General information

Topic: electricity from renewable energy - hydroelectricity
Main resource used for the lesson: video https://www.youtube.com/watch?v=xAahKZ1bjCE
Teaching objectives: how to explain how a technical system works, using specific vocabulary and expressions.
Previous specific knowledge: lesson "climate challenge"

Organization of the lesson

Introduction (5 - 10’)
We ask the students what the previous lesson was about.
We introduce the production of electricity from renewable energy as a way to reduce the CO₂ emissions.
We ask the students to find the different ways of producing electricity from renewable energy.
We explain that the lesson will be about hydro energy.
We give the students’ document to the students.

Function and main components of an hydro power plant (10’)

1st listening of the video:
We ask the pupils to answer to the question “What is the function of an hydroelectric power plant”

2nd listening of the video:
We ask the students to indentify the main components of an hydroelectric power plant and to fill in the blanks on the drawing.

Function of the main components of an hydro power plant (10’)

We ask the students to create simple sentences to describe the function of the main parts of an hydro power plant using a list of terms

- The powerhouse hosts the electricity production equipment
- The dam retains the water
- The penstock carries-down the water to the turbine
- The turbine converts water energy into mechanical energy
- The generator converts mechanical energy into electricity
- The transformer increases the voltage of the electric current
- The power lines deliver the electricity to the users

Model of the energy chain (10’)

We ask the students to complete the model of the energy chain of an hydro power plant
Other useful terms and expressions (10’)
We give some other useful terms and expressions, such as:
- shaft
- flow
- stream
- rotor
- stator
- coil / winding
- magnet

Conclusion (5’)
We explain what is expected for the next lesson: the students are asked to learn the definitions discovered during the lesson using an online quiz.

Documents to be printed and used
- The students’ document

Other resources

Script of the video
A hydro power plant converts the force of moving water into electricity. Hydro power is the leading renewable energy worldwide. Hydro electric facilities fall into 3 main categories, based on the height on the falling water: high head, medium head and run-of-river. Dams stem the flow of watercourses, retaining large volumes of water in reservoirs. When electricity is needed, gates in the dam open, allowing water to flow down giant pipes called penstocks. The long penstocks bring the released water to the power station below the dam. To preserve the river ecosystem, the flow of water running in the natural riverbed between the dam and the power station is kept above a defined minimum. The force of the water exiting the penstock within the power station turns a turbine. The spinning turbine drives a generator. It uses the interaction between the magnets of the moving rotor and the copper winding of the stationary stator to produce an electric current. A transformer boosts the current voltage to between 225,000 and 400,000 Volts, thereby facilitating transmission over the grids high-voltage power lines. Water leaving the turbine returns to the riverbed via the tailrace. All elements of the hydro electric facility are periodically monitored and inspected. Most facilities are automated and are able to generate electricity rapidly to meet peaks in demand. Hydropower production is not a source of greenhouse gases.

Quiz
Link: https://quizlet.com/_3r91rd

Terms and definitions:
- A power plant: the complex, including machinery, associated equipment, and the structure housing it, that is used in the generation of power, esp electrical power
- A dam: a barrier to obstruct or control the flow of water, built across a stream or river
- A penstock: a pipe conducting water from a head gate to a waterwheel
- A turbine: a machine having blades, driven by the pressure of a moving fluid
- A generator: a machine that converts mechanical energy into electrical energy
- A transformer: a device that transfers an alternating current from one circuit to another circuit, usually with an increase or decrease of voltage
• A power line a line for conducting electric power
• A gate a movable barrier
• A shaft a rotating round, straight bar for transmitting motion and torque
• A flow the volume of fluid that flows through a given section during a unit of time
• A stream a steady current in water, as in a river or the ocean
• The rotor a rotating member of a machine
• The stator a portion of a machine that remains fixed with respect to rotating parts
• A coil a conductor, as a copper wire, wound up in a spiral
• A magnet a piece of steel that possesses the property of attracting iron
General information

Topic: electricity from renewable energy - hydroelectricity

Learning objectives: learning how to explain how a technical system works, using specific vocabulary and expressions.

Take notes during the lesson:

Global function and main components of a hydro power plant (10’)

Listen to the video.

Give the global function of a hydroelectric power plant: ____________________________________________

Identify the main components on an hydro power plant and fill in the blanks

Function of the main components of a hydro power plant

Using the following terms, make simple sentences to give the function of the six main components of an hydro power plant (some terms may be used several times):

names and nominal groups: water / electricity / the electricity production equipment / the generator / the power lines / the electric current / mechanical energy / water energy / the voltage / the powerhouse / the transformer / the turbine / the penstock / the dam / the users

verbs: to carry down / to convert / to host / to retain / to deliver / to increase

prepositions: to / into / of

example: The powerhouse hosts the electricity production equipment

• ____________________________________________
• ____________________________________________
• ____________________________________________
• ____________________________________________
• ____________________________________________
• ____________________________________________
Model of the energy chain

Complete the model of the energy chain of a hydro power plant: fill in the rectangles with the name of the components and note the type of energy above the arrows.

Other useful terms and expressions

Homework

Learn the vocabulary using the online quiz https://quizlet.com/_3r91rd

Note down these definitions below: