Lesson Four: Making Resources Work

Grade Level: 4th Grade

Time: Part 1: 60 minutes; Part 2: 60 minutes (which can be broken into two 30-minute sessions); Part 3: at least 30 minutes but will vary based on length of student presentations

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

Objective: Students will highlight the key points of how different energy resources are developed and who contributes to the process.

Purpose: Students learn about the development of Wyoming's minerals and energy.

Required Materials/Resources:

- Development & Use of Energy Resources graphic organizer (one per student)
- Production of Minerals: Oil sample posters (one set for teacher to model oil "tour") (Sources 2, 13)
- Electronic devices

For the teacher:

Oil:

- Video: https://www.youtube.com/watch?v=RNbZQI5isXk *MidAmerican Energy Combustion Fueled Power Plant Virtual Tour* (Source 1) *Video length: 7 minutes 6 seconds*
- Oil Basics (Source 8) https://www.eia.gov/kids/energy-sources/oil/

TEACHER NOTE: Each energy resource has a video resource and a website/text resource. Full links are provided at https://wyaitc.org/curriculum/student-resources/ (Source 14). Either print accompanying text resources for students or have devices available for students to view the texts electronically.

For students:

All 6 energy resources:

- Elementary Energy InfoBook (Source 11) https://www.need.org/wp-content/uploads/2019/10/Elementary-Energy-Infobook.pdf

Uranium:

- Video: https://www.youtube.com/watch?v=258xiAv_8FQ *Uranium Mining with Baking Soda* (Source 4) *Video length: 1 minute 37 seconds*
- Video: https://www.youtube.com/watch?v=Ta3z3pGK0vU *What is Nuclear Energy?* (Source 5) *Video length 2 minutes 27 seconds*
- Video: https://www.youtube.com/watch?v=oT2LHGG-9Ko *Powering America: Uranium Mining and Milling* (Source 12) *Video length: 6 minutes 32 seconds*
- Uranium (nuclear) Basics (Source 6) https://www.eia.gov/kids/energy-sources/uranium/

Natural Gas:

- Video: https://www.youtube.com/watch?v=RNbZQI5isXk *MidAmerican Energy Combustion Fueled Power Plant Virtual Tour* (Source 1) *Video length: 7 minutes 6 seconds*
- Natural Gas Basics (Source 7) https://www.eia.gov/kids/energy-sources/natural-gas/

Coal:

- Video: https://www.youtube.com/watch?v=2IKECt4Y3RI *MidAmerican Energy Coal-Fueled Power Plant Virtual Tour* (Source 15) *Video length: 6 minutes 59 seconds*
- Coal Basics (Source 2) https://www.eia.gov/kids/energy-sources/coal/
- Coal Safety & Reclamation (Source 3) https://www.wyomingmining.org/minerals/coal/coal-safety-reclamation/

Hydroelectric:

- Video: https://www.youtube.com/watch?v=mLUUZ7xIoN4 *MidAmerican Energy Hydroelectric Power Plant Virtual Tour* (Source 14) *Video length: 10 minutes 27 seconds*
- Hydropower Basics (Source 9) https://www.eia.gov/kids/energy-sources/hydropower/

Wind Energy:

- Video: https://www.youtube.com/watch?v=FE5FqNGn53E *MidAmerican Energy Wind Farm Virtual Tour* (Source 16) *Video length: 7 minutes 20seconds*
- Wind Basics (Source 10) https://www.eia.gov/kids/energy-sources/wind/

Suggested Teacher Preparation:

- View the sample resources on oil, which will be the energy resource modeled by the teacher.
- Find supplemental information from the oil text resource to fill in additional information on the graphic organizer once video virtual tour information has been added.
- Be able to display the oil sample posters.
- Review all videos and websites before lesson to become familiar with the development processes and uses of each of the resources. Teachers may also opt to decide on start and stop point for viewing the videos, as video lengths vary. Be knowledgeable enough to decide if students have completed their graphic organizers for their assigned topics in step 6.
- Decide how students will present their research (see step 7).

Standards:

Science: 4-PS3-2 (Explicit)

Social Studies: SS5.3.1 (Explicit)

ELA: 4.W.7 (Explicit), 4.RI.9, 4.SL.1.c, 4.SL.1.d, 4.SL.2, 4.SL.4 (Practiced/Encountered)

CVE: CV5.2.2 (Practiced/Encountered)

Vocabulary: Student groups will encounter vocabulary unique to their resource as they gather information on their topic.

Instructional Procedure/Steps:

Part One: Teacher modeling of research and project development

1. Play oil video.

2. When the video is finished playing, model for students the process of completing the Development & Use of Energy Resources graphic organizer. The posters provided for the "tour" can be a guide for which information is important. While modeling the completion of the graphic organizer, talk aloud about why what is documented is an important fact and how it is a part of the development process.

3. When you have finished inputting information from the video, identify any spots where additional information is needed, and model the process of using the text resource to supplement the information. Emphasize that facts are tied to answering the question: **"How is this resource developed, used, and cared for?"**

4. Once the graphic organizer is completed, say: **"The next part of your task will be putting the information into a presentation that helps others learn about the process your natural resource goes through to become energy. Since we can't easily visit a mine, oil/natural gas field, wind farm, hydroelectric dam, or a power plant for a tour of the whole process, we will be creating a visual tour."** Model the visual tour using the oil sample posters.

Part Two: Student research and project development

5. Assign students to groups. Each group will look at a major energy resources in Wyoming: natural gas, coal, wind, hydroelectric, or uranium.

6. Assign groups an energy resource and provide them with the video and text resources. Groups study the provided resources to learn about the development and use of their assigned energy resource. When finished, each group will decide which steps in the process need to be included in their virtual tour. Students will complete their graphic organizers and check in with the teacher to see if they have included important information and/or if any key facts have been left out. Give groups suggestions on what needs to be added if they are missing information.

7. Once groups have revised their notes and received teacher approval, groups begin on the teacher-decided method of presentation.

Part Three: Presentations of energy development "tours"

8. Provide group with 10-15 minutes to finish preparations and practice their presentations.

9. Have each resource group take a turn presenting their natural resource to the rest of the class. As groups travel to each "stop" on their tour, have the "tour guide" take on the role of someone who would be associated with that part of the process (e.g., miner, engineer, refinery worker, etc.)

10. After all groups have presented, ask students the questions below. Allow students to respond before moving on to the next question.
    - **"Did you see any similarities in the development of the different energy resources?"**
    - **"Was stewardship a part of the process to create energy?"**
        - *If yes,* have students describe how.

TEACHER NOTE: Remind students they need to clearly explain how the raw resource is converted to energy and incorporate the "who" of mining and energy production during their tour. These are important because they relate the content back to the science standard 4-PS3-2 and knowing who is involved. In the "Cared for" section of the graphic organizer, students should also mention ideas about how the resource is stewarded.

- *If no,* say: **"We must remember this resource, so we can return to its stewardship piece in Lesson 9."**

Assessment: Check students' graphic organizers for accuracy and completion. Presentations should address how the resource is developed, how it is used, how it is cared for, **and** who is involved in the development process. The graphic organizers/presentations will also be incorporated into students' final projects at the end of the unit, so either teacher or students should keep them for later use.

Possible extension activities: Have someone who works in one of the industries explored come in to talk about the process of mineral or energy production. Take a field trip to a power plant, wind farm, refinery, etc.

Credits/Sources:

1. MidAmerican Energy. (2015, April 29). *MidAmerican Energy Combustion-Fueled Power Plant Virtual Tour*. Retrieved June 11, 2020 from https://www.youtube.com/watch?v=RNbZQI5isXk
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3. Wyoming Mining Association. (2017) *Coal Safety & Reclamation.* Retrieved June 26, 2017, from https://www.wyomingmining.org/minerals/coal/coal-safety-reclamation/
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7. U.S. Energy Information Administration. (n.d.). *Natural Gas Basics*. Retrieved July 20, 2021, from https://www.eia.gov/kids/energy-sources/natural-gas/

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13. Wyoming Agriculture in the Classroom. (2019) *Student Resources: 4th Grade Minerals & Energy.* https://wyaitc.org/curriculum/student-resources/
14. MidAmerican Energy. (2013, October 4). *MidAmerican Energy Hydroelectric Plant Virtual Tour.* Retrieved October 14, 2020, from https://www.youtube.com/watch?v=mLUUZ7xIoN4
15. MidAmerican Energy. (2013, August 7). *MidAmerican Energy Coal-Fueled Power Plant Virtual Tour.* Retrieved October 14, 2020, from https://www.youtube.com/watch?v=2IKECt4Y3RI
16. MidAmerican Energy. (2015, April 29). *MidAmerican Energy Wind Farm Virtual Tour.* Retrieved October 14, 2020, from https://www.youtube.com/watch?v=FE5FqNGn53E