



# 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](http://www.meridianenergy.co.nz/who-we-are/our-power-stations/hydro)

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

## 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>

