



How do hydro stations work?

Years 1-4 (ages 5-8)

Overview

Show your students the video “How do hydro power stations work?”
www.meridianenergy.co.nz/who-we-are/our-power-stations/hydro

| Curriculum areas | Achievement objectives | Years | Learning | Success criteria |
|------------------------------|---|-----------|--|---|
| Level 1-2 | | | | |
| The nature of science | Investigating in science Extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models. Communicating in science Build their language and develop their understanding of the many ways the natural world can be represented. Participating and contributing Explore and act on issues and questions that link their science learning to their daily living. | Years 1-4 | ✓ Explore and experience the process of water turning into electricity. | ✓ Explain or illustrate how hydro stations work. |
| Science - The physical world | Physical inquiry and physics concepts Explore everyday examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat. | Years 1-4 | ✓ Understand how a water turbine uses the force and energy from water to turn. | ✓ Illustrate how electricity is generated from water. |

What you'll need

- Cross section of a hydro power station worksheet for each student
- Electricity and water flow diagrams
- How do hydro stations work video on the website
- Read and make instructions for making a turbine
- 360 degree footage of Ōhau A or Manapōuri power station

Lesson progression



01. Get your students with a partner to talk about what they know about electricity. Go around the room and get each group to share their ideas.



02. Watch the 360 degree footage on the Meridian website.
<https://www.meridianenergy.co.nz/whare-ako>



03. Have your students complete the “cross section of a hydro power station” worksheet. There are 2 options for you here. There is a cut and paste version suitable for years 0 - 2 and a writing version suitable for years 3 and 4. However choose the version that is suitable to your students. Cut and paste version for years 0 - 2.



04. Use the Ōhau A or Manapōuri water and electricity flow diagrams and get your students to draw the path the electricity takes in red from the generator to its destination. This is a good activity for the students to understand that the water flows back into the river system once it has generated electricity.



05. Your students can have a go at making a water turbine. Download the make a turbine instruction sheet. Read through these instructions with your students. They can do this individually or in groups.

Vocabulary

| | | |
|-------------|-------------------|--------------------|
| Dam | Lake | Reservoir |
| Hydro | Control gate | Tail race |
| Electricity | Generator | Transmission lines |
| Power house | Drive shaft | Transformer |
| Turbine | Intake | Earthfill dam |
| Runner | Penstock | Concrete |
| Gravity | Water | Water pressure |
| Spins | Kinetic energy | Electrical energy |
| Voltage | Switchyard | Network |
| Inlet gate | Potential energy | Canal |
| Tunnel | Hertz | National grid |
| Renewable | Flow | Force |
| Spillway | Mechanical energy | Blades |
| Axis | Buckets | Shaft |
| Rotor | Stator | Rotation |

The vocabulary is useful to display on the wall for students to access at all times and to help them become familiar with these topic specific words.

Assessing your students

Learning Intentions

Students are learning to:

- » Explore and experience the process of water turning into electricity.
- » Understand how a hydro/water turbine uses the force and energy from water to turn.

Success Criteria

Students can:

- » Explain or illustrate how hydro stations work.
- » Illustrate how electricity is generated from water.

Notes to help you teach

- Typically, a dam stores water in a reservoir. Water released from the reservoir falls through a pipe called a penstock to a turbine. These turbines look like large wheels with wide spokes. The water hits the blades and pushes them to make the turbine spin. The turbine's rotation drives a generator to produce electricity. In other words, this spinning 'changes' the force of falling water into electricity.
- Most of Meridian's electricity is made from the energy of falling water. Our hydro stations generate enough electricity to power around 1.4 million homes each year.
- It's not possible to store large amounts of electricity. But it is possible to store water in dams.

Next steps

- » Book a visit from one of our engineers to run a **STEM programme** building earth dams.
- » Book a visit to tour one of **our Power stations**.

Ideas for play based learning

- » Build a dam in a water trough using different materials eg sand, rocks, dirt, clay etc. Which is better?
- » Build a river or a canal in a sandpit or by using a tarp on the ground.
- » Make a turbine from recycled materials.
- » Build a water wall with pool noodles or old pipes. These are like the penstocks.

Links to other resources

- » **Power article by Alex Taylor** - School Journal Level 2 Aug 2011.
- » **Hydro power facts** by Science Kids - <https://www.sciencekids.co.nz/sciencefacts/energy/hydropower.html>
- » **Electricity** by Science Kids <https://www.sciencekids.co.nz/electricity.html>
- » **What is a water wheel** - Wonderopolis <https://wonderopolis.org/wonder/what-is-a-waterwheel>
- » **NZ's Hydro electricity story** <https://teara.govt.nz/en/hydroelectricity>
- » **Hydro electricity** by the Science learning hub <https://www.sciencelearn.org.nz/resources/1574-hydro-power>

