

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.

Students demonstrate their learning 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
Year 8 Science	
AC9S8U04	Classify different types of energy as kinetic or potential and investigate energy transfer and transformation in simple systems
AC9S8H03	Examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations.
AC9S8I01	Develop investigable questions, reasoned predications and hypotheses to explore scientific models, identify patterns and test relationships.
AC9S8I02	Plan and conduct reproducible investigations to answer questions and test hypotheses, including identifying variables and assumptions and, as appropriate, recognising and managing risks, considering ethical issues and recognising key considerations regarding heritage sites and artefacts on Country/Place.

General capabilities

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

Cross curriculum priorities

Sustainability

Adjustments/strategies to include all students

	Enabling	Extending
Content	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.
Process	Peer assistance to work through folios and in the design and production of hydropower projects.	Get in contact with an engineer working at Hydro Tasmania to develop the pumped hydro project and 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 Hydro Tasmania's hydropower project

	Exceeds expectations	Meets expectations	Approaching expectations	Below expectations
Research Skills	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.
Communication Skills in presentation	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.
Understanding and critical thinking	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.
Organisation	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.