Forces

The power of the wind

A functioning wind-powered electric current generator

You will need….

- ✓ a 9 V Lego motor and matching cable
- ✓ LED
- ✓ some Lego spars etc.
- ✓ an aluminium can
- ✓ a ruler, marker and scissors
- ✓ a glue gun

Background:

The Lego motor can convert rotational energy into electrical energy and vice versa; it can act as an electric current generator.

Follow these steps:

1. Cut the top off the can. Measure the circumference of the can and mark out the edges of the blades.
2. Cut the blades (three sides only) using the scissors and bend the blades at an angle.
3. Glue an axle fitting to the base of the can and attach it to the motor.
4. Construct a support. Connect the motor and the LED.

So what happened?

When wind blows the blades of the motor turn and generates electricity.

What next?

1. Experiment with different blade designs.
2. Calculate the efficiency assuming that the total energy (E) of the air moving through the blades in a given time (T) is:

   $E = \frac{1}{2} mv^2$

   where m is the mass of air moving through the blades and v is its velocity.

   $E = \frac{1}{2} (\rho.\mathbf{V})(v^2)$

   where $\mathbf{V}$ is the volume of air and ρ is its density.

   $E = \frac{1}{2} (\rho.2\pi r v)(v^2)$

   $E = \rho \pi r v^3$

   Hence the available wind energy is proportional to its wind velocity cubed. If the wind speed doubles then the available energy is eight times greater.