
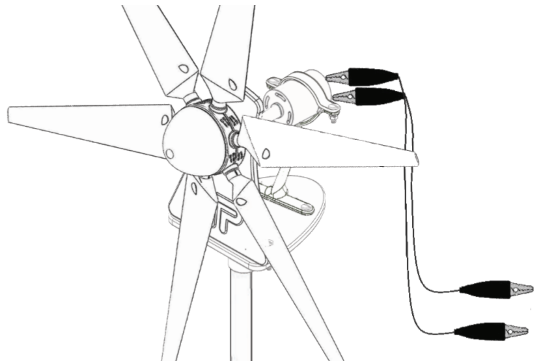
1. Connect the alligator clips directly to the leads of the motor.
2. Connect the other end of the alligator clips to a voltage sensor, or to a load (such as the LED, buzzer, or resistor).

TIP: Student-made blades use a 1/4" dowel inserted into the hub. If the dowel is too loose, wrap the dowel with scotch or masking tape to hold it in place more firmly.

Operation and tips

- A 20 inch box fan with three blades is recommended for operating the wind turbine; these fans are widely available from department stores. Smaller fans may work but are not optimal for use with the larger blades or student-designed blades. Larger fans **should not be used**, as they may cause the turbine to rotate faster than it can tolerate, creating sufficient friction to melt the axle.
- The solar cell can be used with direct sunlight or a desk lamp. Ambient indoor lighting may not be sufficient to perform the lab experiments.
- Chipboard, cardboard, and balsa wood all make excellent materials for student-designed blades using the STEM adapters.
- The LED turns red when the output voltage reaches 1.65 V while the diode is oriented with the cathode (short end) facing low potential, and it turns green at 1.8 V while the diode is oriented in the opposite direction. **Do not exceed 3 V in either direction, as this will burn out the LED.**
- Smaller blades produce power at higher pitch angles (20°-30°), while larger blades can turn at lower pitch angles.

Specifications and accessories

Visit the product page at pasco.com/product/ST-7611 to view the specifications and explore accessories. You can also download experiment files and support documents from the product page.

Experiment files

Download one of several student-ready activities from the PASCO Experiment Library. Experiments include editable student handouts and teacher notes. Visit pasco.com/freelabs/ST-7611.

Software help

The SPARKvue and PASCO Capstone Help provide additional information on how to use this product with the software. You can access the help within the software or online.

SPARKvue

Software: Main Menu > Help

Online: help.pasco.com/sparkvue

PASCO Capstone

Software: Help > PASCO Capstone Help

Online: help.pasco.com/capstone

Technical support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

🗩 Chat	pasco.com	
📞 Phone	1-800-772-8700 x1004 (USA) +1 916 462 8384 (outside USA)	
✉ Email	support@pasco.com	

Regulatory information

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