



Does the number or size of blades on a wind turbine affect how much energy it produces?

Lesson overview:

In this lesson, children learn that some weather conditions can be renewable sources of energy and how these can be generated and used by farmers. The children are then challenged to design and make a working wind turbine and investigate the factors that influence how much energy is produced. This lesson could be used to start the children thinking about how they might design an idea, invention or innovation that will help farmers continue to care for the environment and be climate superheroes for their Farmvention competition entry.

Equipment needed:

- Scrap card
- Sellotape
- Masking tape (optional)
- Pencils
- Scissors
- String
- Paper cup
- Weights (gram weights or pennies)

Presentation guidance:

Slide 2: Energy	<ul style="list-style-type: none"> • Challenge the children to make a list of as many appliances that run on electricity as they can. • Ask the children to talk to their partner about what they understand the term 'energy' to mean and address any misconceptions.
Slide 3: Non-renewable energy	<ul style="list-style-type: none"> • Explain that most of the energy we use for powering our electrical appliances and heating our homes comes from burning oil, gas and coal (fossil fuels). This process produces carbon dioxide which causes climate change. • We call this type of energy non-renewable as it will eventually run out.
Slide 4: Renewable energy	<ul style="list-style-type: none"> • Renewable energy comes from sources that are not going to run out and are cleaner and better for the environment. • Farmers can make and use renewable energy on their farms. This is one of the ways that they help to fight climate change.
Slide 5: Wind energy	<ul style="list-style-type: none"> • Wind turbines can make electricity. The wind blows the blades round which then turns a generator which generates electricity. • Lots of farmers have wind turbines on their farms. Have you seen any?





Slide 6: Solar energy	<ul style="list-style-type: none"> • Solar energy comes from the sun. • Solar panels can convert sunlight into electricity through a reaction between light and silicon crystals inside each panel. • Lots of farmers use solar panels on their farms.
Slide 7: Biomass energy	<ul style="list-style-type: none"> • Biomass energy can be made by burning natural materials such as dead trees and unused parts of a farmer's crop. • Manure from cows can also be used to make energy.
Slide 8: The challenge	<ul style="list-style-type: none"> • Explain to the children that they are going to design and build their own working wind turbine to investigate which factors affect the amount of energy that is produced. • Challenge groups of four to think about which factors they could investigate e.g. size, shape, number of blades. • Divide the groups into pairs so that each pair can vary the group's chosen factor i.e. one pair could make a wind turbine with 4 blades and the other pair could make one with 6. • Emphasize that to make the investigation a fair test, all other variables will need to be kept the same. • Use Practical Action's wind power challenge: to build and test the wind turbines: https://infohub.practicalaction.org/bitstream/handle/11283/621865/Wind%20Power%20Challenge%20-%20Teachers%20notes.pdf?sequence=3
Slide 9: Conclusion	<ul style="list-style-type: none"> • Ask the children to study their results and write an explanation of what they found. • In their conclusion, they should explain what this tells them about the effect of their chosen variable on the amount of energy a wind turbine generates. • Why do they think this is important for farmers? Why is this important for helping them to fight climate change?
Slide 10: Evaluation	<ul style="list-style-type: none"> • Ask the children to think critically about their investigation. Was there anything that was not controlled that could have affected their results? Did they conduct a fair test? How could they improve their investigation if they did it again? How could they make their results more reliable?
Slide 11: Farmventing	<ul style="list-style-type: none"> • Encourage the children to think about how they could use their learning about renewable energy to help them design an idea, invention or innovation that will help farmers continue to care for the environment and be climate superheroes.





Key Stage 2 Curriculum Links:

Subject	Topic	Objective
Science	Electricity	<ul style="list-style-type: none"> Identify common appliances that run on electricity.
	Lower Key Stage 2 Working Scientifically	<ul style="list-style-type: none"> Asking relevant questions and using different types of scientific enquiries to answer them Setting up simple practical enquiries, comparative and fair tests Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions Using straightforward scientific evidence to answer questions or to support their findings.
Geography	Human and physical geography	<ul style="list-style-type: none"> Human geography, including: types of settlement and land use, economic activity including trade links, and the distribution of natural resources including energy, food, minerals and water

