

4.2 Pupil challenge: Build a model wind turbine

This classroom challenge is designed to engage the children in practical activity and give them an experience of technology. It will also, hopefully, develop their thinking skills and personal capabilities. These include thinking, problem solving, making decisions, being creative, working with others and self-management. The exercise should encourage them to display many of these attributes as individuals and in their groups.

In our experience, the following lesson development has worked well but you can modify the plan to suit your situation. (*Information, and sample lesson plans may be found by entering lesson plans in an internet search box.*)

Introduction to the Lesson.

- Discuss Climate Change and its causes with the children and explain the effects of Greenhouse Gases in the atmosphere.
- Explore energy sources and the concept of renewable/clean and non-renewable/dirty energy with the children.
- Explain the nature of Drumlin Co-Operative and its emphasis on wind generated energy. (*Power Point if time allows*)
- Ask the children to consider how energy may be generated by a wind turbine. (*Class ideas and responses*)
- Introduce the children to Michael Faraday and his explorations and discoveries re electro-magnetism.
- If possible, demonstrate the creation of an electric current, using a coil, a magnet and a galvanometer. (*An excellent opportunity to liaise with your local post primary school for a demonstration lesson or you may want to follow the teacher demonstration advice in the appendix if that is a possibility*)
- If appropriate you may wish to use Pupil Activity Sheets 1 and 2 at this stage.

Lesson Development

Ask pupils in small groups to build a wind turbine that can be driven to produce electrical energy from wind provided by a hair dryer (heater switched off). The turbine is a small electric motor operated in reverse. The structure is mainly wood and Sellotape. A sensitive galvanometer or voltmeter can be used to detect current, but a more effective demonstration would be to light a series of LEDs. You may wish to use Pupil Activity Sheets 4 and 5, or provide sheets of blank paper.

Introduction to the Practical Activity

(*see the appendix for help with risk assessment*)

Introduction to the range of resources and materials available

Instruction on the safe use of equipment

Explanation of workshop rules

Organisation of class and groups

We Are Looking To:

Given the resources available in the table below, pupils should be able to design and build a tower between 500 mm and 600 mm in height, on a base, to support an electric motor and mounting with an attached propeller.

We Are Looking For:

You are asked to build a model tower which meets the following criteria. You have 60 minutes in total, but you must spend the first 5 – 10 minutes designing your tower.

You can amend your tower as you proceed, but note any changes on your design sheet.

- a design sheet with detail, such as measurements and materials to be used, with at least two views from different angles
- the construction to match closely the detail on the design
- strength and stability of the structure
- economic use of resources
- aesthetic construction
- freely moving propeller blades
- the motor and propeller able to freely turn through 360 degrees
- the ability to move the tower with ease from one site to another

Resources per group of three pupils	Additional resources for the classroom
1 piece of A3 Card Tape 1 propeller Electric Motor: 1.5 - 4.5 volt Electric Motor Mount Two 600 mm lengths of square section wood One length of 600 mm wooden dowel 2 Wooden Wheels Selection of scrap materials, for example lids, cardboard boxes etc Pupil Activity Sheets 4 and 5	6 Junior Hacksaws 6 Wooden Bench Hooks 4 Low melt Glue guns 4 Pairs of Gloves 4 Pairs of Safety Goggles Glue sticks 4 Aprons Ruler Scissors Design sheet

Extension:

- Show: <http://bpes.bp.com> Follow **Primary Resources**, then **Page 3** (at the foot of the screen)
- Determine how the shape of the blades affects the transfer of energy from wind to electrical.
- See the *The Wind Power Challenge* link