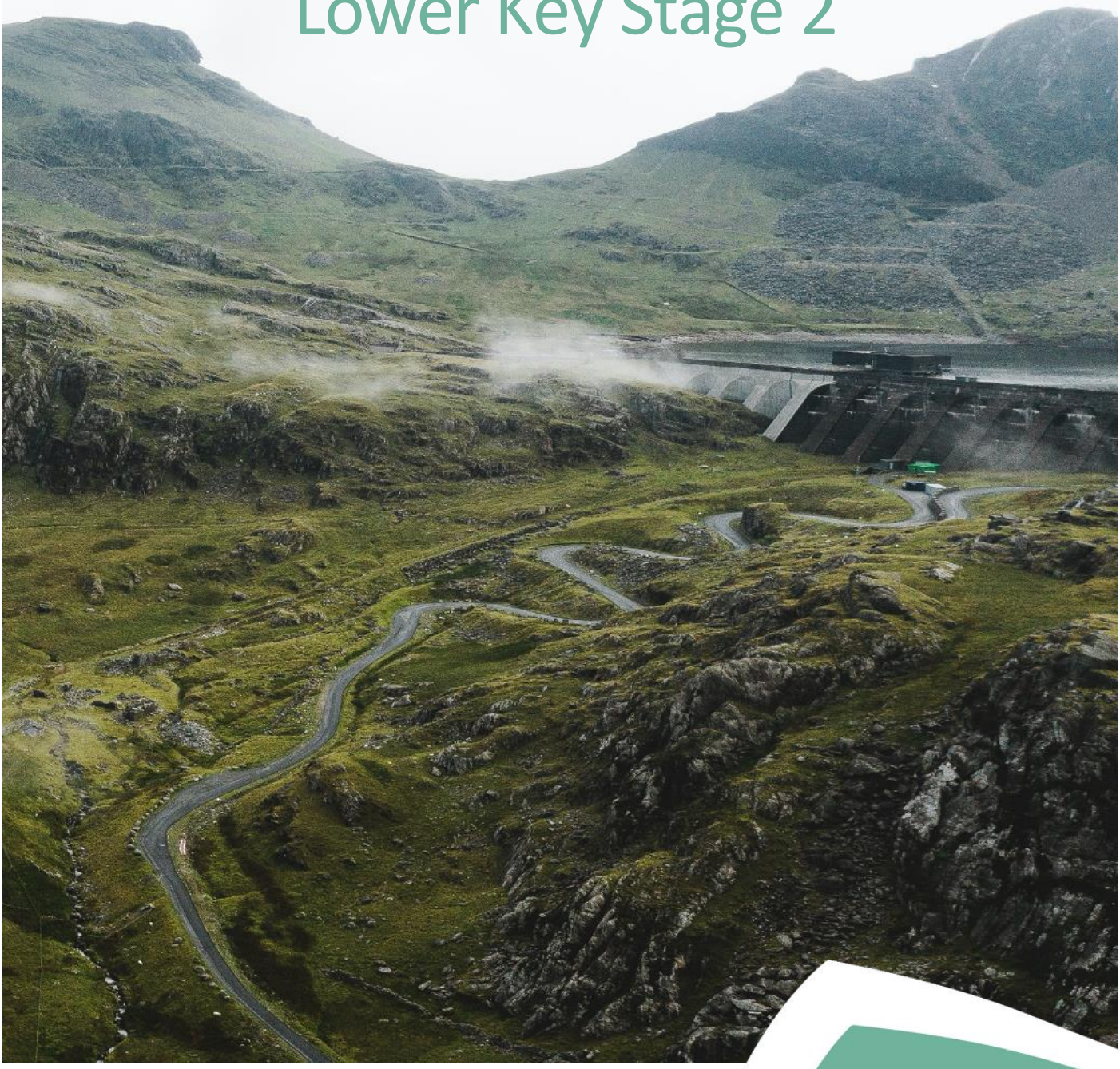
Topic based resource

Energy

Lower Key Stage 2



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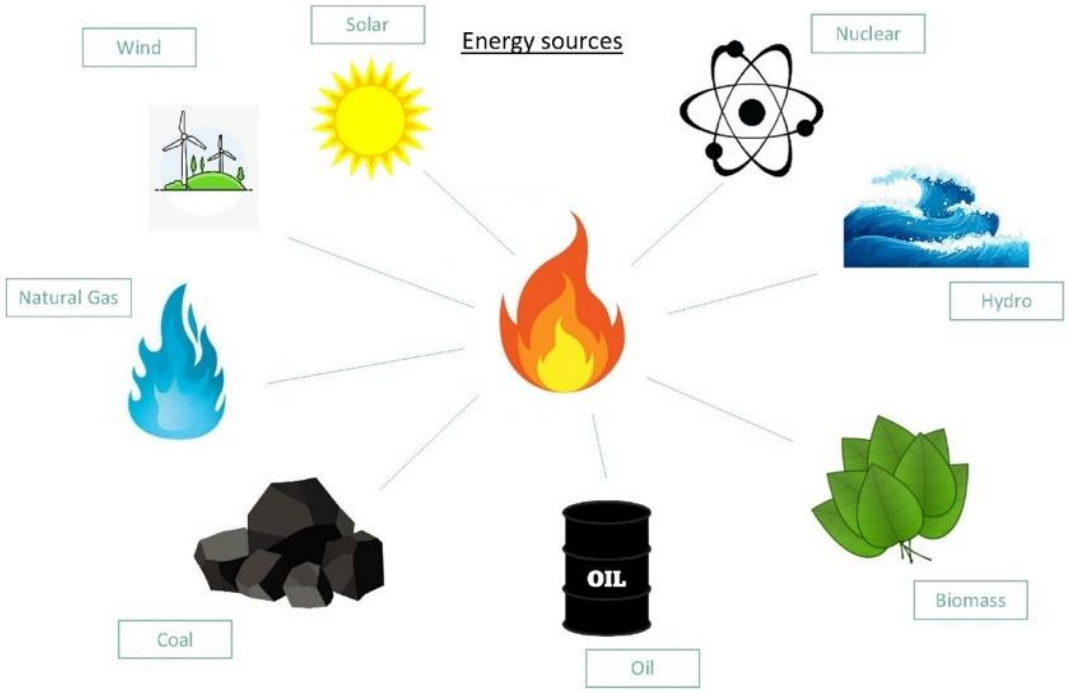
7 AFFORDABLE AND CLEAN ENERGY

cadwch keep
gymru'n wales
daclus tidy

Background information

We need energy in all areas of modern life from watching television and cooking our food to powering our cars and manufacturing the goods that we use. Traditional sources of energy are coal, oil and gas, but we now know that these fossil fuels are damaging the planet so we are looking to greener sustainable solutions to provide us with the energy we can't manage without. These activities allow the children to explore sustainable energy and understand how it works.



Climate perspective

As we become more aware of the threat to our planet from global warming, we need to find ways to limit further damage caused by human activity. In the UK about 30-40% of our electricity from renewable sources is created using water power.

It is a consistent form of power generation and is one of the most flexible in that it can be started and stopped quickly according to demand, unlike other forms of power supply such as coal or nuclear and is not dependent on the immediate weather conditions such as solar or wind energy. The rainy climate and mountainous landscape in Wales lend themselves to hydropower production.

Although hydropower can have an impact on the environment through construction, habitat destruction and wildlife populations, it is clean to run with little or no greenhouse gas emissions and makes use of a free natural resource.

Other forms of energy such as Biomass, Tidal power, wind, solar and Geothermal all have a part to play in the push towards green energy which will hopefully slow down climate change.

Water Wheels

Lower Key Stage 2

Investigating Hydro Power

Humans have been harnessing the power of water for thousands of years to provide energy for processes such as grinding wheat to make flour and cutting wood. Technological advances in the industrial revolution meant that water could be used to make electricity. Hydroelectric power is generated by capturing the energy created by the movement of water. There are four main types: dams, pumped storage, run of the river and tidal power which harness the power of moving water and turn it into electricity using a turbine connected to a generator.

Materials needed:

You may wish to ask the children to collect items required at home and bring them to school in advance.

Provide each group with a range of materials including:

- 2 plastic plates,
- Equal sized plastic cups or pots,
- Duct or insulating tape (needs to be water resistant),
- A skewer or length of dowel,
- A drill (palm drill or sharp scissors will work),
- Bucket or deep tray,
- Water and containers to pour water,
- length of string and a paper clip.

Ask the children to work in groups to think about how they can use the items provided to make a working water wheel. Share design ideas and construct (see below for basic instructions.)

Step 1

Make holes in the centre of both plates large enough to push the dowel or skewer through.

Step 2

Stick the cups on to the plates at regular intervals using the tape.

Step 3

Push the dowel or skewer through the holes in the plates and secure to the sides of the bucket or tray.

Step 4

Pour water on to the water wheel to test it works. Invite the children to explore through play how the wheel works. Discuss how the wheel is moving the water. Can they make the wheel move faster and slower? Do the children notice what happens to the water as it comes out of the wheel at the bottom?

Step 5

Ask the children to think about how the water wheel could be used to generate energy and discuss their suggestions. Fix the string to the dowel at the side of the wheel with the paper clip secured on the end. Can you get the string to wind around the stick using only the energy created by pouring water on the wheel? How could this be used to harness the power for use in homes and businesses?

Follow up activity

Provide children with a range of water play resources – lengths of drainpipe and guttering, containers, buckets, trays, jugs, bottles, watering cans, objects that can be used to block the water or create a dam and floating toys or objects such as bottle tops or balls. Can children create a way to use the water wheel to move objects along a water channel? Can the children move water from a reservoir at the top end of a system to another reservoir at the bottom using a series of channels and water wheels?

Follow up discussion

Is Hydropower the Answer?
It is important that children form their own opinions as to what is best for the planet and people as individuals. Like all types of power production Hydropower has positive and negative impacts on the environment and humans. Can the children create a mind map to show of the pros and cons of using Hydropower?

Curriculum Links

Areas of Learning and Experience - Science and Technology
Statement of what matters:

Forces and energy provide a foundation for understanding our universe.

Design thinking and engineering offer technical and creative ways to meet society's needs and wants.

Areas of Learning and Experience - Humanities
Statement of what matters:

Our natural world is diverse and dynamic, influenced by processes and human actions.

Next steps and other ideas

- Provide opportunities for open ended water play for children to continue to explore different combinations of water wheels, channels, pipes and so on
- Can you make a water wheel using Lego or other construction kits/materials?
- Write letters of persuasion to argue for or against a new hydroelectric power station in the local area.
- Research examples of different types of hydroelectricity production – many smaller examples are being developed by communities.

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