

## Non-renewable energy

ClassDay/Time APES

Technology Lesson? Yes No (circle one)

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Title of lesson: Non-renewable energy

Date of lesson: Begin second half of block on 10/02/13

Length of lesson: 2 ½ blocks

Description of the class:

**Name of course:** AP Environmental Sciences

**Grade level:** 11 / 12

**Honors or regular:** Advance Placement

Source of the lesson:

Give specific information.

TEKS addressed:

College board topic: earth system and resources

### I. Overview

Students should be able to explain what is net energy and why is it important, what are the advantages and disadvantages of using oil, natural gas, coal, and nuclear energy.

### II. Performance or learner outcomes

Students will be able to:

1. apply concepts on net energy yields from non-renewable resources and make inferences on which methods have the greatest cost benefit.
2. Explain the ecological and environmental impacts of mining and utilizing non-renewable energy resources
3. *Research sustainable solutions and develop new ideas that will improve the use of non-renewable energy resources.*

### II. Resources, materials and supplies needed

- a. Online resources such as: fuel film, gaslandthemovie.com, gasholemovie.com, TED talk Bilal Bomani: Planet fuels could power a jet, TED- Lisa Margonelli, the political chemistry of oil
- b. Energy.gov,
- c. Textbook chapter pages 370-396

**IV. Supplementary materials, handouts. (Also address any safety issues Concerning equipment used)**

**V. Safety Issues**

**VI. Accommodations for learners with special needs (ELLs, Special Ed, 504, G&T)**

**Five-E Organization**

Teacher Does	Probing Questions	Student Does
<p><b>Engage:</b>  <i>Learning Experience(s)</i>  <a href="http://www.ted.com/talks/lisa_margonelli_the_political_chemistry_of_oil.html?quote=802">http://www.ted.com/talks/lisa_margonelli_the_political_chemistry_of_oil.html?quote=802</a></p> <p><b>Approx. Time __5__ mins</b></p>	<p><i>Imagine a world without OIL....use ONE word to describe this world</i></p>	<p><i>Expected Student</i>  <i>Students think individually for 1 minute...</i>  <i>Possible answers:</i>  <i>Clean</i>  <i>Chaos</i>  <i>Undeveloped</i>  <i>Better</i>  <i>Worse....etc</i></p>
<p><b>Explore:</b>            Class blackout</p> <p><b>Approx. Time __25__ mins</b></p>	<p><i>No lights in the room:</i></p> <ol style="list-style-type: none"> <li>1. What is a NECESSITY to successfully conduct the class?</li> <li>2. What elements in the classroom are dependent on traditional non-renewable resources?</li> <li>3. What is the cost of energy in the US per person?</li> </ol>	<p><i>Expected Student</i>  <i>Students conduct an audit of the classroom looking at all the appliances and the energy they use per hour. Then they revisit the same questions and they evaluate their responses and gather a conclusion.</i></p>
<p><b>Formative assessment</b></p>	<p><i>Looking at a graph the student is able to determine the energy consumption in the US.</i></p>	

<p><b>Explain:</b> Students develop notes on net energy and the importance of energy yield by different resources.</p> <p><b>Approx. Time__20__ mins</b></p>	<p><i>Describe our history of energy use over the last three hundred years.</i> <i>What is net energy and what is it important for evaluating energy resources?</i> <i>Explain what is the role is subsidies in net energy yield?</i></p>	<p><i>Expected Student Responses/Misconceptions</i></p>
<p><b>Evaluation(Decision Point Assessment)</b></p>	<p><i>Reflection</i> <i>*is there a problem with our energy consumption based on net energy yields.</i></p>	

<p><b>Extend / Elaborate:</b> <i>4 corners activity</i> <i>1.OIL</i> <i>2.Natural Gas</i> <i>3. Coal</i> <i>4. Nuclear</i></p> <p><b>Approx. Time__25__ mins</b></p>	<p><i>1.What is crude oil? How is extracted? How is it refined? What are the percentages of the commercial energy used in the world and in the US.</i> <i>What is the peak production for an oil well?</i> <i>What is the difference between proven and unproven reserves?</i> <i>Differentiate between tar and oil sand, how is it extracted and how is it converted to heavy oil?</i> <i>What is shale oil and how is it produced?</i></p> <p><i>2.What is the difference between natural gas, Liquefied petroleum gas and liquefied natural gas?</i> <i>What are the three countries with most natural gas reserves? What are the major advantages and disadvantages of using gas?</i></p>	<p><i>Expected Student Responses/Misconceptions</i></p>
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	<p><i>What are some sources of unconventional natural gas and what major problems are related to the use of these resources?</i></p> <p><i>3. What is coal, how is it formed? How a coal power plant works? Where are the major reserves of coal? What is the issue with coal use in China. What is coal ash waste? What are the major advantages and disadvantages of using this resource?</i></p> <p><i>4. Explain how a nuclear fission reactor works, Describe the nuclear fuel cycle. Describe some consequences of the Chernobyl and Fukushima nuclear power plants incidents. compare and contrast the advantages and disadvantages of relying on nuclear energy to produce plans. What is nuclear fusion? And what is its potential as an energy source?</i></p>	
<p><b>Evaluation(Decision Point Assessment):</b></p>		

<p><b>Evaluate:</b></p>	<p><i>Test</i></p>	<p><i>Expected Student</i></p>
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<p><i>Lesson Objective(s) Learned (WRAP –UP at end) -&gt; Summarize</i></p> <p><b>Approx. Time _____ mins</b></p>		<p><i>Responses/Misconceptions</i></p>
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