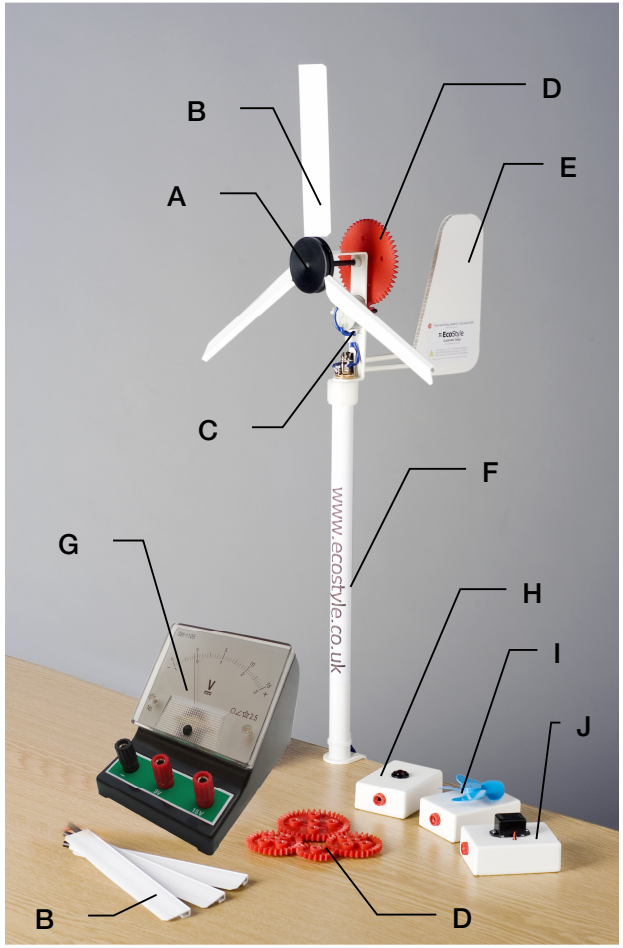
Wind Turbine Kit

Designed and Manufactured in the United Kingdom by EcoStyle Ltd

EcoStyle
www.ecostyle.co.uk

1 User Manual/Operating Instructions



What's in the box?

A Turbine hub
B Turbine blades
C Generator motor
D Gears (60T, 40T (x2), 20T)
E Tailplane
F Tower
G Voltmeter
H LED module
I Motor module
J Piezo buzzer module

Contents

FREE LESSON PLANS AVAILABLE

Please visit **www.ecostyle.co.uk/lessonplans**

Safety goggles must be worn

This is not a toy – children should be supervised by an adult during use

Developed with and endorsed by
THE NATIONAL ENERGY FOUNDATION

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2 Setting Up and Powering the Wind Turbine

Setting up the wind turbine

Take the wind turbine out of the case. Take care when handling the turbine as the top part of the wind turbine (the nacelle) is separate to the upright column (the tower).

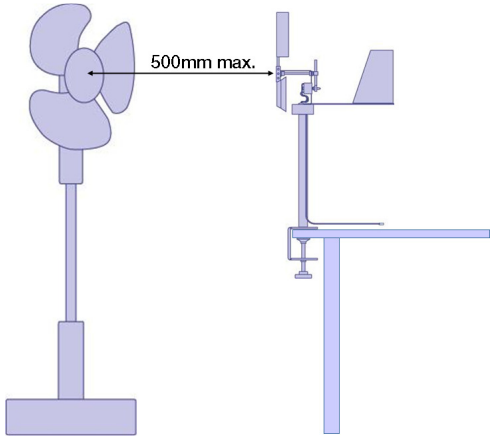
Firmly clamp the wind turbine onto a table or other flat surface.

Insert 3 x turbine blades into the turbine hub as shown in section 3 on the following page.

Connecting the voltmeter

Connect one blue plug to the black socket, and the other plug to either the red '3V' or '15V' sockets.

The polarity of the wind turbine changes depending on the rotational direction of the turbine hub. If the needle gives a negative reading when the turbine is operating, try reversing the blue plugs.



Powering the wind turbine

To carry out consistent experiments indoors, a fan should be used to power the wind turbine. For best results, use a minimum diameter 300mm (12") – 400mm (16") fan.

Position the fan a maximum of 500mm away from the turbine, and ensure the centre of the hub is level with the centre of the fan. If necessary, raise the fan using books/boxes etc. Set the fan to maximum speed.

The turbine can be used outside in moderate wind speeds.

3 Fitting Turbine Blades to the Turbine Hub

• 3 blades fitted

• 2 blades fitted

• 6 blades fitted

Fitting turbine blades

Start by attaching 3 turbine blades. Ensure the blades are evenly spaced around the hub. Firmly push in the black rod into the hub, and push the white blade down until it touches the hub.

Make sure the blades are secure otherwise they could fly out when the turbine rotates. Please ensure that safety goggles are worn.

Changing the blade angle

Starting with the blades parallel with the front face of the turbine hub, rotate them so they are angled at 30-45º to the face of the hub. Ensure all the blades are angled by the same amount.

Try varying the angle of all the blades. What happens to the voltage when the blade angle is increased or reduced?

Changing the number of blades

The turbine hub can accept combinations of two blades, three blades or six blades.

Always ensure the blades are evenly spaced around the hub otherwise the hub will become unbalanced.

What happens to the voltage when the number of blades is increased or reduced?

4 Connecting Modules to the Wind Turbine

Connecting the motor module

Plug the blue plugs from the wind turbine into the red and black sockets on the motor module.

When the wind turbine generates electricity, the blue propeller on the motor module will rotate. The faster the wind turbine spins, the faster the propeller will rotate.

Be careful that the blue propeller does not get pushed down against the body of the module box, preventing it from spinning freely. If this happens, gently pull the propeller upwards away from the box to release it.

Connecting the LED module

Plug the blue plugs from the wind turbine into the red and black sockets on the LED (light-emitting diode) module.

When the wind turbine generates electricity, the LED on the LED module will light up. The faster the wind turbine spins, the brighter the LED.

The LED is polarity dependant. The polarity of the wind turbine changes depending on the rotational direction of the turbine hub. If the LED fails to light, try reversing the blue plugs in the red and black sockets.

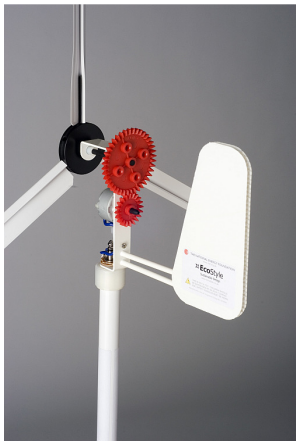
Connecting the Piezo buzzer module

Plug the blue plugs from the wind turbine into the red and black sockets on the buzzer module.

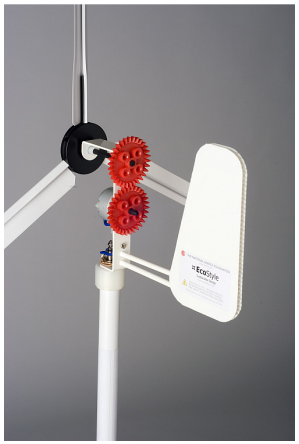
When the wind turbine generates electricity, the buzzer on the buzzer module will make a sound. The faster the wind turbine spins, the louder the buzzer. The buzzer requires at least 1.5V to operate. The wind turbine's voltage output can be checked using the voltmeter.

The buzzer is also polarity dependant. If the buzzer fails to sound, try reversing the blue plugs in the red and black sockets.

5 Changing the Gears



- Gear ratio 3:1 (60-tooth and 20-tooth gears)



- Gear ratio 1:1 (two 40-tooth gears)

- Gear ratio 1:3 (20-tooth and 60-tooth gears)

Three gear combinations can be achieved by changing the red plastic gears:

- 3:1 (60-tooth and 20-tooth gears)
- 1:1 (two 40-tooth gears)
- 1:3 (20-tooth and 60-tooth gears)

To change the gears, slightly loosen the small black bolt in the brass hubs of the gears. Remove the gears and replace them with another combination, and retighten the black bolts.

The upper part of the wind turbine may be lifted off the upright tower to make changing the gears easier.

Make sure that there is a gap between the cog on the propeller hub driveshaft and the plastic bearing, to ensure that the driveshaft spins freely.

NB – the small black bolts may drop out and become lost if they are loosened too much. To avoid this, loosen the bolts just enough to allow them to be removed.

6 Help and Advice

For additional technical support, please email **info@ecostyle.co.uk** or phone **0844 272 2011**

Problem	Possible Cause	Solution
The turbine doesn't spin freely	The upper red cog is pushed too tightly onto the driveshaft	Loosen the cog and pull away from the hub to create a gap between the cog and the bearing
	The lower red cog on the generator motor is pushed against the white body of the turbine	Loosen the cog and pull away from the white body of the turbine to create a gap
The turbine rotates too slowly	The fan speed is too slow	Increase the fan speed
	The fan is too far away from the turbine	Position the fan closer to the turbine (e.g. 50cm)
	The centre of the fan is not aligned with the centre of the turbine hub	Reposition the fan so the centre of the fan propeller is level with the centre of the turbine hub
	The angle of the blades is too sharp/shallow	Adjust the blades (e.g. 30°-45°)
Negative reading on the voltmeter	The turbine leads are connected the wrong way	Reverse the position of the blue plugs
The buzzer module does not sound	The turbine leads are connected the wrong way	Reverse the position of the blue plugs in the red/black sockets
	The turbine is rotating too slowly	(See above)
The LED module does not light	The turbine leads are connected the wrong way	Reverse the position of the blue plugs in the red/black sockets
	The turbine is rotating too slowly	(See above)
The motor module does not spin freely	The blue propeller has been pushed down against the top of the module case	Pull up the blue propeller to create a gap between it and the top of the module case