

Pump It Up: Water & Energy

A Learning Activity for Grades 3-5

In collaboration with Anglophone South School District

Overview

Water is a vital component to all living things! In this 1-hour, hands-on learning opportunity, students will discover the connection between water and energy. They will create, explore, and discuss hydroelectric energy, a large source of renewable energy found in our province of New Brunswick. Prepare to get a little wet! 💧

What You'll Need

- PowerPoint Presentation: *Pump It Up - Water & Energy*
- Pencils – Unsharpened (1 per group)
- Maker Space Materials (recycled cardboard, cardstock, tape, dixie cups, scissors, used pop/water bottles, string, straws, etc.)
- Access to sink OR bucket with watering can/water bottle
- Design Template (see below, photocopies needed for each group)
- Chart Paper
- Marker
- Small, light object per group (eraser, recycled paper, cotton ball, etc.)
- Book – *Water Dance* by: Thomas Locker.

Instructions

1. **DISCUSSION:** Using chart paper, simply print the word, “Water” in the center of a sheet and ask students to share the first thing that they think of when they hear that word. Write their responses down. Read the book, *Water Dance*, written and illustrated by Thomas Locker. After reading, have students add more responses to the chart paper.
2. **LEARNING GOALS:** Read over students’ responses and then identify if ENERGY came up. Next, go over the learning goals with students on Slide 2. Hydroelectric Energy = *is a form of renewable energy that uses the power of moving water to generate electricity.*
3. **CAN YOU SPOT IT?:** Using the King’s Landing Drone video (1:26) on Slide 3, have students watch to observe a barrier to the river. Feel free to pause it and have students



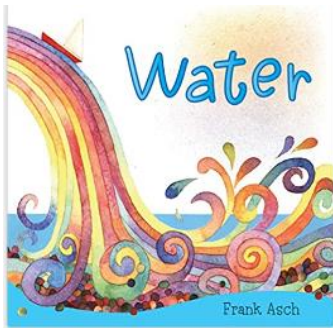
share what they know about a dam. Discuss: *Why would they need to dam the river? What are they using that dam for?*

4. **WATER WHEEL CHALLENGE:** Go to Slide 4. Using the maker space materials available, have students brainstorm, plan, and create a water wheel that lifts an item. Be sure to set a timer for students and use the planning sheet below. All groups **MUST** begin with an unsharpened pencil and on one side, they will tie a piece of long string and a light object at its end (eraser, recycled paper, cotton ball, etc.). By developing a water wheel (that works!), students will also see their string wind around their pencil and lift the light object as their water wheel is turned by the motion of the moving water. (Have students wind the string around the pencil a few times before beginning to pour water onto their final water wheel.) A sink or a bin with a water bottle/watering can be used to test the water wheels. Be sure to gather all groups and watch the testing phase together as each group presents their creation. Celebrate each group's inventiveness!
5. **VIDEO:** Go to Slide 5 and watch NB Power's Video (12:13) on how the Mactaquac Generating Station works, as students make a deeper connection between water & energy.
6. **CAREER MINDFULNESS:** Especially with the 2030 Mactaquac Generating Station deadline coming, what jobs will be critical in the hydroelectric energy sector in the years to come? Review slide 6 and have students share their responses of the importance of each career title mentioned. Can you think of more?
7. **REFLECTION & NEXT STEPS:** Go back to the original chart paper of Water and have students add to it. How does hydroelectric energy affect me? How does it affect our province?
8. **SHARE:** Feel free to send us photographs of your class completing this learning activity via Twitter @NBCOE.

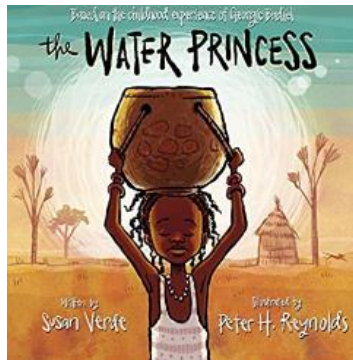
Possible Extensions:

- During the Water Wheel Challenge, invite students to also speak to the potential (water wheel) & kinetic energy (water) used in this opportunity
- Grade 5: Review simple machines – wheel & axle and its connection to the water wheel
- Schedule a field trip to the Mactaquac Generating Station to see it for yourselves
- Research other renewable sources of energy here in New Brunswick
- Using the 3 possible options listed in the NB Power video for 2030, have students think about the implications of each one for the current Mactaquac Generating Station. Which do they feel is the best one and why?
- Have students create an individual water colour art piece showcasing their own connection to water and energy

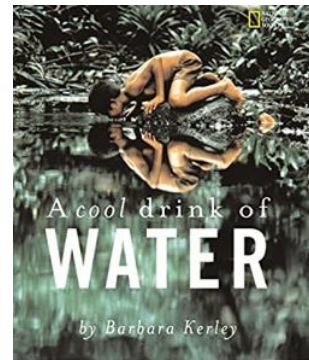
Additional Read Aloud Suggestions



Water
By: Frank Asch



The Water Princess
By: Susan Verde & Georgie Badiel
Illustrated by: Peter H. Reynolds



A Cool Drink of Water
By: Barbara Kerley

Curriculum Outcomes

Science	<p>GCO 1: Students will develop the skills required for scientific and technological inquiries, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions (scientific literacy).</p> <p>GCO 2: Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology (STSE).</p> <p>Concepts Included: Grade 3 - Interactions of living and non-living components ▪ Energy flow Grade 4 - Uses of Earth resources – water Grade 5 - Common simple machines, Different types of forces</p>
Literacy	<p>GCO 1: Students will speak and listen to explore, extend, clarify, and reflect on their thoughts, ideas, feelings, and experiences.</p> <p>GCO 2: Students will be able to communicate information and ideas effectively and clearly, and to respond personally and critically.</p> <p>GCO 3: Students will be expected to select, read, and view with understanding a range of literature, information, media, and visual texts</p>

	GCO 8: Students will be expected to use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations.
Personal Wellness	GCO 4 Students will develop knowledge of self and explore the world of work.
Social Studies	3.1.2 Describe the major physical features, climates, and vegetation of their province and the Atlantic region. 4.3.3 Examine the relationship between humans and the physical environment. 5.6.1. Illustrate the similarities and differences of past societies and your society.

Global Competencies



Collaboration



Communication



**Critical
Thinking &
Problem-
Solving**



**Fostering and
Teaching Self-
Awareness
and Self-
Management**



**Innovation,
Creativity &
Entrepreneurship**



**Sustainability
and Global
Citizenship**

Acknowledgements

Roman History: <https://romanhistory.org/structures/roman-sawmill>

National Geographic: <https://education.nationalgeographic.org/resource/hydroelectric-energy>

Alternative Energy Tutorials: <https://www.alternative-energy-tutorials.com/hydro-energy/waterwheel-design.html>

NB Power: <https://www.nbpower.com/en/about-us/learning/learn-about-electricity/hydro>

King's Landing: <https://www.youtube.com/watch?v=8aTYaiU-hiE>



Water Wheel Challenge

Design and create a working water wheel!

Names: _____

Your water wheel **must**: turn, stand the force of water, and rotate to lift the light object attached to your pencil.

REFLECT:

How did our design do? What would we change for next time? What challenges did we face?
