



Filling the Cupboard and Freezer for the Winter - What Energy is Needed?

Target grades: 6-8

AK ELAM Standards:

Reading for Literacy in Science and Tech.

RST.KI.6-8.3

Writing

WSLST.PDW.6-8.4,5

WSLST.RBPK.6-8.7

WSLST.RW.6-8.10

Speaking and Listening

SL.CC.6-8.1 (a, c)

Science GLEs:

[6/7/8] SA1.1 & SA1.2

NGSS:

See page 6.

Set up time: 20 minutes

Class time: One class period

Overview:

Students will determine the costs of running various appliances based on the cost of electricity in their community and the amount of energy these appliances typically use. Students will compare these costs to other regions in Alaska.

Objectives:

Students will consider the different energy inputs needed for food preservation when creating a mini-cookbook on the different ways of processing and preserving food. Students will interview family or community members and access the Cooperative Extension Service's online resources to conduct their research.

Materials:

Computers with Internet access

What are the different ways of preserving food? student worksheet (2 for each student)

Background:

When we sit down for dinner, we seldom think about our meal in terms of energy. However, all of our meals require energy to produce and transport the food that end up on our table. Plants capture radiant energy from the sun, the energy moves up the food web to the animals that eat the plants, and we eat both. We also use tractors, threshers, and fossil fuel fertilizers for food production—all these things require energy.

Even after production, food requires other energy resources. Because Alaska has harsh climates that are not optimal for food production, most food has to be imported from out of state by plane, truck, or barge. All of these forms of transportation require energy fuel. While growing food in Alaska proves difficult, we do have some flourishing markets, like seafood. Traditional food harvesting also remains important in the state and is protected by Article 8, section III of the Alaska State Constitution which states "Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use."

Subsistence hunting and fishing, berry picking, and other food harvesting techniques are important to many Alaskan residents; however, the ways to process and preserve these foods can vary from



community to community or from family to family. All of these methods require some form of energy. Wood is used as fuel for smoking salmon, electricity is needed to keep a freezer running, labor is used to build a root cellar, and stoves are needed to heat water to can foods.

Subsistence: Subsistence hunting, fishing, and farming refer to non-commercial methods of harvesting food to feed one's family (as opposed to harvesting food to sell it). In Alaska, subsistence hunting, fishing, and gathering is an important way of life that many people rely on to feed themselves and their families.

Vocabulary List:

canning - a method of food preservation where food is preserved for future use by sealing it in an airtight can or jar.

drying - a method of food preservation where food is preserved for future use by reducing the moisture content of the food to inhibit spoiling.

freezing - a method of food preservation where food is preserved for future use by reducing the temperature to about 3 degrees Fahrenheit to inhibit spoiling.

jelly - a method of food preservation where fruit or fruit juice is preserved for future use with sugar and gelatin or pectin.

pickling - a method of food preservation where food (often vegetables) is preserved for future use by immersing the food in a saltwater brine or vinegar solution.

subsistence food - non-commercial harvesting of food (including wild game, fish, or plants from either the wild or a garden) for feeding one's family or community members.

root cellar - an underground storage area that uses passive cooling from the ground to store vegetables (especially root vegetables such as potatoes, carrots, and turnips) for future use.

Gear Up:

Ask students to come up with different food processing and preserving techniques, and write the list on the board. Next, have students brainstorm how these techniques use energy (electricity for freezer or stove, wood fuel, etc.). Have students identify people that they know who hunt, fish, garden, or harvest wild foods (such as berries)-- are these people who they could interview about how they process their game, fish, and other food? Potential interviewees may be elders in the community, family members, or family friends.

Activity:

Tell students that they are all going to contribute recipes for processing and preserving food to a mini-cookbook. Each student will contribute at least two entries for the cookbook, using interviews from community members, the Cooperative Extension's online resources (see Additional Resources), or a



combination of both. Students should identify energy resources needed for the preservation methods as well as ongoing energy needs (electricity for freezer, etc.). Encourage students to be creative with this assignment. Have them draw pictures, take photos, and include stories in the cookbook.

When conducting interviews, have students identify members of their families or community that process and preserve food. These are usually people who have a vegetable garden in the summer or people who hunt, fish, or harvest wild berries. For safety reasons, students should only interview people that they and their parents/guardians know and trust. Students may pair up to conduct interviews. Students can either record the interviews or take written notes. The following are suggested questions for an interview:

1. Where did you learn to make this recipe?
2. What type of ingredients and supplies do you need for your recipe? Where do you get your ingredients and supplies?
3. What are the directions to make your recipe?
4. What type of energy is need to make this recipe-- a cook stove, firewood, refrigerator or freezer? Anything else?

Students can practice interviewing each other in class. Students (with permission of the interviewee) may also take pictures during the interview or draw pictures to illustrate the recipe.

Extension:

Have a community member talk to the class about traditional food preservation techniques, and facilitate a discussion on how these differ from modern techniques. Be sure to discuss the different energy needs of each technique.

Additional Resources:

UAF's Cooperative Extension Service

Online resources about local food resources and preserving food (the Preserving Alaska's Bounty section under Education is particularly useful).

<http://www.uaf.edu/ces/foods/>

<http://www.uaf.edu/files/ces/publications-db/catalog/hec/CCM-00080.pdf/>

Step-by-Step Guide to Oral History

This website gives a thorough overview on how to conduct interviews.

http://dohistory.org/on_your_own/toolkit/oralHistory.html



Alaska English/Language Arts Standards:

Reading Standards for Literacy in Science and Technical Subjects

RST.KI.6-8.3

3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Writing Standards for Literacy in History/Social Studies, Science and Technical Subjects

WSLST.PDW.6-8.4,5

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

WSLST.RBPK.6-8.7

7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

WSLST.RW.6-8.10

10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening Standards

SL.CC.6-8.1 (a, c)

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6(7,8) topics, texts, and issues, building on others' ideas and expressing their own clearly.

a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

Alaska Science Grade Level Expectations:

[6] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

[6] SA1.2 collaborating to design and conduct simple repeatable investigations.

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[8] SA1.2 collaborating to design and conduct repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings.

Skills for a Healthy Lifestyle:

SHL. D 1 & 2

- 1) make responsible decisions as a member of a family or community;
- 2) take responsible actions to create safe and healthy environments.

Alaska Technology Standards:

T. A 2

- 2) use technological tools for learning, communications, and productivity.

T. C 1 & 2

- 1) use technology to observe, analyze, interpret, and draw conclusions;
- 2) solve problems both individually and with others.

T. E 1 & 6-8

- 1) evaluate the potentials and limitations of existing technologies;
- 6) evaluate ways that technology impacts culture and the environment;
- 7) integrate the use of technology into daily living; and
- 8) recognize the implications of emerging technologies.

Alaska Library/Information Literacy Standards:

L/IL B 5

- 5) organize and use information to create a product.

Alaska Cultural Standards:

CS B 3 & 4

- 3) make appropriate choices regarding the long-term consequences of their actions; and
- 4) identify appropriate forms of technology and anticipate the consequences of their use for improving the quality of life in the community.

**Next Generation Science Standards:**

Standard: PS3A - Definition of Energy		
Performance Expectation: MS-PS3-3 - Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy. (This lesson is one step toward reaching the performance expectation above.)		
Dimension	Name or NGSS code/citation	Matching student task or question taken from the lesson
Science and Engineering Practice	Constructing Explanations and Designing Solutions <input type="checkbox"/> Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. (MS-PS3-3)	Gear Up Discussion: Students discuss various ways that food is preserved and stored. The focus is on the energy involved in the various phases of processing, preserving, and storing food.
Disciplinary Core Idea	ETS1.A Defining and Delimiting an Engineering Problem <input type="checkbox"/> The more precisely a design task's criteria and constraints are defined; the more likely it is that the design solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (MS-PS3-3)	Filling the Cupboard and Freezer for the Winter (Student Worksheet): Writing the directions for the food preservation and storage process.
Crosscutting Concept	Energy and Matter <input type="checkbox"/> The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3)	Filling the Cupboard and Freezer for the Winter (Student Worksheet): Completing the sections on the food preservation recipe looking at energy used during and post-processing of foods.

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