Secondary science, math, STEM

Recommended for year 6, 8 science, STEM, or related options

Unit: Discover energy transfer through pumped hydro power

Lesson 2: What is the *Battery of the Nation*?

Teacher preparation

It is best to complete lesson 1 in this unit first, unless students have a solid understanding of what energy is and how it is transferred.

Connect with a younger group of students that your students can present to for the *Battery of the Nation* projects (if your students are in year 8, year 6 students would be ideal as it fits the curriculum for year 6).

Introductory discussion (15 minutes)

Review the previous experiment on the Boyle's self-flowing flask.

What was learned?

While at their desks, have students demonstrate the transfer of potential energy to kinetic energy by sitting still and then jumping up. Discuss how our bodies get energy *[we get energy from our cells (metabolic energy), which get energy from the foods we eat (chemical energy), which get energy from the sun (radiant energy). It's all energy transformation].*

What about the energy we use to heat our homes, power our tablets, iPhones and refrigerators? Discuss where the energy that we use every day in our homes comes from *(It's energy transfer as well. If it's hydro power, it comes from the kinetic energy of moving water).*

In Australia, over 80 percent of the energy generated each year is from non-renewable resources. The rest (20 percent) is from renewable energy generation, 88 percent of which is generated in Tasmania using hydro power.

Lesson (90 minutes + time to work on project)

1) Briefly review why renewable energy is so important now and into the future. A portion of future renewable energy in Tasmania will be pumped hydro power, and has been called the *Battery of the Nation*. Have students heard of pumped hydro power? *Tasmania will be producing more renewable energy than it can use and will be an important part of energy generation for the nation.*

   Begin a discussion on stored energy:

   - Can energy be **stored**? *Batteries can store energy. Batteries are not a perfect solution as they eventually need to be recharged or disposed of and they are made of chemicals that are not good for the environment.*
   - Why is it important to store electricity (electrical energy) for later use? *So we have energy when we need it. For example, energy from the sun and wind is intermittent as the sun is not always shining and the wind is not always blowing.*

- Can we store renewable energy such as wind or solar? *Not for long periods of time.*

2) Show students the video from Hydro Tasmania on pumped hydro power: www.youtube.com/watch?v=_PH0IJ-_qOI.

From the video:

- Why is it ideal to use more than one renewable energy source together?

Battery of the Nation **project**

Students will create a presentation on pumped hydro power generation for a younger audience while answering the questions: **What is pumped hydro power, how does it work, and why is it important?**

Criteria:

- Each project should be presented in 10 minutes or less.
- All three questions are thoughtfully answered in the presentation. Show students the rubric/assessment tool listed in the teacher guide.
- Research must be shown and references listed.
- Each project needs to meet the comprehension level of the audience. Be creative yet simple.
- Presentations can use a range of mediums (PowerPoint, create a model, role play, stop motion, etc.)
- Students need to first research their topic so they fully understand pumped hydro power. They can use some of the resources listed in the teacher resources.

NOTE: It is useful for students work in pairs or small groups so they share information. Be sure students get feedback from their audience once they present to them.

Extension

Research the proposed Cethana Pumped Hydro site to learn what type of considerations need to be made when deciding on where to locate pumped hydro. Contact education@hydro.com.au

Reflection

As a class group review:

What they enjoyed, what they found challenging, what went well and what they would do differently next time.

What methods did they use to gain feedback from their audience.