



Energy builders – build your own renewable energy scheme

Time needed for activity 60 minutes plus

Location Outdoors

Context

This activity includes STEM challenges which encourage learners to apply their knowledge and skills to provide creative solutions, using renewable energy to help combat climate change. DCF themes can be incorporated into this activity at any point by using online research and STEM tutorials to aid the creative process.

Natural Resources Wales’ purpose is to pursue the sustainable management of natural resources in all of its work. This means looking after air, land, water, wildlife, plants and soil to improve Wales’ well-being, and provide a better future for everyone.

Curriculum for Wales

Science and Technology

- **What matters –** Design thinking and engineering offer technical and creative ways to meet society’s needs and wants.

Expressive Arts

- **What matters –** Creating combines skills and knowledge, drawing on the senses, inspiration and imagination.

Mathematics and Numeracy

- **What matters –** Geometry focuses on relationships involving shape, space and position, and measurement focuses on quantifying phenomena in the physical world.

Humanities

- **What matters –** Our natural world is diverse and dynamic, influenced by processes and human actions.

Language and Literacy

- **What matters –** Expressing ourselves through languages is key to communication.

Objectives

Learners will be able to:

- develop their understanding of how natural resources can be harnessed to create energy.
- observe the impacts that the geographical landscape has on the flow of energy.
- work together in a creative way to meet engineering challenges and solve problems.

Resources and equipment

- [Activity plan – Understanding a river system](#)
- [Resource cards – Understanding a river system](#)
- [Information note – Energy](#)
- Natural materials
- Creative items to support their engineering efforts. For example, foil, Lego, string, cardboard



What to do

Build a Mini Hydro Scheme

1. We recommend introducing this challenge to your learners by discussing the geographical features and topography of a river system. You can use the [Activity plan - Understanding a river system](#), before taking on the next section of this activity.
2. Discuss how the flow of water can be controlled to generate hydroelectricity by the installation of weirs, dams, Archimedes screws, etc. Ask your learners to research these methods and infrastructure online to gain a basic understanding of how they work.
3. Explain to your learners that their challenge will be to work in groups to create a mini river system. Your learners will act as engineers looking to harness the power of the water to generate electricity. They will need to develop a method of controlling the water flow so the water's energy can be harnessed.
4. Divide your learners into pairs or small groups and provide each group with a tray in which to build their river system. Allow your learners space and time to discuss their ideas and develop their plans.
5. Each group can use natural materials such as mud, clay, sticks, stones, etc. from the surrounding area to create a river system. You may wish to provide your learners with a range of additional suitable materials such as string, Lego or sheets of material, that could hold water back to help them engineer water control methods, e.g. dams, weirs, floodgates or Archimedes screws. Ask them to consider the best place to locate their water control method in their river system. Remind them that to generate electricity, they are seeking to harness the river's flow so they should seek to locate their control method where it will benefit from an abundance of flowing water to spin the turbines of their pretend hydro scheme.
6. Once complete each group should test their design in front of the rest of their peers by pouring water into the top/start of their river system. Which group's design worked the best and why. Discuss how they could make improvements.

Build a Wind Farm

1. Introduce the challenge by discussing how geographical features and the topography of a landscape can alter air flow and wind direction. For example, features like mountains direct air currents, forcing air to rise up and over them. Ask your learners to research how the landscape affects air flow, speed and direction.
2. Discuss how air flow in the shape of wind can be captured and controlled to generate wind energy by the installation of wind turbines and wind farms. When air moves quickly, it is using kinetic energy, which can be captured as it flows across the blades of a turbine and turned into electricity.
3. Explain to your learners that their challenge is to create a mini wind farm. Their model should be free-standing and should include a method of capturing air flow.
4. Divide your learners into small groups and allow space and time to discuss their ideas and develop their plans.
5. Give your learners access to a range of suitable materials to help each member of the group design, create and engineer working, miniature wind turbines.
6. In a suitable outside space, task each group with deciding on the best location for their mini wind farm. Your learners need to consider stability of the turbines, turbine spacing and positioning to capture maximum air flow. Allow time for the groups to set up their wind farm.
7. Each group can present their wind farm, explaining their decision making. What would they do differently if they had more time?
8. Can the whole group assess which group has created the most stable and efficient turbine design? And which group has chosen the best wind farm location? What are the successful elements of both?



Suggested key questions

- What direction will the water or air move in?
- How can the water or air be controlled?
- What material will work best to control the water or air?
- What shape should the devices be to harness nature's energy efficiently?

Adapting for different needs or abilities

More support

- Demonstrate with a pre-made version.
- Complete the activity in larger, adult led groups.

More challenge

- Complete the activities individually.
- Make multiple hydro schemes or wind farms.
- Make a temporary mini dam on a suitable local stream. (Remember to dismantle after the activity.)

Follow up activity/extension

Try out our:

- [Activity plan - Not in my backyard](#)
- [Activity plan - 3 C's of climate change](#)
- Investigate a renewable energy solution for your home or school

Additional Information

Find out more about Natural Resources Wales' work to address climate change at www.naturalresourceswales.gov.uk

Natural Resources Wales/Climate change

Looking for more learning resources, information and data?

Please contact: education@naturalresourceswales.gov.uk or go to <https://naturalresources.wales/learning>

Alternative format; large print or another language, please contact: enquiries@naturalresourceswales.gov.uk 0300 065 3000

