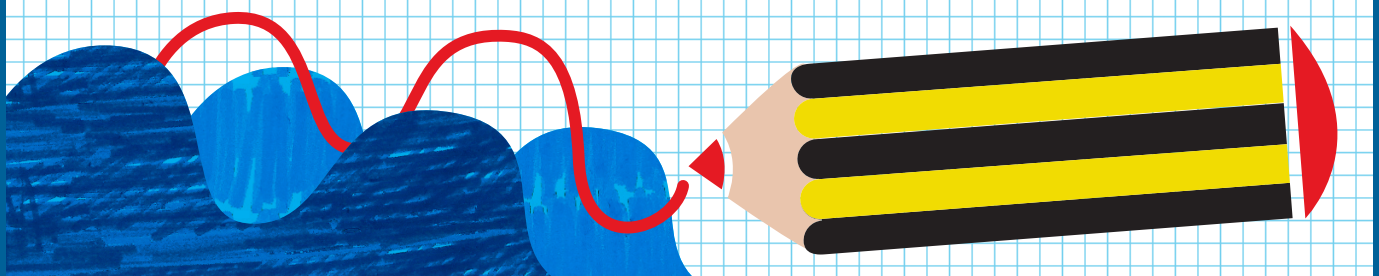
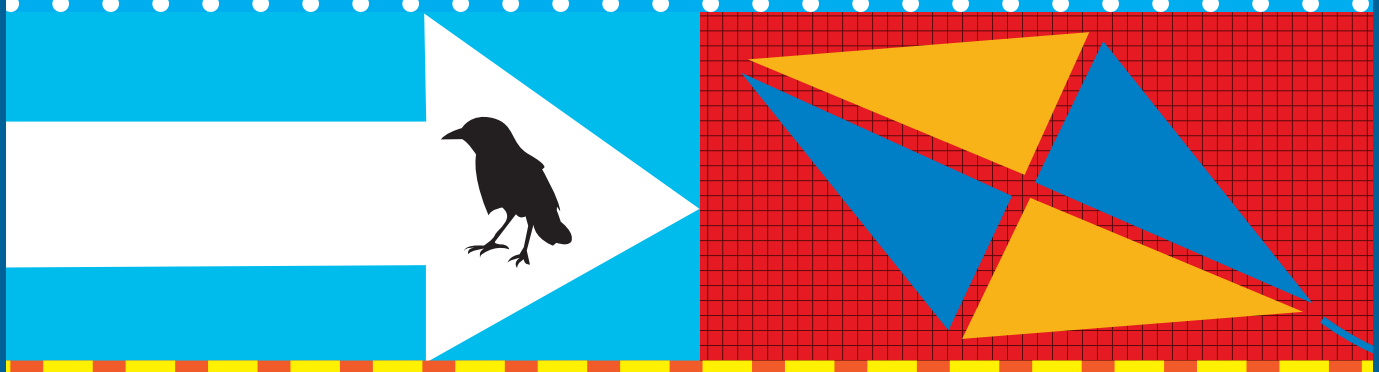
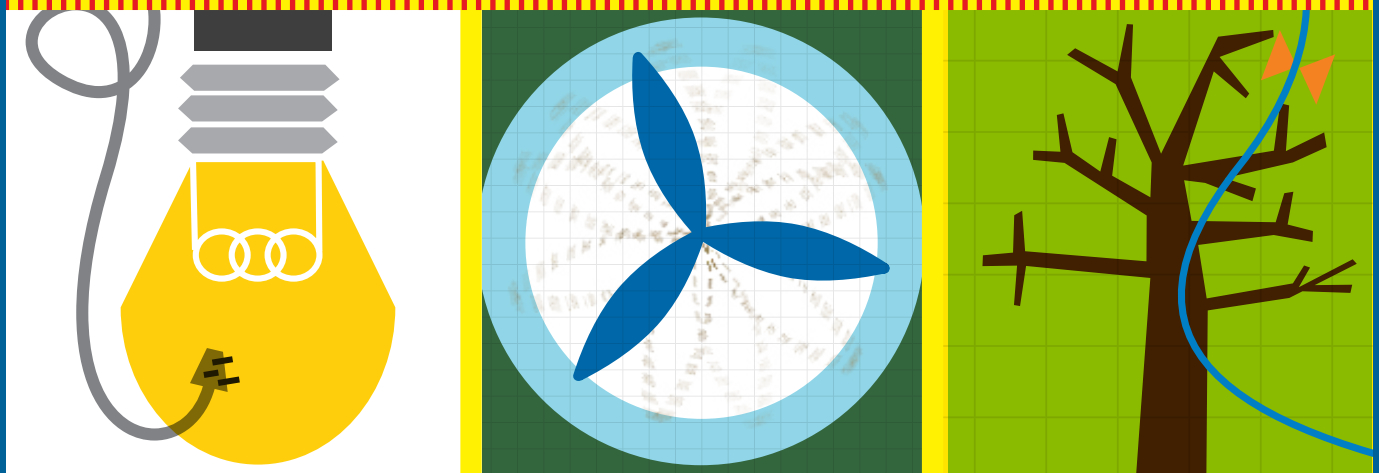


# Wind Energy for Kids



## What is wind power?

### Inside this pack you will find

out what makes the wind blow, how a modern wind turbine makes electricity, how we measure the speed and direction of the wind, and how to make your own windmill! Wind power is vital to stopping global warming and looking after our planet.

People have been using the wind for thousands of years. The first windmills were built over 5,000 years ago by the ancient Persians. Some were used for turning grinding stones that crushed grain into flour, and others were used to pump water out of wells. Windmills first appeared in Australia during the late 1800's and were used to pump water for people and farm animals.

Today, wind energy is also used to generate electricity using wind turbines (modern windmills).

When lots of wind turbines are built in one place it is called a wind farm. Wind farms on land are called onshore wind farms, and when they are out at sea they are called offshore wind farms.

Wind turbines don't produce any harmful waste products such as carbon dioxide ( $\text{CO}_2$ ), a gas that forms a layer above the Earth's surface and traps heat. This is causing the Earth to warm up. We need wind energy to reduce  $\text{CO}_2$  emissions and help prevent climate change. As we use up the coal and gas we burn to make electricity we need to find new forms of energy, such as wind.

Imagine what it would be like if there wasn't enough electricity to watch tv, play your favourite computer game or even turn the lights on! If we don't find these new forms of energy, we'll be in danger of not having enough electricity.



**Did you know that some windmills built over 50 years ago are still pumping water from under ground?**

## What is wind?

Wind is the movement of air. It can be anything from a light breeze to a howling gale.

### ACTIVITY ONE

List five things that show you when the wind is blowing.

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....

### Why does the wind blow?

Wind is created because:

- ▶ warm air is lighter than cold air, therefore warm air rises and cold air sinks.
- ▶ The movement of air is called wind.

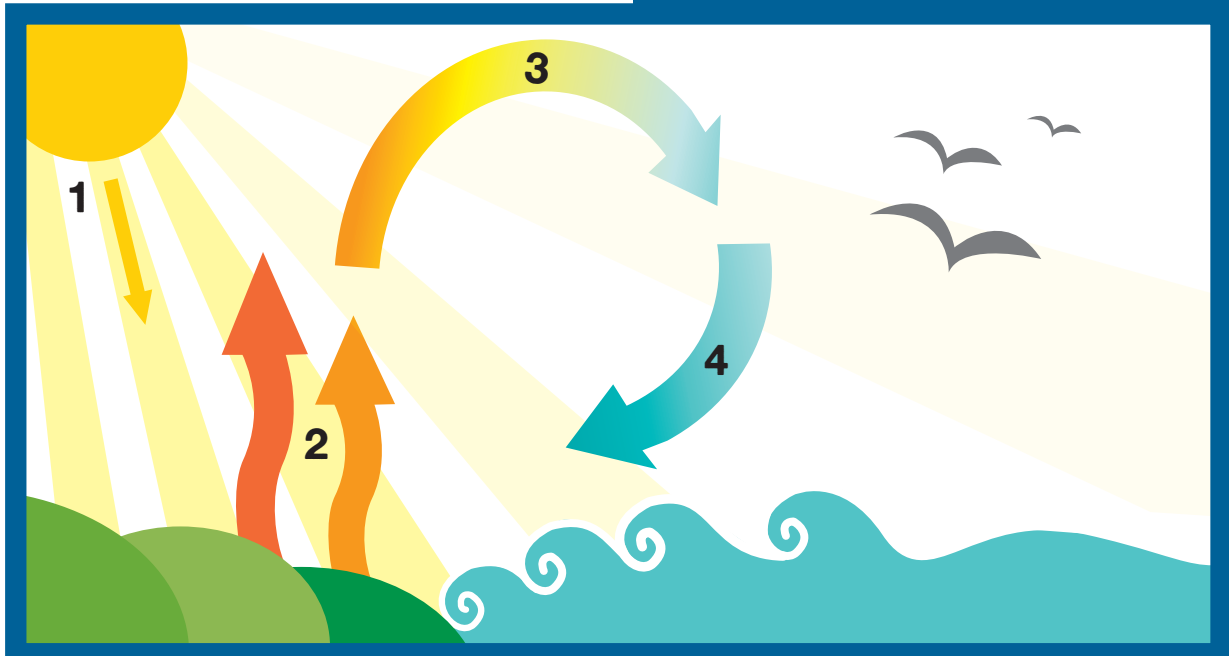
### How is a sea breeze created?

Have you ever been to the seaside?  
Did you notice that it is often windy on the beach?

This is because of the temperature difference between the land and the sea.

Here is how it works:

1. The sun warms up the earth. The land absorbs less heat than water, so air over the land heats up more quickly than air over the sea.
2. The warm air over the land rises high into the sky first.
3. As the warm air rises, it begins to cool down. This cold air moves out to sea and sinks down, pushing the cooler air over the sea towards the land.
4. The cool air above the sea moves in over the land and replaces the warm air that has risen into the sky. The movement of the air creates the wind.

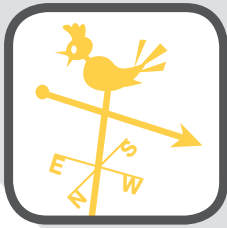


## Measuring the wind

Knowing the speed and the direction of the wind helps us when we're sailing, when we're flying aeroplanes and when we're deciding where to build wind turbines!

### Direction: which way is the wind blowing?

You can see which direction the wind is blowing in by using a windvane or a windsock.



#### Windvane

A windvane is also called a weathercock. It is one of the oldest tools for measuring the direction of the wind, and you

can often see them on top of old buildings and churches. The windvane works by pointing in the direction that the wind is blowing. If the figure on top of the windvane is pointing to the west, then the wind is coming from the west.



#### Windsock

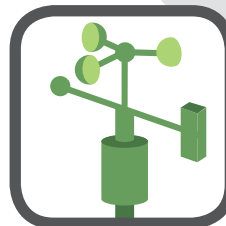
A windsock, also called a wind cone, shows you the direction and the speed of the wind. The direction of the

wind is shown when the wind blows into the larger open end and the sock points the way the wind is blowing. If the sock is pointing to the west, then the wind is coming from the east.

The windsock also shows you how fast the wind is blowing. If the sock is flapping about gently then there is only a light wind. If it sticks out in a straight line then the wind is much stronger.

You might have seen a windsock at an airport.

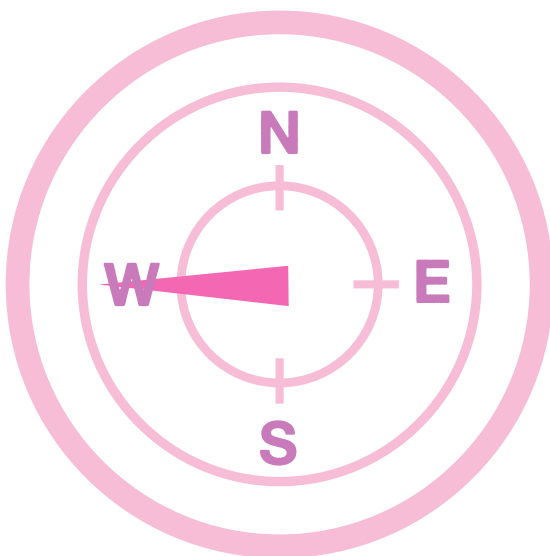
### Speed: how hard is the wind blowing?



#### Anemometer

An anemometer is the main instrument used to measure wind speed. It has three or four cups that rotate when the wind blows. The speed

of the wind is measured by how many times the cups spin round in a given time. In a strong wind they will spin round very fast.




### Did you know?

The wind is always named after the direction it blows from, so a westerly breeze blows from the west.

## The Beaufort scale

### Look out of your window. What wind speed do you think it is today?

The Beaufort scale measures the speed of the wind – its full name is the Beaufort wind force scale. It was created in 1805 by the British naval commander Sir Francis Beaufort for measuring winds at sea and is still used by sailors and scientists. The Beaufort scale divides the wind speed into twelve categories.

	Beaufort scale (Force)	Wind speed (miles per hour)	Description	Conditions
	0	< 1	Calm	No motion. Smoke rises straight up.
	1	1 to 3	Light air	Wind motion visible in smoke.
	2	4 to 7	Light breeze	Wind felt on face. Leaves rustle.
	3	8 to 12	Gentle breeze	Leaves and small twigs move constantly. Flags will flap lightly.
	4	13 to 18	Moderate breeze	Small branches move. Dust and loose paper raised.
	5	19 to 24	Fresh breeze	Bushes and small trees sway.
	6	25 to 31	Strong breeze	Large branches move. The wind whistles in electricity and telephone wires. It is hard to use umbrellas.
	7	32 to 38	Near gale	Whole trees sway and walking into the wind becomes difficult.
	8	39 to 46	Gale	Very difficult to walk and tree twigs begin to break from trees.
	9	47 to 54	Severe gale	Larger branches break off trees and some small trees blow over. Light damage is caused to buildings, such as tiles and chimneys being blown from roofs.
	10	55 to 63	Storm	Trees are blown over and severe damage is caused to buildings.
	11	64 to 72	Violent storm	Widespread damage is caused to buildings.
	12	73 +	Hurricane	Severe devastation is caused.



## ACTIVITY TWO

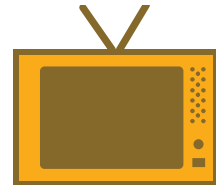
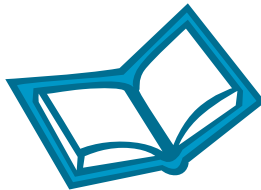
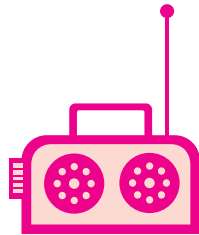
Circle the eight items in the picture that use wind to work and colour the picture in.



**Did you know that wind can be used to make electricity?**

### ACTIVITY 3

Circle the objects that need electricity to work.

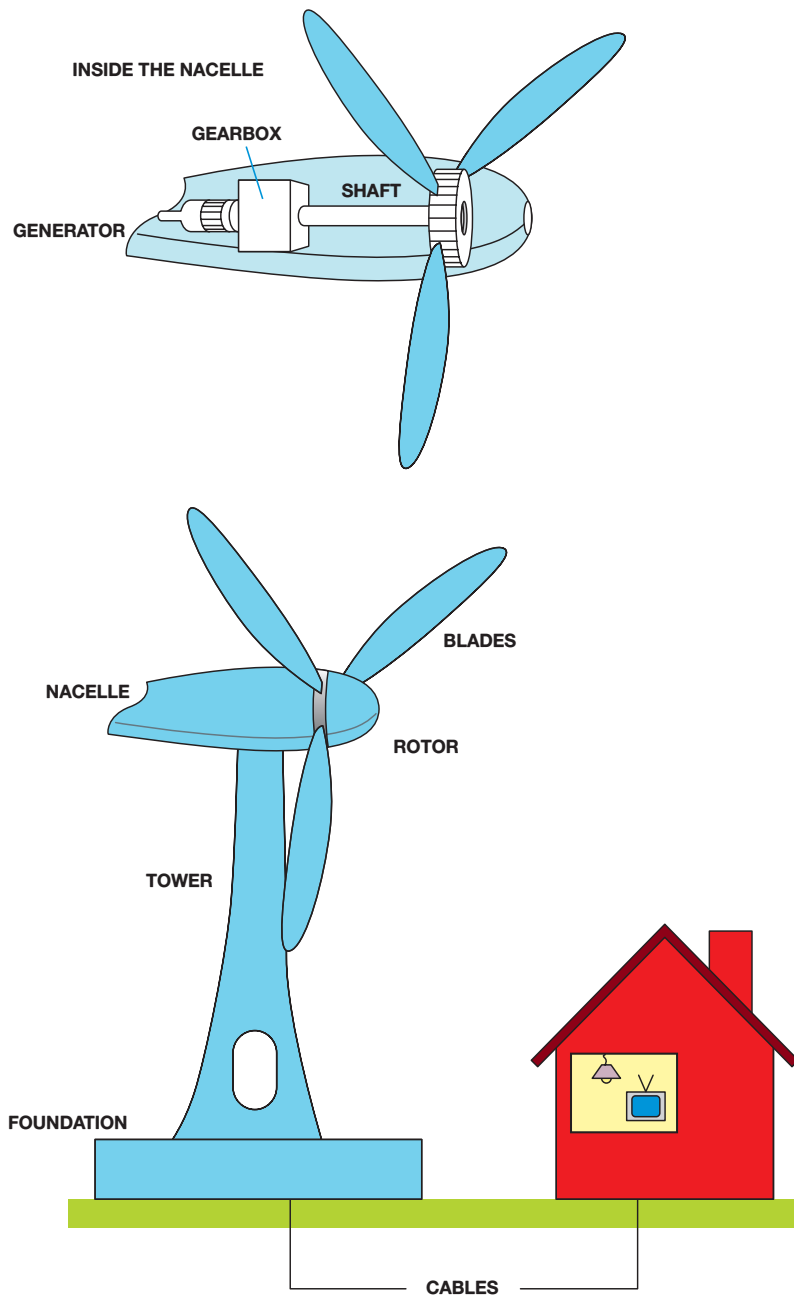


**What objects have you used today that need electricity to work?**

## How does a wind turbine work?

One wind turbine can generate up to 6.5 million units of electricity each year. That's enough to run a computer for 2,250 years!

This picture shows the parts of a wind turbine.





## What's inside a wind turbine?

How does a wind turbine create electricity? When the blades of the turbine catch the wind they turn the rotor. The rotor turns a shaft that is connected to a set of cogs called a gearbox. The gearbox is connected to a generator, which makes electricity when it turns. Each turn of the rotor is called a revolution. The rotor turns about 22 revolutions per minute (rpm), but in order to generate electricity the generator has to turn at 1,500rpm. The gearbox converts the 22 revolutions to 1,500 revolutions. The electricity is sent down thick cables that run down the tower to the ground. The cables take the electricity to the National Grid.

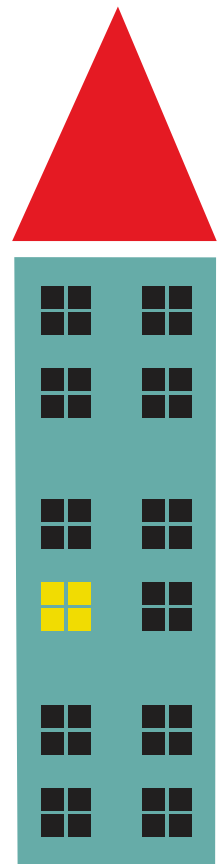
The National Grid is the network of cables and pylons that distributes the electricity to houses so we can turn on the lights and watch tv.

### ACTIVITY FOUR

Can you find the words in the box that relate to wind turbines? Words to look for:

**Generator**      **Rotor**      **Nacelle**      **Cables**  
**Wind turbine**      **Gearbox**      **Revolution**  
**Shaft**      **Electricity**      **Tower**      **Blades**

R	C	B	G	E	N	E	R	A	T	O	R	J	M	L
E	O	Q	G	H	A	U	J	V	J	X	M	T	L	W
P	L	T	W	L	C	X	D	G	J	C	A	W	K	I
T	Y	U	O	D	E	S	H	L	E	A	M	A	D	N
S	I	B	D	R	L	B	E	V	H	B	J	F	A	D
S	L	C	K	R	L	M	I	R	T	L	E	N	T	T
E	D	L	R	M	E	P	U	G	K	E	S	O	E	U
K	F	K	C	N	B	L	A	D	E	S	H	I	O	R
T	F	A	H	S	J	V	S	F	K	Q	C	T	V	B
R	J	E	Y	V	E	T	Z	J	W	O	V	U	S	I
V	E	J	K	U	K	L	N	S	O	I	X	L	H	N
L	B	W	D	U	E	J	G	E	A	R	B	O	X	E
W	N	G	O	R	F	E	X	K	P	V	N	V	B	L
E	L	E	C	T	R	I	C	I	T	Y	M	E	M	U
B	A	H	B	Q	K	U	H	F	D	Z	G	R	E	C



Draw your own wind turbine



## MAKE YOUR OWN WINDMILL

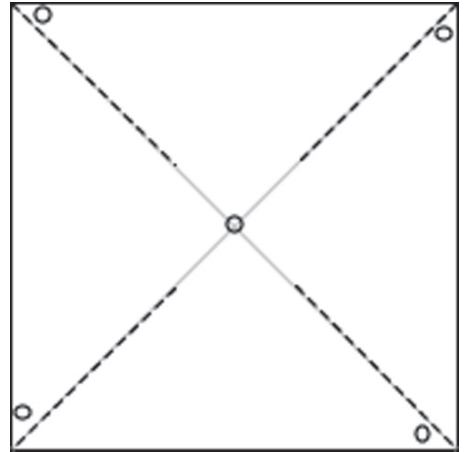
(adult supervision required)

### You will need:

- ▶ **Thin card or thick paper**
- ▶ **1 berry pin (sewing pin with a bead top)**
- ▶ **2 pencils, one with a rubber top**
- ▶ **Ruler**
- ▶ **Scissors**

### Directions:

1. Cut a 20cm x 20cm square out of the card or paper.
2. Lightly draw a line diagonally across the paper from each corner to the opposite (diagonal) corner.
3. Mark the middle of the square (where the two lines cross) and make a small hole. You can use a pencil or the pin to do this.
4. Measure 3cm from the hole along each of the diagonal lines and make a small mark with your pencil.
5. Cut along each of the diagonal lines from the outside corners to the mark.
6. Using a pencil or the pin make a hole in the top left corner of each of the four flaps (see diagram above).
7. In turn, pick up each flap at the corner with the hole in it, and curl it to the hole in the middle of the square. Thread the pin through the holes, so the head of the pin is on top of the folded flaps.
8. Thread the pin through the middle hole.
9. Push the pin into the rubber on top of the pencil. Be careful not to push the pin too far through the rubber so it sticks out the other side. If it does, gently pull it back through. You may need to ask an adult to help you with this.
10. You have now made your windmill – watch it turn by blowing on it or holding it in the breeze.



## Notes for adults

### Suitable for children between the ages of seven and eleven

#### Activity One:

Examples include leaves blowing around, trees swaying, hair being blown about, a sailboat moving across water, flags moving, a kite flying, clouds moving across the sky etc.

#### Activity Two:

List of the items in the picture that use wind. Hot air balloon, wind turbine, kite, windmill, man on skateboard being pulled by a power kite, sailboat, windsurfer and clothes drying on the washing line.

#### Activity Three:

List the items that need electricity to work. Lamp, radio, computer, television.

#### Other useful sources of information:

1. There are lots of useful information and pictures on the Action For Renewable website. Read their introduction to wind energy to learn the basic facts of generating electricity from the wind and check through their frequently asked questions to see if the answer to your question is there. More in-depth answers can be found in their reference section. You can find this by going to the 'Jobs and careers' section on the site.

You can find more childrens activities on the WestWind Energy website under the news section. More information about WestWind Energy's projects and employment opportunities on the w-wind.com.au website.

2. Wind with Miller is a website on wind energy for children. Here children can learn about wind energy, wind turbines and meteorology.

[http://windpower.org/en/knowledge/wind\\_with\\_miller.html](http://windpower.org/en/knowledge/wind_with_miller.html)

#### Activity Four:

R	C	B	G	E	N	E	R	A	T	O	R	J	M	L
E	O	Q	G	H	A	U	J	V	J	X	M	T	L	W
P	L	T	W	L	C	X	D	G	J	C	A	W	K	I
T	Y	U	O	D	E	S	H	L	E	A	M	A	D	N
S	I	B	D	R	L	B	E	V	H	B	J	F	A	D
S	L	C	K	R	L	M	I	R	T	L	E	N	T	T
E	D	L	R	M	E	P	U	G	K	E	S	O	E	U
K	F	K	C	N	B	L	A	D	E	S	H	I	O	R
T	F	A	H	S	J	V	S	F	K	Q	C	T	V	B
R	J	E	Y	V	E	T	Z	J	W	O	V	U	S	I
V	E	J	K	U	K	L	N	S	O	I	X	L	H	N
L	B	W	D	U	E	J	G	E	A	R	B	O	X	E
W	N	G	O	R	F	E	X	K	P	V	N	V	B	L
E	L	E	C	T	R	I	C	I	T	Y	M	E	M	U
B	A	H	B	Q	K	U	H	F	D	Z	G	R	E	C

This document has been published by WestWind Energy in association with Action for Renewables.



Action for Renewables is the campaign for the expansion of renewable energy in the UK. Our vision is of a future Britain powered in large part from clean, green and secure renewable energy sources, doing its part to combat dangerous climate change. We're building a strong and active coalition of renewables supporters, including ordinary people, environmental campaigners and the industry.

[www.actionforrenewables.org](http://www.actionforrenewables.org)



[www.w-wind.com.au](http://www.w-wind.com.au)