# B6.4 Harnessing the energy of wind

You're spending your summer vacation in the Netherlands. On your hike, you see several windmills. You ask your mother why the windmills are moving. She explains to you that the rotor blades are arranged so that the wind can drive the wheels. The energy produced by this is frequently converted to electrical energy so that the miller can get his millstones moving and grind flour.

**How must a windmill (or wind turbine) be built so that it can generate electricity?**

**Write down your ideas:**

**You need the following for the experiment:**

- ☐ Adhesive tape
- ☐ 1 cardboard tube
- ☐ Color construction paper
- ☐ 1 drinking straw
- ☐ Glue
- ☐ 1 pair of scissors
- ☐ Project template
- ☐ 1 sheet of thin cardboard (approx. 15 x 15 cm)
- ☐ 2 tea bags (or two pieces of string with a small object as a weight)
- ☐ 1 thumbtack
- ☐ 1 wooden skewer

Figure 1: Required materials.

Figure 2: What your wind turbine could look like.

## How to set up the experiment:

Lay out all the materials as shown in the photo.

1. Cut your rotor out of construction paper using the project template.
2. Cut in the rotor blades and fold them over.
3. At the center of the rotor, place a piece of tape on the front and one on the back.
4. Poke a hole in the middle of the rotor.
5. Make multiple cuts of a few centimeters into one end of the cardboard tube.
6. Bend the ends out and glue the tube firmly to a piece of cardboard.
7. Poke two holes across from each other at the top of the cardboard tube. Tip: You can use the thumbtack for this purpose. You can use the wooden skewer to make the holes a little larger so that a drinking straw goes through more easily. Make sure that the two holes are at approximately the same height.
8. Now stick a drinking straw through the two holes. The "shell" is complete.
9. Push the rotor onto the wooden skewer,
10. Then insert the wooden skewer through the drinking straw. The skewer works as the axle.
11. Attach the string with the tea bag on the end of the wooden skewer without the rotor. In addition to a knot or a loop, you can secure the string on the wooden skewer with a piece of adhesive tape.

**How to conduct the experiment:**

Blow on the wind turbine.

**Write down your observations:**

What happens with the tea bag?

_____

What happens when you stop blowing?

_____

**Evaluate your observations:**

1. Formulate the energy conversion chain. Fill in the missing words using the following terms: tea bag – wind – wind turbine.

The kinetic energy of the _____ is converted to the kinetic energy of the

_____.

The _____ is lifted up.

2. Guess what happens if you change something in the experiment, and then try it out, if possible. Write it down in the table.

| What changes | My guess | My observation in the experiment |
|---|---|---|
| I blow harder. | | |
| I blow more lightly. | | |
| I attach two tea bags to the wind turbine. | | |
| I remove the tea bags from the wind turbine. | | |

**Doing further research:**

Find out where wind energy can best be harnessed. The following questions will help you:

- Which regions have many wind turbines?
- Are there differences that stand out?

Write down what you discover.