Centre of Excellence ENERGY

3-5 Energy-Efficient Gingerbread House Challenge

Overview

In this hands-on and cross-curricular building challenge, elementary learners will have the opportunity to plan and build energy-efficient gingerbread houses to gain the highest energy-efficiency score in the classroom!

NB Curriculum Connections

3-5 Learning Areas
English Language Arts: ○ *Strand:* Interactions - *Big Idea:* Expression – *Skill Descriptor:* Select and present content to communicate facts, ideas, and opinions to peers and teachers. ○ *Strand:* Reading - *Big Idea:* Reading Comprehension – *Skill Descriptor:* Respond personally to presentations, oral stories and a variety of multi-modal text.
Mathematics: ○ *Concepts – Processes:* Standard Measurement ○ *Concepts – Fluency:* Automaticity (with basic facts)
Science: ○ *Strand:* Learning & Living Sustainably – *Big Idea:* Responsible and Sustainable Application – *Skill Descriptor*: Apply scientific knowledge and an understanding of sustainable practices responsibly with respect to the natural world.

Global Competencies

Collaboration

Communication

Critical Thinking & Problem-Solving

Innovation, Creativity & Entrepreneurship

Fostering and Teaching Self-Awareness and Self-Management

Sustainability and Global Citizenship

What You'll Need

- Printable Energy-Efficient Scorecards – double sided (*1 per small group – see below*)
- PowerPoint Presentation
- Gingerbread House Kits (complete with walls, roof, icing, gumdrops, and peppermint candies; *1 per small group of 4-5 learners*)
- Pencils
- 1 bag of mini marshmallows
- 1 package of pull and peel licorice
- 4-pack of chocolate bars (*with squares – like Aero or Jersey Milk*)
- 1 package of wafer cookies
- 1 package of 12 *Sunrype Fruit To Go* fruit strips

Instructions

1. **<u>Discussion:</u>** Allow learners to share their thinking around this question: "*What is energy-efficiency*?" Energy-Efficiency simply means to reduce the use the amount of energy being used – we can do this through a variety of ways. Refer to Slide #2 of the PowerPoint Presentation for three ways to live with more energy-efficiency:

   - <u>Upgrade appliances and home products that use less energy:</u> Some older appliances use A LOT of energy but with technology and awareness, newer appliances use less. Appliances are now rated, or graded, on their energy-efficiency with stars so consumers can be aware before buying them. Home products, like lightbulbs, can be replaced to LED lightbulbs, and save a lot of energy each year, as well.
   - <u>Change our daily habits:</u> turning off lights when leaving a room, turn the tap off between brushing my teeth and rinsing, and unplugging unused electronics are just a couple of daily habits to help with energy-efficiency.
   - <u>Spread the word:</u> Once we know about energy-efficiency, we have a responsibility to share what we know, because we all live on this beautiful planet of Earth. Using less energy, helps our Earth.

2. **<u>Energy-Efficient House Products:</u>** Energy-efficiency doesn't only happen on the inside of our houses – today, we'll be focusing on how energy-efficiency can be used on the OUTSIDE of our houses! Show each slide, from 3-9 of the PowerPoint, and use the information below to explain, not only the energy-efficient product, but also the materials that learners will use in their own gingerbread house.

   <u>*Weather Stripping*</u> (Slide 3)– Thin, sticky pieces of materials that help stop leaks in windows or doors. Leaks from wind or weather (rain or snow) can waste a lot of energy

– actually, almost 40% of a home's heating or cooling costs! Remember when building your energy-efficient gingerbread house, you can add weather stripping with pull and peel licorice.

*Solar Panels (*Slide 4*)*- convert sunlight to heat energy through collectors, like small pipes. These collectors have a liquid in them that moves around and is heated by the sun, which creates energy that can be used to heat your home, power your appliances, or even heat your swimming pool. Generally, 15 solar panels per house, can help drastically eliminate the need for electrical power. To add solar panels to your gingerbread house, use the squares from our chocolate bars.

Smart Meter (Slide 5) – is on the side of your house and can let you know, through technology, how much energy you are using at any time. No more estimating and no more manual readings by NB Power. They have workers who must drive around to each house and building and read the energy meter in order to send the bill. Just this transportation use alone, would be a HUGE energy savings for NB. To add a smart meter, place a peppermint candy on the side of your gingerbread house.

Cool Roof (Slide 6) – On a hot, scorching summer day would you rather wear a black t-shirt or a white t-shirt and why? Allow learners to respond. It's the same for our roof! Our roof can get up to over 100 degrees Celsius if it has dark or black shingles on a summer day, which means we'll have to run more fans or air conditioning to cool it down. IF our roof was light or white to begin with, it will not heat up as much and we would use less energy to cool it down. Mini marshmallows can make your gingerbread have a cool roof.

*Insulated Vinyl Siding (*Slide 7*)* – an extra layer to protect from leaks of air. By adding this extra layer of insulation, between the outside and inside of a house, it also can reduce noise, hold up better against bad weather storms, and reduce energy (not so much heat or cooling needed). To add this to your gingerbread house, we'll be using Sunrype Fruit Strips.

Heat Pump (Slide 8) – heats and cools houses using a lot less energy than electric heat, oil or propane sources. They do not create heat or cool air, but they simply move air inside and outside and keep temperatures steady. Wafer cookies will be used as heat pumps on our gingerbread houses.

LED Lights (Slide 9) – These types of lights change energy into light rather than heat, like traditional lights. LED lights last a lot longer and they use 90% less electricity than regular lights! Gumdrops will be used as LED lights for your gingerbread house.

BONUS Energy-Efficient Products (Slide 10) – Have learners identify **WHY** these would be energy-efficient for a homeowner.

- Compost Box
- Rain or Snow Barrel
- Solar Landscape Lighting
- Windmill

Are there some other energy-efficient products not mentioned or that our group could create? Discuss before diving into the building challenge.

3. **Gingerbread Building Challenge:** Divide the class into smaller groups of 3-4 learners. Open the Gingerbread Kit boxes together and talk about the different pieces need to assemble a house – walls and a roof. Also explain that sometimes it is difficult building with delicate materials, so some grit and patience may be needed to finish well! Give each group a copy of their double-sided *Energy-Efficient Scorecard* (on Slide 11). Re-read the possible energy-efficient possibilities, as well as the BONUS challenges. Remember, *the goal is to create a gingerbread house with the **highest** energy-efficiency score!* When ready, start the timer (on Slide 11) or feel free to set your own time limit. Let the building begin!

4. **Show & Share:** As the timer stops, have students tally up how many energy-efficient products they were able to use in their design and fill out their scorecard. Once completed, do a Show and Share - learners tour the room and listen as peers tell about their design, show their score, and discuss their challenges.

5. **Wrap Up and Clean Up:** Discuss: *What were some of the challenges that you had to face? What is your favorite product of your energy-efficient gingerbread house? What did you learn from this activity?* Then, have all groups clean up.

Extension Ideas:

- Invite another class to come to an "Energy-Efficient Gingerbread House Showing" and have small groups present their designs and answer questions.
- What about the INSIDE of our houses? Using white paper, have learners design the inside of their energy-efficient gingerbread house with more energy-efficient products and appliances.
- Go on an Energy-Efficient Community Walk and see how many of the energy-efficient products that we learned about from this learning opportunity, are visible in your community.

Reflection Activity

Please see the attached PDF for several choices on how you and your learners can reflect upon today's activity.

Acknowledgements

1. Natural Resources Canada - Energy Efficiency: https://natural-resources.canada.ca/energy-efficiency/10832#:~:text=Innovation%20in%20the%20fields%20of,performance%2C%20and%20increasing%20asset%20values, 2023.

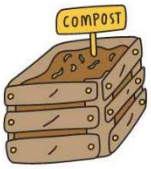
2. NB Power – Smart Meters: https://www.nbpower.com/en/grid-modernization/smart-meters/, 2023.

Try adding as many of the following items to your creation and then adding up your energy-efficiency score!

			Points
	Weather Stripping (minimum 1 door and 3 windows)	 =	4
	Solar Panels (minimum 4)	 =	2
	Smart Meter (1 per house)	 =	1
	Cool Roof	 =	4
	Insulated Vinyl Siding (on all 4 walls)	 =	3
	Heat Pump	 =	1
	LED Lights (on edge of roof)	 =	2

BONUS POINTS

Using any leftover materials, add more energy efficient products to your Gingerbread House!

			Points
	Compost Box	=	2
	Rain & Snow Barrel (minimum 4)	=	3
	Landscape Lighting (solar powered stake lights - min.8)	=	3
	Windmill	=	8
	Your Own Energy-Efficient Product Idea (per idea)	=	3

What's Your Energy-Efficient SCORE?

TOTAL: