Lesson Two: Looking Back

Grade Level: 4th Grade

Time: 45 minutes

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

Objective: Students will read an informational text as an introduction to the mining and energy industry in Wyoming.

Purpose: Students learn about the importance of minerals and energy in Wyoming.

Required Materials/Resources:

- Minerals and Energy in Wyoming text (one per student) (Sources 1-13)
- Word Sort activity (one copy per pair of students)

Suggested Teacher Preparation:

- Read through the "Minerals and Energy in Wyoming" text and become familiar with the information it contains.

Standards:

ELA: 4.RI.2, 4.RI.4, 4.RI.10 (Practiced/Encountered)

TEACHER NOTE: Even though coal is technically classified as a fossil fuel because it is composed of organic material, it is often referred to as a mineral.

Vocabulary:

- **Bentonite** - a kind of absorbent clay formed by the breakdown of volcanic ash
- **Coal** - A black/dark brown rock made from old plant matter found mainly underground. Coal is mined and used as fuel.
- **Crude oil** - unrefined petroleum
- **Hydropower** - electricity produced from machines that are run by moving water
- **Industry** - a group of businesses that provides a particular product or service
- **Infrastructure** - the basic physical and organizational structures and facilities (e.g., buildings, roads, pipelines, and transmission lines) needed for the operation of a society or enterprise
- **Mineral** - a substance (such as quartz, coal, petroleum, salt, etc.) that is naturally formed under the ground
- **Natural gas** - odorless gas that is taken from under the ground and used as fuel and to make materials
- **Revenue** - money that is made by or paid to a business or an organization
- **Trona** - a gray mineral that occurs as an evaporate in salt deposits and consists of a hydrated carbonate and bicarbonate of sodium
- **Uranium** - a gray, dense radioactive metal used as a fuel in nuclear reactors

TEACHER NOTE: A possible alternative activity would be to have students interactively manipulate the words from the word bank into the correct column of the chart on an interactive whiteboard.

Instructional Procedure/Steps:

1. Pass out the "Minerals & Energy in Wyoming" text to students. Either read the text aloud or call on students to read it aloud. Have students follow along while reading with their own copies.

2. Discuss key vocabulary and concepts with the class as the text is read.

3. When students have finished reading the text, pass out the Word Sort activity. Have pairs of students complete the Word Sort activity. Students place each term under its correct heading. When students are finished, collect the

Word Sorts.

4. Close the lesson by having students discuss the questions listed below. Allow students to respond before moving on to the next question.
    - **"What personal connections can you make to minerals and energy in Wyoming?"**
    - **"In the text, can you track your morning activities (alarm, phone, light, warm shower) to the resources that may have made them possible?"**
    - **"What other aspects of your daily lives are you aware of being impacted by Wyoming's minerals or energy?"**
    - **"Does anyone have a family member who works in the industry?"**

TEACHER NOTE: Some students may also make the case that coal, uranium, oil, and gas could go in the power production box. Ask students to justify their rationale for putting them in either column.

Assessment: Use the key below to score students' Word Sort sheets.

WORKSHEET KEY

Oil & Gas	Minerals	Power Production
crude oil	trona	solar energy
gas	uranium	hydro
state's largest amount of generated taxes	rare earth minerals	wind
carbon dioxide	bentonite	power plants
helium	coal	

Credits/Sources:

1. National Mining Association. (2016). *Facts, Stats and Data.* Retrieved June 26, 2017, from http://nma.org/facts-stats-and-data/
2. Wyoming State Geological Survey. (n.d.) *Wyoming's Oil & Gas Facts*. Retrieved June 26, 2017, from http://www.wsgs.wyo.gov/energy/oil-gas-facts
3. U.S. Energy Information Administration - EIA. (2017, April 18). *Frequently Asked Questions: What is the U.S. electricity generation by energy source?*. Retrieved June 26, 2017, from https://www.eia.gov/tools/faqs/faq.php?id=427&t=3
4. U.S. Energy Information Administration - EIA. (2016, November 23). *Frequently Asked Questions: Which States Produce and Consume the Most Natural Gas?*. Retrieved June 22, 2017, from https://www.eia.gov/tools/faqs/faq.php?id=46&t=8
5. Wyoming Mining Association. (2016, April 6). *Economics*. Retrieved June 22, 2017, from https://www.wyomingmining.org/minerals/economics/
6. Wyoming State Geological Survey. (n.d.). *Wyoming Industrial Minerals.* Retrieved June 22, 2017, from http://www.wsgs.wyo.gov/minerals/industrial-minerals
7. U.S. Energy Information Administration - EIA. (2017, June 15) *Independent Statistics and Analysis*. Retrieved June 22, 2017, from https://www.eia.gov/state/data.php?sid=WY
8. U.S. Energy Information Administration - EIA. (2017, June 15). *Independent Statistics and Analysis.* Retrieved June 22, 2017, from https://www.eia.gov/state/data.php?sid=WY
9. U.S. Energy Information Administration - EIA. (2017, June 15). *Independent Statistics and Analysis.* Retrieved June 22, 2017, from https://www.eia.gov/state/data.php?sid=WY
10. Wyoming Mining Association. (n.d.). *2017-2018 Concise Guide to Wyoming Coal*. Retrieved October 1, 2018, from http://www.wyomingmining.org/wp-content/uploads/2013/10/2017-18-Concise-Guide-to-Wyoming-Coal.pdf
11. Wyoming Mining Association. (2016, April 6). *Trona.*Retrieved June 22, 2017, from https://www.wyomingmining.org/minerals/trona/

12. Wyoming Mining Association. (2016, April 6. *Bentonite.* Retrieved June 22, 2017, from https://www.wyomingmining.org/minerals/bentonite/
13. Stafford, J. Wyoming State Geological Survey (2012, February). *Wyoming's Electrical Generation* (Rep.). Retrieved June 22, 2017, from website: http://www.wsgs.wyo.gov/products/wsgs-2012-electricalgeneration-summary.pdf