

# Teachers Guide: Discover Pumped Hydro

## Year 8: Science and STEM

### Key understandings and learning intentions

Without energy, the world would not exist. What is energy? Can we create it? Students will delve into these questions in part one of the lesson plan through a challenge to build a self-flowing water flask: a perpetual motion machine, resolving that energy cannot be created, but only transformed and then stored for our energy needs.

In part two of the lesson plan, students then explore the idea of stored energy through the study of a renewable and sustainable method: a pumped hydro power station. This is the future of renewable energy in Tasmania and has been called the 'Battery of the Nation'.

Students demonstrate their learning through the Battery of the Nation project that can be presented to primary school students on pumped hydro power and other renewable energy sources such as solar and wind that can supplement it.

#### Fast facts

**Lesson Plan: One (divided into two parts)**

**Duration: 180 (plus student's own time to finish project)**

**Resources: See the lesson plan for materials list**

### Achievement standards

Students will:

- *identify* different forms of energy and describe how energy transfers and transformations cause change in simple systems
- *explain* how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems
- *reflect* on implications of these solutions for different groups in society
- *identify* and construct questions and problems that they can investigate scientifically.

### Guiding questions

1. What is energy and can we create it?
2. How does energy transfer from one form to another?
3. How can we use the transfer of energy to generate electricity for our use?
4. Why is the storage of energy such a challenge? Why is it so important?
5. How can pumped hydro power generation meet Australia's energy needs for the future?

Learning Area	Content Description
<b>Year 8 Science</b>	
<b>ACSSU155</b>	Energy appears in different forms, including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems.
<b>ACSHE135</b>	Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations.
<b>AC SIS139</b>	Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge.
<b>AC SIS140</b>	Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed.

### General capabilities

Critical and creative thinking, literacy, numeracy, and information and communication

### Cross curriculum priorities

Sustainability

### Adjustments/strategies to include all students

	Enabling	Extending
<b>Content</b>	Introduce students to vocabulary before lesson and allow more time to finish. Use videos and other materials in extension section.	Research the use of sustainable technologies to deliver basic services in remote Aboriginal and Torres Strait Islander communities.
<b>Process</b>	Peer assistance to work through folios and in the design and production of the Battery of the Nation projects.	Get in contact with an engineer working at Hydro to develop the Battery of the Nation pumped hydro project to get questions answered.

### Evidence of student learning

Students are able to:

- Analyse the requirements for the transfer of energy
- Describe how energy transforms from one form to another when generating electricity
- Identify variables
- Explain energy transfer simply and creatively.

## Rubric/assessment tool for Battery of the Nation project

	Exceeds expectations	Meets expectations	Approaching expectations	Below expectations
<b>Research Skills</b>	Uses relevant, reliable and current information from a wide range of sources.	Uses relevant, reliable and current information from a range of sources.	Uses relevant, reliable and current information from a limited range of sources.	Uses information that is irrelevant, unreliable and/or lacks currency.
<b>Communication Skills in presentation</b>	Presents to audience with a high level of clarity, effective sequencing and explanatory techniques appropriate to age level with creativity.	Presents to audience with clarity, effective sequencing and explanatory techniques appropriate to age level with some creativity.	Presents to audience in a generally clear manner with sequencing and explanatory techniques.	Has difficulty conveying meaning to audience due to lack of clarity, sequencing and/or explanatory techniques.
<b>Understanding and critical thinking</b>	Goes beyond answering the questions fully, bringing an originality of perspective.	Answers the required questions fully and in great detail.	Answers the questions but in a limited way.	Provides inaccurate answers to the questions or does not address all questions.
<b>Organisation</b>	Organization is coherent, unified and is consistently effective in its purpose.	Organization is coherent, unified and is effective in its purpose.	Organization is coherent but ineffective at times.	Organization is confused and fragmented.