

## Topic

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What are the environmental impacts of petroleum production and consumption?

## Objective

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Students will discover the changes in the petroleum industry practices during the past 50 years. Students will learn of the controls and technological innovations that have been implemented to take better care of the natural environment, future concerns, and alternatives.

## Materials

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- Oil and Natural Gas books
- Copies of the following for each student which are at the end of the lesson plan:
  - Exit Exam
  - Grading Rubric
  - Student Scoring Rubric
  - Useful Web sites
  - The Great Energy Hunt

## Engagement

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With the world's current demand on oil and gas running about 86 million barrels a day, which is equivalent to approximately 40,000 gallons a second, how do we meet the challenge of future demands? Let's look at the facts we have.

## Exploration

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Assign groups of students to work together as a team. The teams will make presentations to the class on the topics below. Teams of 4 or 5 will collaborate to complete this project. Students' research should include the following:

- A 3-page typed research paper that includes the LA guidelines. (You may want to have a certain number of required sources to be cited, bibliography etc. There is a list of helpful web sites at the end of the lesson).
- A PowerPoint presentation that explains your research (Hand out the grading rubric)
- A poster illustrating the main findings of your research

Each team-mate should contribute equally to each part of the assignment, and the project will be partially graded on teamwork and each member's contribution to the team. Share the Student Scoring Rubric at this time.

## Explanation

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It is recommended that each team elect, or teacher selects, one member to be the Project Manager of the group. It is the job of the project manager to oversee the project and keep everyone on track. The project manager may decide to split up responsibilities by having one team member do the research, one produce the PowerPoint, one prepare the poster, and one present. Or they may choose to split the research, PowerPoint and poster equally, then have one presenter or everyone present their portion of the research. Groups have the flexibility to split the work in whatever way they choose, as long as all members contribute equally.

The page numbers referenced after the topics are pages from *Oil and Natural Gas* book for a beginning reference to their research. The group presentations will serve as the explanation to each of the following topics:

- The World's demand and consumption of Oil (p. 56-57)
- Oil and the Environment (p.40-41 p.54-55)
- Deep Sea Drilling & Deepwater Technology (p. 34-37)
- Alternative Energy Sources -Oil substitutes (p. 60-61)
- What are some of the initiatives oil and gas companies have used to protect our future generations? (Serving Society p. 66-67)
- What can consumers do to ensure that future generations will receive the benefits of petroleum products? (p. 58-59)



## Grading Rubric for Presentation Project

| Grade | Content   | Organization   | Originality  | Workload  |
|-------|---|--|--|---|
| 4     | Project covers the topic in-depth with many details and examples. Subject knowledge is excellent. | Content is very well organized and presented in a logical sequence.      | Project shows much original thought. Ideas are creative and inventive.                     | The workload is divided and shared equally by all members of the group                                |
| 3     | Project includes essential information about the topic. Subject knowledge is good.                | Content is logically organized.  | Project shows some original thought. Work shows new ideas and insights.                    | The workload is divided and shared fairly equally by all group members, but workloads may vary.       |
| 2     | Project includes essential information about the topic, but there are one or two factual errors.  | Content is logically organized with a few confusing points.              | Project provides essential information, but there is little evidence of original thinking. | The workload is divided, but one person in the group is viewed as not doing a fair share of the work. |
| 1     | Project includes minimal information and there are several factual errors.                        | There is no clear organizational structure, just a compilation of facts. | Project provides some essential information, but no original thought.                      | The workload is not divided, or several members are not doing their fair share of work.               |

## Evaluation

The evaluation will be based upon the research paper, the power point presentation and the poster. Evaluate individual and group work according to your own expectations. It will also include the following Exit Exam questions:

1. Based on the information presented by classmates, what is your strongest concern that was presented and why?.
2. In your opinion, what needs to be done about your concerns about our environment? State at least three reasons that support your view.

## Elaboration

The Great Energy Hunt



### Student Scoring Rubric for Team Members

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Name: \_\_\_\_\_

Name of report: \_\_\_\_\_

#### Score for group members:

- 4 = This member completed all of their workload
- 3 = This member completed the majority of their workload
- 2 = This member completed some of their workload
- 1 = This member did not do their work, thereby creating extra work for other members

List all members of your group below. Put a score by each member's name that you feel they deserve. Be sure to include your name and the score for yourself. Feel free to add any comments you think will be helpful.

### Useful Websites

(Please note that the website content is in English)

Energy4me - Essential Energy Education  
provided by the Society of Petroleum Engineers  
[www.energy4me.org](http://www.energy4me.org)

Society of Petroleum Engineers  
[www.spe.org](http://www.spe.org)

Captain Offshore Platform Virtual Tour  
<http://resources.schoolscience.co.uk/SPE/index.html>

A child's visit to an offshore oil rig  
[www.mms.gov/mmskids/explore/explore.htm](http://www.mms.gov/mmskids/explore/explore.htm)

EnergyZone, provided by UK's Energy Institute  
<http://www.energyzone.net/>

Facts, games, and activities about energy, plus links  
[www.eia.doe.gov/kids/index.html](http://www.eia.doe.gov/kids/index.html)

A US Department of Energy site about fossil fuels  
[www.fossil.energy.gov/education/index.html](http://www.fossil.energy.gov/education/index.html)

A comprehensive guide to oil refining  
[www.howstuffworks.com/oil-refining.htm](http://www.howstuffworks.com/oil-refining.htm)

Shell's Energy Minds for students  
[www.shell.us/views/energy\\_minds.html](http://www.shell.us/views/energy_minds.html)

Basic geology, how oil forms, and how it is found  
[www.priweb.org/ed/pgws/index.html](http://www.priweb.org/ed/pgws/index.html)

All about fuel cells, Smithsonian Institute  
[www.americanhistory.si.edu/fuelcells/basics.htm](http://www.americanhistory.si.edu/fuelcells/basics.htm)

The Alliance to Save Energy's kids site  
[www.ase.org/section/\\_audience/consumers/kids](http://www.ase.org/section/_audience/consumers/kids)

Plenty of links on the topic "Recycle, Reduce, Reuse"  
<http://42explore.com/recycle.htm>

The US's National Institute of Environmental Health Sciences  
site on recycling and reducing waste  
[www.niehs.nih.gov/kids/recycle.htm](http://www.niehs.nih.gov/kids/recycle.htm)

How Oil Drilling Works  
[www.howstuffworks.com/oil-drilling](http://www.howstuffworks.com/oil-drilling)

EIA Report on Demand  
US Energy Information Administration  
[www.eia.doe.gov/oiaf/ieo/oil.html](http://www.eia.doe.gov/oiaf/ieo/oil.html)

The Outlook for Energy - A View to 2030 ExxonMobil  
[www.exxonmobil.com/Corporate/energy.aspx](http://www.exxonmobil.com/Corporate/energy.aspx)

Energize Your Future Shell  
[www.shell.com/us/energizeyourfuture](http://www.shell.com/us/energizeyourfuture)

Students' page from American Geological Institute  
[www.earthsciweek.org/forstudents/index.html](http://www.earthsciweek.org/forstudents/index.html)

# Oil and the Environment

## The Great Energy Hunt

SECONDARY STUDENTS



Oil/Petroleum



Solar Energy



Nuclear Energy



Coal



Natural Gas



Wind Power



Hydroelectric Power



Biomass



Geothermal Energy



Hydrogen

- 1) Describe the energy source. (What is it? How does it work?)
- 2) Is the energy source considered renewable or nonrenewable?
- 3) What is the history of the energy source?
- 4) Where is the energy source found?
- 5) How is the energy source recovered?
- 6) How is the energy source stored once it is recovered?
- 7) How is the energy source used today?
- 8) Is the energy source "efficient?" (production costs compared to energy production)
- 9) What are the capital costs or setup costs involved in using the energy source?
- 10) Are there ongoing operating costs involved when using the energy source?
- 11) What are the advantages of the energy source?
- 12) What are the disadvantages of the energy source? (finding, extracting, manufacturing, using)
- 13) What is the economic impact of the energy source?
- 14) What is the environmental impact of the energy source?
- 15) Is there a high cost to the consumer in using the energy source?
- 16) Are there any other interesting facts about the energy source?
- 17) What is the future of the energy source?
- 18) What were the sources of your information?