



<b>Title:</b> Unconventional Energy: A Look at Natural Gas in Arkansas	
<b>Author:</b> Trish Turnbough Cave City Middle School Cave City, AR	
<b>Course:</b> Science <b>Grade Level:</b> 6-7	<b>Duration:</b> One to two 45 minute periods
<b>Objective:</b> To give students an introduction to natural gas in the state of Arkansas.	
<b>Summary of Lesson:</b> This lesson gives an overview of the discovery of natural gas and its development in Arkansas. It also examines the discovery of the Fayetteville Shale.	
<b>Standards: CCSS, Arkansas State Frameworks, Next Generation Science Standards, Other</b>	
<b>Code:</b>	<b>Standard:</b>
CCSS.ELA-Literacy.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical text.
CCSS.ELA-Literacy.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
CCSS.ELA-Literacy.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topic.
CCSS.ELA-Literacy.RST.6-8.8	Distinguish among facts, reasoned judgments based on research findings, and speculation in text.
CCSS.ELA-Literacy.WHST.6-8.7	Conduct short research projects to answer a question (including self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
Next Generation Science Standards MS-ESS3-3.	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* <b>[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that</b>



	are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]
PS. 7.6.5	Investigate careers, scientists, and historical breakthroughs related to energy forms and conversions,
PS.7.7.1	Identify natural resources used to supply energy.
PS.7.7.5	Investigate careers, scientists, and historical breakthroughs related to natural resources, alternative resources, electricity, and magnetism.
<b>Teacher Excellence and Support System:</b> 1c: Setting instructional outcomes, 1d: Demonstrating knowledge of resources, 1e: Designing coherent instruction, 1f: Designing student assessments, 3b: Using questioning/prompts and discussion, 3c: Engaging students in learning,	
<b>Instructional Strategies and Practices:</b> Discussion, Independent Research, Peer Partner Learning, Research Project, Didactic Questioning, Assigned Questions, Oral Presentations, Analyzing Resources,	
<b>Bloom's Level:</b> <i>(Highest Level Only)</i> Evaluation: What do you think about natural gas development in Arkansas?	
<b>Materials and Resources:</b> <ul style="list-style-type: none"> <li>• Projection equipment</li> <li>• Computers with internet access</li> <li>• Map of Arkansas</li> <li>•</li> </ul>	
<b>Formative Assessment:</b> Teacher made rubric for presentation from <a href="http://rubistar.4teachers.org/">http://rubistar.4teachers.org/</a> Write new lyrics to Beverly Hillbillies theme song	

**Teaching Notes:**

**Bell ringer:** Project photo. "Rougnecks photographed following July 1, 1922 discovery of the Smackover field" [www.aoghs.org](http://www.aoghs.org)



Have students analyze photo using the National Archives handout found at:  
[http://archives.gov/education/lessons/worksheets/photo\\_analysis\\_worksheet.pdf](http://archives.gov/education/lessons/worksheets/photo_analysis_worksheet.pdf)

**Student Activity:**

**Introduction:**

1. Explain that natural gas is a fossil fuel burned for energy. Ask students if they know what fuel is used to heat their homes, their bathwater and the food on their stoves. If needed, you might briefly discuss how natural gas was formed and where it is found.
2. Have students read: Natural Gas  
<http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=4251>
3. and Fayetteville Shale <http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=6011>
4. After reading each article answer the following questions.  
For discussion and to check comprehension:
  - What is natural gas? What is it used for?
  - Where is natural gas found in Arkansas?
  - Explain to the person sitting next to you what is meant by "unconventional" gas.
  - What benefits are created from natural gas development?
  - Are there any negative impacts associated with natural gas development?



- What questions do you have about natural gas development in Arkansas?

**Activity:**

- Natural gas extraction has far-reaching effects on rural communities. In this activity, group students to research and prepare a brief presentation on the following:
  - Economy: Students in this group should identify the economic opportunities, including job creation, and challenges that arise from natural gas development.
  - Land: Students in this group should explain the amount of land required for natural gas development. They should be able to illustrate how gas extraction might change the use of land and roads in the community.
  - Water: Students in this group should describe the amount of water required for hydraulic fracturing and where the water comes from. This group could also examine protecting against drinking water contamination.

**Assessment:**

- Students will be assessed with a teacher created rubric. <http://rubistar.4teachers.org/>

**Extensions:**

- Show students YouTube video of Beverly Hillbillies theme song, (<http://www.youtube.com/watch?v=YD22a4APsCg>)
- Have students write new lyrics based on natural gas in Arkansas and have them perform their original lyrics for the class.

**See Student Handout at:**

[http://archives.gov/education/lessons/worksheets/photo\\_analysis\\_worksheet.pdf](http://archives.gov/education/lessons/worksheets/photo_analysis_worksheet.pdf)