Renewable Energy Kit

SE-7611

Kit Components

Items

6 Long Blades (6 in)

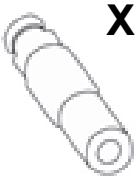
X6

6 Long Blades (4 in)

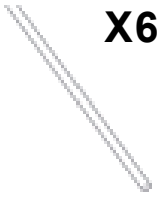
X6

6 STEM Blade Adapters and 6 Wooden Dowels

X6

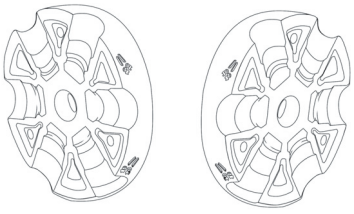


X6



1 Shaft with Wing Nut

2 Hub Pieces



1 DC Motor

1 DC Motor Stand with 2 Small Screws and Nuts

X2

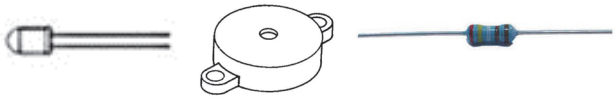
1 Nacelle Front

1 Nacelle Base

4 Nacelle Screws and Nuts

X4

1 LED, 1 Buzzer, and a 30 ohm 1/4 W Resistor



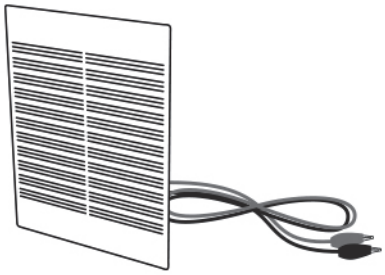
1 Tall Tower

1 Short Tower

1 Nosecone

1 Base

1 Solar Panel, 2 Watt (W)



Assembly Steps

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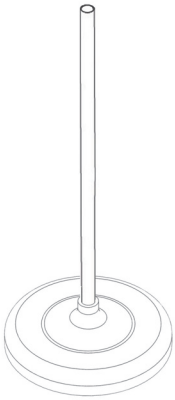
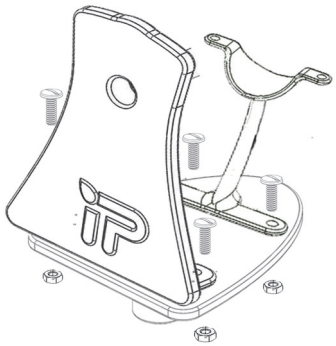
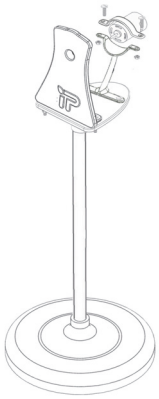
<td>  </td>
<td>  </td>
<td>  </td>
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<td>Step 1 - Base-Tower Assembly

Connect your tower into the base. The deeper it is the less chance of wobble when the blades rotate at high RPM’s. Wobbling may occur especially with the larger blades but will settle down after a few seconds.</td>
<td>Step 2 - Nacelle Assembly

a) Connect the nacelle front into the nacelle base using the long screws & nuts.

b) Connect the DC Motor Stand to the nacelle base.</td>
<td>Step 3 - Generator Assembly

a) Connect your Nacelle Assembly to your tower.

b) Using the small screws and nuts connect your DC motor using the motor clip to the motor stand.</td>
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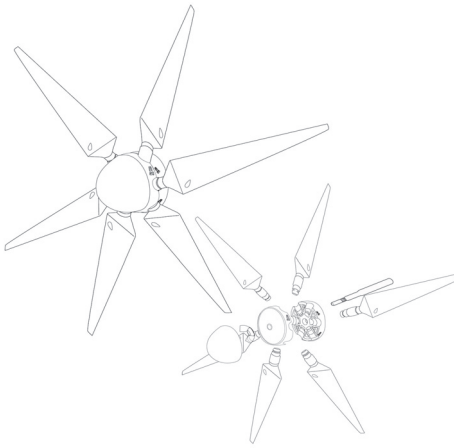
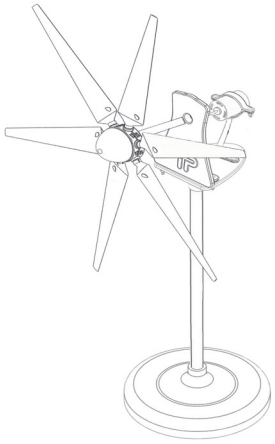
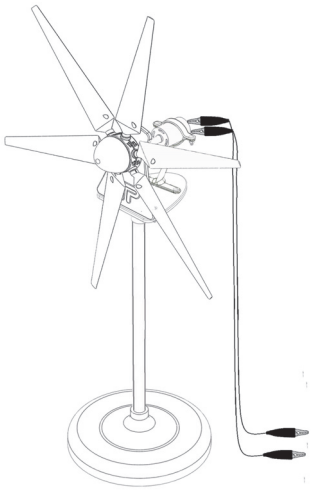
<td>  </td>
<td>  </td>
<td>  </td>
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<td>Step 4 - Blade Assembly

a) Place your blades in your hub with the leaf on the blade facing forward and sandwich them together.

b) Compress them together with your fingers and insert your shaft.

c) Use the Wing Nut to compress the blade assembly.

d) Connect the Nose Cone.</td>
<td>Step 4 - Rotor Assembly

a) Connect your Blade Assembly Shaft into the motor shaft.

b) Adjust your blades to the desired pitch angle.</td>
<td>Step 6 - Power Setup

a) Connect your alligator clips directly onto the motor or the motor leads.

b) Connect to voltage sensor or load (LED, buzzer, etc.).

Note: You can try to change up your tower height for stability. By using the shorter tower and smaller blades they tend to keep the Turbine well balanced.</td>
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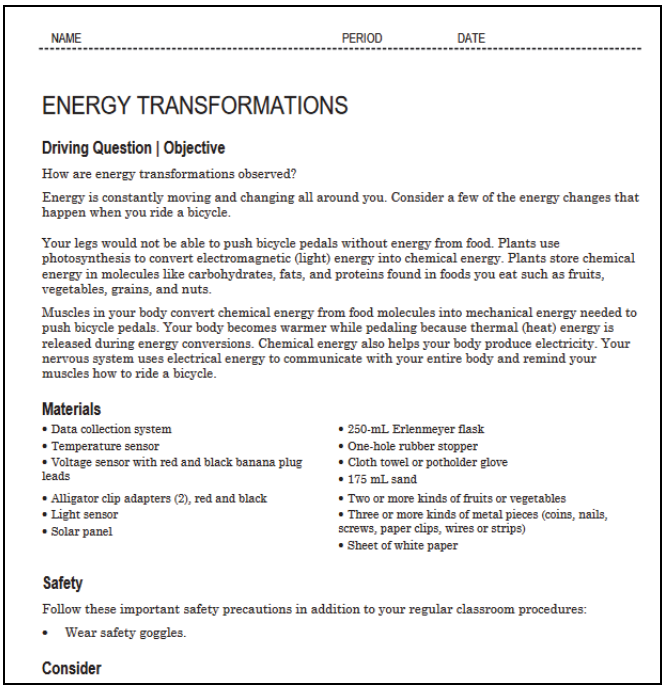
Lab Activities

The following lab activities are available as PDF and SPARKlabs files on

www.pasco.com/renewable

They are free to download and use with SPARKvue.

1. Energy Transformations
2. What is Electricity?
3. Solar Panel Performance
4. Light and Solar Panels
5. Load and Solar Panels
6. Heat and Solar Panels
7. Wind Power I: Distance and Speed
8. Wind Power II: Blade Length, Number, and Pitch
9. Power and Energy
10. Power Curves
11. Design an Efficient Turbine



NAME PERIOD DATE

ENERGY TRANSFORMATIONS

Driving Question | Objective

How are energy transformations observed?

Energy is constantly moving and changing all around you. Consider a few of the energy changes that happen when you ride a bicycle.

Your legs would not be able to push bicycle pedals without energy from food. Plants use photosynthesis to convert electromagnetic (light) energy into chemical energy. Plants store chemical energy in molecules like carbohydrates, fats, and proteins found in foods you eat such as fruits, vegetables, grains, and nuts.

Muscles in your body convert chemical energy from food molecules into mechanical energy needed to push bicycle pedals. Your body becomes warmer while pedaling because thermal (heat) energy is released during energy conversions. Chemical energy also helps your body produce electricity. Your nervous system uses electrical energy to communicate with your entire body and remind your muscles how to ride a bicycle.

Materials

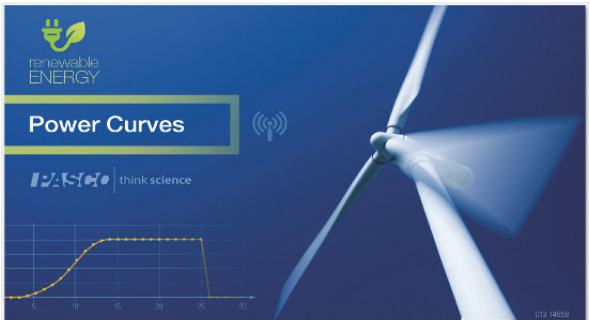
- Data collection system
- Temperature sensor
- Voltage sensor with red and black banana plug leads
- Alligator clip adapters (2), red and black
- Light sensor
- Solar panel
- 250-mL Erlenmeyer flask
- One-hole rubber stopper
- Cloth towel or potholder glove
- 175 mL sand
- Two or more kinds of fruits or vegetables
- Three or more kinds of metal pieces (coins, nails, screws, paper clips, wires or strips)
- Sheet of white paper

Safety

Follow these important safety precautions in addition to your regular classroom procedures:

- Wear safety goggles.

Consider



Operation & Tips

- A 20 in box fan with three blades is recommended for operation with the wind turbine. These fans are widely available from department stores. Smaller fans may work but are not optimal for use with the large blades or student designed blades.
- 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 0.9V and green at 1.2V. WARNING: Do not exceed 3V.
- Smaller blades produce power at higher pitch angles (20°-30°) while larger blades can turn at lower pitch angles.

Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100

Phone: +1 916 462 8384 (worldwide)
800-772-8700 (U.S.)

Web: www.pasco.com/support

Email: support@pasco.com

The Product Manual will be updated periodically. For the latest revision of this Product Manual, visit the PASCO Web site at

www.pasco.com/manuals

and enter the product number, SE-7611, in the text window.

CE Statement
This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.

Product End of Life Disposal Instructions:
This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle/disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol (to the right) and on the product or its packaging indicates that this product **must not** be disposed of in a standard waste container.