Year 6: Science and Mathematics

Lesson Plan 1: What is hydropower?

Introductory Activities (Engage)

(5 minutes each)

As a class group brainstorm:

- Where does electricity come from?

Possible Answers	
Power lines	Coal
Power points	Water
Sun	Wind

Collate your answers on a flip chart, poster or other

Have a class poll with students voting by showing a thumbs up when they agree and a thumbs down when they disagree with the questions below:

- Who thinks electricity is made?
- Who thinks electricity is transformed from different forms of energy?

Lesson 1 (Explore)

(20 minutes)

Materials	Quantity
Smart board or projector	1
Internet connection	1
Glossary	1 ea
AS3 Waterwheel activity	1 ea
AS5 Hydropower station cross section	1 ea

1. Display the poster Hydropower station cross section to your class.

- **Dam:** the most recognisable feature of hydropower schemes. Dams are constructed to create water storages (lakes). The water in the lakes has **potential energy**.
- **Inlet:** the inlet permits water to enter the penstock under gravity. The movement of this water is called **kinetic energy** (energy of motion).
- **Penstock:** directs the water into the turbine. The pressure and force of the water spins the turbine extremely fast. The **kinetic energy** from the moving water is transferred onto the turbine to make it spin.
- **Turbine:** The turbine is connected to a shaft with a rotor on the end. The rotor is covered with electromagnets.
- **Generator:** the generator transforms the **kinetic energy** into **electrical energy**. It contains the stator (fixed parts) and the rotor (moving part).
  - **Stator:** is made from copper windings.
  - **Rotor:** is covered with electromagnets and spins within the stator. When the rotor turns inside the stator, it causes copper electrons to move. This movement of electrons is electric current. This electricity is transferred to a transformer.
- **Transformer:** near the power station transformers increase the voltage of the electricity so that it can be sent long distances along high voltage power lines. (There are transformers closer to points of use (homes, schools, business) that decrease the voltage to 240V for general use).
- **Power lines**: transfer the energy from the power station to your community.
- **Household connection:** homes are connected to the power lines by an over-head or underground cable.

Exploratory questions

- Where is our schools nearest lake? Is there a dam or power station there?
  - Explore these on the Hydro Tasmania's website www.hydro.com.au

- What types of energy are used to create hydropower? Can you think of any other examples of gravitational potential, kinetic and electrical energy?
- Potential energy (stored energy e.g. batteries or a diver on a diving board – due to their position), kinetic energy (motion e.g. rolling a ball downhill), electrical energy (any appliance or device that plugs into a power point)
- What happens to the water after is has been used in the power station?
  - The water continues to flow through the catchment and water cycle.

Options for assessment and extension

	Option 1
Science – **Science Understanding** **Literacy** **Individual Activity**	Students create their own glossary of the types of energy used in the generation of hydropower (potential, kinetic and electrical) Research and complete the definitions in their own words **Extension** Provide examples of these types of energy in their daily routines
Science – **Science Understanding** **Literacy** **Individual/paired Activity**	Waterwheels and turbines are machines that use the kinetic energy of moving water. They have been an important part of history and had many uses over time. 1. Students research the history of waterwheels and turbines and demonstrate their learning in a poster, written piece or digital presentation. **Extension** 2. Students create their own waterwheel (refer to activity build a waterwheel)
Science – **Science Understanding** **Literacy** **Individual/paired Activity**	The rotor is covered in electromagnets and they are an important component in the transformation of kinetic energy to electrical energy Electromagnets have many uses including in motors, generators, transformers, electric bells and buzzers, loudspeakers, headphones, MRI machines, magnetic locks. 1. Ask students to research five examples of an electromagnet

Elaborate and Review

As a class group review:

Energy and energy transformed

- What types of energy are transformed to generate electricity?
- How is the energy transformed?

Is hydropower sustainable?

- What happens to the water after is has flowed through a power station?
- Is water a renewable resource? (refer to the Year 4 Lesson Plan – The Water Cycle)