

Lesson Six: Powering Up Wyoming's Economy

Grade Level: 4th Grade

Time: 60-90 minutes (Split into two parts if necessary.)

Essential Question: How can we be stewards of Wyoming's minerals and energy to benefit current and future generations?

Objective: Students will study the impact of minerals and energy on Wyoming's culture and economy.

Purpose: Students learn how important mineral and energy resources are to Wyoming's culture and economy.

Required Materials/Resources:

- Powering Up Wyoming's Economy Cloze activity sheet (one per student) (Sources 1-12)
- Powering Up Wyoming's Economy Cloze activity sheet Answer Key (one for the teacher)
- Electronic devices to play Kahoot quiz OR white boards/paper and markers (see Part 1: Steps 3 & 4)
- Powering Up Wyoming's Economy Kahoot quiz <https://play.kahoot.it/#/k/874063d4-5691-4745-a855-140a0eabca42>
- Panel Discussion Question sheet (one per student)
- Roles sheet for panel discussion (one per group)
- Chart paper
- Markers

Suggested Teacher Preparation:

- Try out and prepare the Kahoot game for class use. (A teacher device will need to be connected to a projector to display the game questions for the students. Teacher will click on the link <https://play.kahoot.it/#/k/874063d4-5691-4745-a855-140a0eabca42> and then click play. At this point, a 6-digit game code will generate. Students use their devices (any electronic device with internet access will work - iPad, computer, tablet, etc.) to log on to [Kahoot.it](https://kahoot.it). They will be asked to type in the six-digit code and their name to join the game.
- Secure electronic devices for students to play the Kahoot game or gather other materials needed for sharing the questions and results
- Arrange desks or tables for panel discussion.
- Review the “Powering Up Wyoming’s Economy” Answer Key. Understand the big picture of how minerals and energy play a role in Wyoming’s economy and culture.
- Prepare brainstorming anchor chart.

Standards:

Science: 4-ESS3-1 (Practiced/Encountered)

Social Studies: SS5.3.2 (Explicit), SS5.2.1, SS5.4.1
(Practiced/Encountered)

ELA: 4.SL.1.a, 4.SL.1.c, 4.SL.4 (Practiced/Encountered)

Vocabulary:

- **Culture** - a way of thinking, behaving, or working that exists in a place or organization
- **Economy** - financial system of interaction and exchange
- **Impact** - have a strong effect on someone or something

Instructional Procedure/Steps:

1. Say: **“Brainstorm all the ways that you have used or been impacted by energy in the last 48 hours.”** Record responses on chart paper.


2. Guide students in a whole group discussion by asking the questions below. Allow students to respond before moving on to the next question.
 - **“Who pays for schools and government buildings to be built?”**
 - **“Who pays for teachers’, firefighters’, and police officers’ salaries?”**
 - **“How does the state of Wyoming receive money?”**
 - **“If the state was not able to make money off our resources, what would happen? For example, what would be the impact to our schools, our libraries, etc.? What jobs would be impacted?”**
3. Pass out the Powering Up Wyoming’s Economy Cloze activity sheets. Begin the Kahoot quiz. (See Suggested Teacher Preparation above.)
4. When all students have joined, start the game by displaying the first question. Have students read the question and select the answer they think is correct via iPad, computer, or other device. If these options are unavailable, students can respond using a personal whiteboard, paper, etc.
5. Have students fill in the blanks on their Cloze activity sheets as you play the game. Question 1 on the game matches question 1 on the students’ Cloze activity sheet and answer key. By the end of the game, students should have all blanks completed. *Follow the answer key for filling in the blanks because not all blanks will be filled with the game alone.*
6. *Stop here if you want to complete the lesson in two parts.*
7. Separate students into 5 groups and pass out role cards to each group. Explain to students that each group will be thinking like a different type of person: farmer, student, miner, business person, teacher. As a group, have students review their Powering Up Wyoming’s Economy


TEACHER NOTE:
The amount of teacher input in this discussion will vary based on students’ previous exposure to these concepts. Students need to understand that public services and resources are funded through tax money, and that a large portion of Wyoming’s money comes from the mineral and energy industry.

Cloze activity sheets. Say: **“Select 5 to 7 facts from the worksheet that you feel most impact or are most relevant to your assigned person.”**



In these tasks, students will be engaged in the higher order thinking skills of evaluation and synthesis by comparing, rating, and inferring.

8.  Pass out the Panel Discussion question sheets. Using the group’s chosen facts and their knowledge from previous lessons, have each group discuss and write the answers on their Panel Discussion question sheets from their assigned role’s point of view.

9.  When groups are finished answering their discussion questions, set up the panel discussion. Have a student from each role/group represent their Wyoming citizen to answer a question by the teacher from the Panel Discussion question sheet.
 - Have one student from each role/group come forward. Have students display their role card.
 - Ask a question from Panel Discussion question sheet. Each student on the panel takes a turn answering the question as it relates to their role. Students can use their discussion sheets as an aid.
 - When everyone on the panel has responded to the question, another person from the group will tag in to respond to the next question.
 - Repeat until all questions have been discussed. Make sure every student in each group has the opportunity to respond to at least one question.

10. After the panel discussion, revisit the brainstorming chart from the start of the lesson, and have students add additional information based on the Kahoot Cloze activity and panel discussion.

Assessment: Collect completed Cloze activity sheets, and check for accuracy. Listen to the panel discussion and assess students’ individual understanding of the lesson content specifically the ways people are impacted by Wyoming’s energy and natural resources.

Credits/Sources:

1. Hammerlink, J.D., Webster, G.R., & Berendsen, M.E. (2014). *Wyoming Student Atlas: Exploring our Geography*. Laramie:Wyoming: University of Wyoming.
2. Petroleum Association of Wyoming. (2016). *Wyoming Oil and Gas Facts and Figures* (Publication). Retrieved July 8, 2017, from http://www.pawyo.org/images/2016_PAW_Facts_and_Figures_Brochure.pdf
3. The NEED Project. (2016). *Elementary Energy InfoBook* (Publication). Retrieved June 26, 2017, from <http://www.need.org/files/curriculum/guides/Elementary%20Energy%20Infobook.pdf>
4. Wyoming Mining Association. (n.d.). *Mission*. Retrieved June 27, 2017, from <https://www.wyomingmining.org/>
5. World Nuclear Association. (2016, May). *Safety of Nuclear Power Reactors*. Retrieved June 27, 2017, from <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/safety-of-nuclear-power-reactors.aspx>
6. Student Energy. (n.d.). *Explore the Energy System*. Retrieved June 27, 2017, from <https://www.studentenergy.org/>
7. Student Energy; Rutherford, J. (n.d.). *Natural Gas*. Retrieved June 27, 2017, from https://www.studentenergy.org/topics/natural-gas?gclid=Cj0KEQjwh428BRCnvcyl-5nqjY4BEiQAIjebwpbhLABqr5r1qBMEN_bwTXPk4VFni3QX_GZzC3JjHkAaAuED8P8HAQ
8. U.S. Department of the Interior Bureau of Reclamation. (2018). *Wyoming Area Office Overview*. Retrieved October 10, 2018 from <https://www.usbr.gov/gp/wyao/>
9. U.S. Energy Information Administration - EIA. (2018, March 7). *FAQs: What is U.S. electricity generation by energy source?* Retrieved October 4, 2018, from <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>
10. U.S. Energy Information Administration - EIA. (2017, May 10). *FAQs: How much of U.S. carbon dioxide emissions are associated with electricity generation?* Retrieved June 26, 2017, from <https://www.eia.gov/tools/faqs/faq.php?id=77&t=11>

11. U.S. Energy Information Administration - EIA. (2016, March). *Trends in U.S. Oil and Natural Gas Upstream Costs* (Rep.). Retrieved July 8, 2017 from <https://www.eia.gov/analysis/studies/drilling/pdf/upstream.pdf>
12. <https://play.kahoot.it/#/k/874063d4-5691-4745-a855-140a0eabca42> Kahoot created by Wyoming Agriculture in the Classroom.