HOW CAN SWANSEA GENERATE GREEN ENERGY?

SUPPORT MATERIALS

If you need further support on specific aspects of outdoor learning these materials can enhance the engaging experiences you are providing. They can support you as you design, plan and implement your curriculum. Outdoor learning is a great way to develop learners' integral skills (creativity and innovation, critical thinking and problem-solving, personal effectiveness, planning and organising). You will want to focus on why learning matters and ensure you are meeting your learners' needs.
These materials show a path that could be taken through the activity. This is not meant to be prescriptive. You should adapt your approach depending on your learners' needs and interests and your local area.

OVERVIEW

Learners consider what energy is, the different types of energy and how electricity is generated from different sources. They explore a local area energy plan and decide where to locate a new renewable energy installation. Learners find out about the Tawe barrage, its location and consider its positive and negative impacts on the environment, people's lives and communities. They learn about some of the history of the Tawe valley and consider the Blue Eden project and what impact it might have on Swansea Bay, emailing their ideas to Swansea County Council.

CURRICULUM FOR WALES

Areas explored:

- Health and Well-being
- Humanities
- Languages, Literacy and Communication
- Science and Technology

Activity also incorporates aspects of cross-curricular skills outlined in the LNF and DCF.

RESOURCES

Internet enabled device and internet access.
Access to Find out what every symbol means on an OS Explorer map - OS GetOutside.

DOING THE ACTIVITY

- Most tasks require learners to work in pairs or groups.
- Encourage learners to share their ideas, and through open questioning, explain and justify their ideas when possible. Focus questions have been suggested to guide learners through the tasks.
- Some tasks might be more effective if pairs or groups of learners have access to an internet enabled device.
- When taking learners outdoors, it is essential that the Countryside Code is adhered to and any relevant risk assessments have been carried out with risks mitigated.

TASK 1

WHAT IS GREEN ENERGY?

Explain to learners that in this task they will consider what energy is, the different types of energy and how electricity is generated from different sources. They explore a local area energy plan and decide where to locate a new renewable energy installation.

Screens 3-4

Ask learners to consider what energy is and discuss the questions posed.

Focus questions

- What is energy? Why do you think that?
- What types of energy are there? How do you know?
- What activities do you do that require energy?

Explain there are different types of energy and invite them to discuss the questions posed.

Focus questions

- What types of energy are used in your home and in school? List them and give an example of how each is used.
- Where do you think this energy comes from? Why?

Screen 5

Invite learners to consider the pie chart showing typical usage of electricity in a house and to discuss the questions posed.

Focus questions

- How can you estimate the percentages used for each category?
- How does your house use electricity? Sketch a pie chart to show your ideas.
- How is your pie chart different and/or similar to the one shown here? Why do you think that is?

Screen 6

Explain to learners that electricity is generated from a range of sources and that solar energy is seen as 'clean energy'.

Invite them to sort each type of energy generation into 'dirty' or 'clean' in the Venn diagram on screen.

Screen 7

Ask learners to read about how electricity is generated and to discuss the questions posed.

Focus questions

- Which sources are renewable? Why?

Screens 8-9

Invite learners to read further information about how electricity is generated and to complete the drag and drop task to show their ideas. Then, ask them to discuss the questions posed.

Focus questions

- What do you think 'green energy' means?
- What ways do you know about that generate green energy? Why do you think each of these ways is green?

Screen 10

Explain to learners that there are different terms we use to categorise energy generation and invite them to match each term with its definition using the drag and drop facility.

Screen 11

Ask learners to read the information and to discuss the questions posed.

Focus questions

- If green energy is no harm to the environment even when building or siting structures, are any of these renewable energy sources really green? Why?

Screen 12

Invite learners to access the Swansea Local Area Energy Plan 2024, look at page 16 and discuss the questions posed.

Focus questions

- How many installations are operational?
- Which is the nearest operational installation to your school? What type of technology does it use?
- Looking at the maps, where else do you think should be considered for a renewable energy installation? Why?
- What type of technology should it use? Why?
- How could you try to ensure your new energy installation is green?

Screen 13

Inform learners that they are going to present their ideas for the location of a new renewable energy installation to the class. Prior to carrying out research ask them to discuss the questions posed.

Focus questions

- What technologies could you use? Why?
- Which is the best technology to choose? Why?
- Where will the energy installation be sited? Why?

A map is provided to help learners choose their location.

Screens 14-16

Ask learners to prepare their presentation taking account of what the audience will know and understand and to ensure they include why they chose this technology, how it works and why the site was chosen.

Invite learners to present their ideas and to ask for class feedback these things.

TASK 2

SWANSEA BARRAGES

Explain to learners that in this task they will explore the Tawe barrage, its location and consider its positive and negative impacts on the environment, people's lives and communities.

Screens 3-4

Ask learners to read the information about the Tawe barrage and to use the OS map to find the barrage and Swansea marina. Then, ask them to look at the old map of Swansea from 1964 Ordnance Survey Map Swansea and to discuss the questions posed.

Focus questions

- How has the area changed since 1964?
- What was there before the Tawe barrage was built?

Screen 5

Ask learners to view a satellite image of Swansea marina on the map and to discuss the questions posed.

Focus questions

- Where is the Tawe barrage? How can you estimate its distance from school?
- What are the differences in the river Tawe between the barrage and the sea and upriver from the barrage? How do you think these changes could have been caused by the barrage?
- How do you think these changes could have impacted on the organisms that lived on or near the river? Why?

Screens 6-7

Ask learners to discuss the questions posed and to list the possible impacts of the Tawe barrage on screen.

Focus questions

- What do you think were the local environmental impacts of actually building the Tawe barrage?
- What do you think are the longer-term environmental impacts of the Tawe barrage? List your ideas.

Invite learners to read about the possible negative impacts on ecosystems from a barrage to look again at their list and to discuss the questions posed.

Focus questions

- How is your list different or similar to the negative effects listed above?
- Choose one of the ideas in your list and try to think of ways this negative impact could be lessened. Share your ideas with the class.

Screen 8

Explain to learners that the Tawe barrage had positive effects on people's lives. Ask them to look at the two maps again and to discuss the questions posed.

Focus questions

- How do you think the Tawe barrage had positive impacts on:
    - travel and transport
    - local people's leisure time
    - tourism
    - energy generation?

Screens 9-10

Inform learners that they will visit the Tawe barrage to look for evidence of positive and negative impacts on the environment, people's lives and communities. Explain that they should take notes and photographs of any evidence to use in a display and take them on a visit.

Screens 11-12

Ask learners to produce a class display of their evidence, possibly categorising it into positive and negative impacts.

Invite them to spend some time studying the class display and to write a Tweet/X about whether they think building the Tawe barrage was positive for the people and environment in Swansea Bay or negative.

TASK 3

HOW COULD THE BLUE EDEN PROJECT IMPACT ON SWANSEA?

Explain to learners that in this task they will explore the history of the Tawe valley. They will consider the Blue Eden project and what impact it might have on Swansea Bay, emailing their ideas to Swansea council.

Screen 3

Ask learners to watch the video £1.7 billion Blue Eden Swansea Tidal Lagoon (1 minute), read the article £1.7 billion Blue Eden project announced for Swansea, and to discuss the questions posed.

Focus questions

- When was the article written?
- Is the article from a trusted source? Why do you think this?
- How will the project have positive impacts on people's lives?
- The project will generate electricity from tidal energy and by other technologies. What are these technologies?

Screen 4

Ask learners to watch the video Tide Education Tidal energy (about 2 and a half minutes) and to discuss the questions posed.

Focus questions

- How was tidal energy first used?
- How is tidal energy used to generate electricity?
- Why is tidal energy generation more effective at generating electricity than wind energy?

The Blue Eden plans include 'a newly-designed tidal lagoon'. Using your understanding about energy and tides, explain how the tidal lagoon could generate electricity.

Screen 5

Invite learners to watch the video Dalgylch Tawe - treial rheoli adnoddau naturiol - Tawe Catchment (almost 5 minutes), taking notes about the history of the Tawe Valley and any environmental issues discussed and to discuss the questions posed.

Focus questions

- Why was the lower Tawe Valley important historically?
- How does the landscape change as you go away from the sea? How have humans caused these changes?

Screen 6

Ask learners to look at the map and discuss the questions posed.

Focus questions

- What impacts could the actual building of the Blue Eden project have on Swansea Bay? Why?
- Which of the longer-term impacts below could cause issues in Swansea Bay?
    - changing water circulation and sediment formation
    - changing water quality
    - disrupting habitats
    - restricting the passage of migratory fish
    - posing a collision risk to fish and marine mammals.

Screens 7-8

Explain to learners that you want them to consider the positives, minuses and interesting points of the Blue Eden project. Invite learners to type their ideas into the right section of the PMI diagram.

Ask learners to look at their minus ideas and discuss with their group the questions posed.

Focus questions

- How can each minus idea be overcome? What would we need to do?

Screens 9-11

Inform learners they are going to send a formal email to Swansea County Council, outlining their ideas about the Blue Eden project. Ask them to read the information and then to write and send the email.

Screen 12

Explain to learners that you want them to use the reflection triangle to consider how they composed their email.

Invite learners to drag and drop the terms provided to show their thoughts and to consider what other strategies they used and to record their ideas.