River Ness Hydro Project

Learning intentions

- *To understand what renewable energy is and why it is important.*
- *To test different variables to determine how we can produce the most energy.*

Activity 1 — Discussion

Discuss as a class the following points:

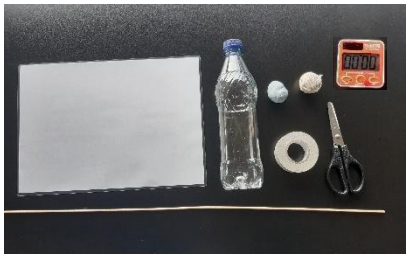
- What is renewable energy?
    - Can you give some examples of renewable energy?
    - Why do we want to use renewable energy sources to produce electricity?
    - Watch this video to learn a little more about renewable energy.
- What is hydro power?
- What are different types of hydro power?
- Watch these videos to learn about some careers within the renewable energy sector.
    - James at the European Marine Energy Centre (EMEC)
    - Jerry at the European Marine Energy Centre
    - James at SSE

Activity 2 — Test a Hydro Turbine

In groups, make your own hydro turbine and test different variables to see if you can produce more energy.

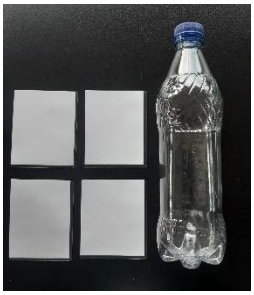
Equipment

- Plastic bottle (with a hole in the bottom)
- Wooden dowel/skewer
- String
- Plasticine
- Laminated card
- Tape
- Scissors
- Stopwatch



Method

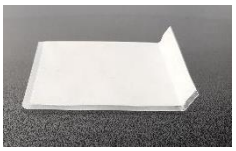
1. Cut out 4 rectangles of the same size from the laminated card.
   Each rectangle should be about 1/3 the height of the bottle. These will become the paddles for the turbine.



2. Mark on the bottle where the paddles will go.
   Make sure they are evenly spaced out.

3. Cut along the marks you have made on the bottle where the paddles will go.

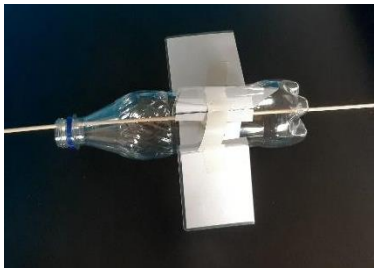
4. Fold one edge of your paddles about 1cm from the end.



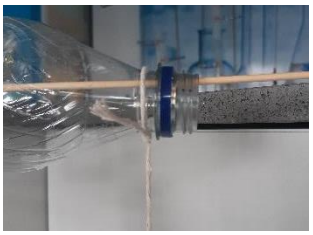
5. Insert the folded edge of the paddles into the slits you have made on the bottle.

6. Tape the paddles to the bottle.

7. Put the dowel/skewer through the hole in the base and until it comes out from the top of the bottle.



8. Tie one end of your string to the top of the bottle and add a small amount of plasticine to the other end of the string.



9. Hold your turbine under running water and time how long it takes for the string to wind up.

10. Fill in the table below.

Attempt 1 (seconds)	Attempt 2 (s)	Attempt 3 (s)	Average (s)

The faster the string is wound up shows more energy is being generated by the water.

<u>Experiment</u>

Change 1 variable on your hydro turbine to see what change will produce more energy.

- Make a new turbine, changing 1 variable.

  Here are some suggestions of what you could change:
  - number of paddles
  - size of paddles
  - shape of paddles
  - height the water is falling from

Use the table below to help you.

The variable I will change is:	
The variables I will keep the same are: (everything else)	

- Make a prediction about what you think will happen.

_____
_____
_____

- Test your new turbine and fill in the table below.

Attempt 1 (seconds)	Attempt 2 (s)	Attempt 3 (s)	Average (s)

- Compare your results from both of your turbines and make a conclusion about which produces the most energy.

_____
_____
_____

<u>Discussion</u>

- What is a variable?
- Why do we only change 1 variable?
- Why did we test each turbine 3 times and take an average?
- Compare the results from the whole class and see if you can work out which turbine would be best to make, e.g. which size, shape and number of paddles generates the most energy.
    - If you have time you could build it and test it.
- If you were to repeat this experiment how would you make it better?

Activity 3 - River Ness Project Quiz

Watch this video about the Hydro Ness project and then try out this quiz on Kahoot.