

# Lesson Plan 100105

### Peak Oil (Target: Grades 7-10)

# **Objectives:**

- 1. Create awareness for finite petroleum resources and the surging demand for fossil fuels by developing nations.
- 2. Define "Peak Oil" and "cheap oil" and provide clear information about why there are such differences of opinion about how long petroleum resources will last.
- 2. Create awareness for economic and cultural effects of reduced availability for "cheap oil."
- 2. Create understanding of the need to reduce fossil fuel comsumption and to develop alternative, sustainable fuels.
- 3. Generate critical thinking about ways in which our dependence on petroleum makes us vulnerable as a nation and as individuals.

## Materials/Sources:

- 1. "Peak Oil" Questions & Answers Page.
- 2. "Peak Oil" News Report Transcript Page.
- 3. "Peak Oil" Classroom Comic
- 4. Computers connected to the internet/world wide web.

# Methods:

- Distribute "Peak Oil" Questions & Answers page to students. Have them spend 15 minutes reading and reviewing the information provided.
- 2. After students have read the Questions & Answers page, hand out the "Peak Oil" News Report Transcript Page and the "Peak Oil" Classroom Comic.
- HOMEWORK: Using the web resources on the Classroom Comics page and other searches, students will conduct online research about how a global oil crisis could effect their lives. Have them list 10 everyday products, services or habits that might change or disappear completely.
- 4. NEXT CLASS PERIOD: Student-led discussion.

A. Before you start the discussion, ask for a show of hands to the following questions:

- "How many of you think the peak oil problem is real and should be taken seriously?"

- "How many of you think the peak oil problem is overstated and that we are not in danger for the forseeable future?"

B. Choose two students--one each that raised their hands to the questions--to lead a discussion within the class. Ask them to discuss these questions:

1. If peak oil is not a problem, why would so many scientists create the peak oil scenario and write so many papers about it? What would be their motivation?

2. Who stands to gain most by downplaying the potential problems of peak oil?

3. What did the gasoline price gouging after Hurricane Katrina (2005) teach you about oil supply and demand?

4. Why do you think our government does not conduct investigations into sudden gasoline price increases that always occur right before holiday weekends such as Memorial Day, Labor Day and Thanksgiving? 5. Who do you think is more responsible for our growing oil dependency problems: industry, the government, or ourselves? (Why?)

B. After the discussion, ask students for their impressions of the Rustle the Leaf Classroom Comic. Ask what they think of the piece of equipment in the background, and of the point of punchline. Ask why they think we would rather change the subject than change our behavior.

# **Background Information for Teachers:**

#### Peak Oil Prediction

The Association for the Study of Peak Oil and Gas is an organization founded by geologist Colin Campbell. The association argues that the world faces the midpoint or maximum rate of global oil production around 2007, after which time production decline begins. This could potentially lead to a major global crisis in the early 21st century. Proponents of the peak oil theory point to the fact that the production rate of an increasing percentage of oil fields is either at the beginning of a decline or their rate is already declining. Huge, easily exploitable oil fields are likely to be a thing of the past. Natural gas is expected to peak anywhere from 2010 to 2020.

Exacerbating the potential oil depletion problem is the increasing global demand for oil due to population growth and increased global economic prosperity. In a recent year, 25 billion barrels of oil were consumed worldwide, while only eight billion barrels of new oil reserves were discovered.

In March of 2005, the International Energy Agency raised projections of annual global demand to 84.3 million barrels per day, which means over 30 billion barrels annually. This puts consumption equal to production, leaving no surplus capacity. Even if there are temporarily sufficient oil reserves that could be used to meet rising global demand, there is an unknown limit on the increase of oil production capacity, absent additional investment in oil production, transportation and refining facilities. Also in March of 2005, the Algerian minister for energy and mines stated that OPEC has reached their oil production limit.

#### The End of Cheap Oil

The phrase "the end of cheap oil", used to describe the predicted final result, refers to both the monetary and the energy efficiency aspects (i. e. the price will increase due to scarcity and the increasing inefficiency of oil production). When oil production first began in the early twentieth century, at the largest oil fields 50 barrels of oil were recovered for every barrel of oil used in the extraction, transportation and refining processes. This ratio becomes increasingly inefficient over time: currently, anywhere between one and five barrels of oil are recovered for every barrel used in the various recovery processes. When this ratio reaches the point where it takes one barrel to recover one barrel, then oil becomes useless as energy. At that point, all energy used to extract oil would result in a net energy loss; society would be more efficient and better off using that remaining energy elsewhere. Implications of a World Oil Peak

It is widely considered that a world peak in cheap oil production would have a substantial adverse impact upon contemporary society and prosperity since the industrial and technological revolutions have, in large part, been due to the use of cheap oil and other fossil fuels. Almost all agree that fossil fuels are finite and must be replaced with alternative energy sources in the future. However, opinions differ as to when this will happen, how to replace fossil fuels with alternative energy sources, and how difficult it would be to implement such changes. SOURCE: http://www.answers.com/peak+oil&r=67



#### Q: What is Peak Oil?

A; Peak Oil is the point at which all the oil discoveries in the world, being drilled and drained and refined by all the nations and oil companies in the world, are no longer able to meet the oil demands of the world. It is the point at which the easy-to-get oil ("Cheap Oil") is used up and the hard-to-get oil is all that is left.

Q: Doesn't "Peak Oil" mean running out of oil?

A: Not really. Peak Oil refers to running out of oil production capacity. Peak Oil is a term used to describe the inevitable moment when our ability to extract oil from the Earth will not meet the needs of all the people who have grown dependent on consuming it.

Q: What do you mean by "Cheap Oil?" Why is some oil easier to get than other oil? A: Imagine the Earth is hard, wooden ball the size of a basketball. Now imagine that hidden deep inside it are little sponges filled with water. Now, the only way we can get at the sponges to get the water is by drilling holes in the ball and pushing hollow syringe needles down into the holes where they make contact with the sponges. Once we have a needle down where the sponge is, we need to draw up the water. At first, when the sponge is soaked with water, drawing some water is very easy. After a certain amount is drawn out, however, it's harder and harder to get the water out of the sponge. This is very much how oil deposits exist. At first, every oil deposit has a certain amount of "Cheap Oil", but the rest requires a great deal more effort and energy to remove. Since the beginning of the discovery of oil deposits in the late 1800s, world economies have enjoyed the benefits of cheap, easy-to-get oil.

Q: Isn't there more undiscovered oil out there? A: By the mid 1960s, most all of the world's oil deposits had been discovered, and the last 40 years have been spent going after the "Cheap Oil" and using it to fuel growing economies and rising world populations. According to most geologists and oil production experts, we have found all the significant oil deposits on Earth. What new oil is found doesn't come close to meeting demand. Experts tell us we now use 4 to 5 gallons of oil for every one gallon we discover. Q: Are governments and oil companies lying when they say half of the world's oil is still in the ground? A: No, they're just not providing the whole truth. While it may be true that over half of the Earth's oil is underground, it is the hard-to-get oil. They are asking us to feel good about oil reserves that will never be seen, or will be extracted and refined at an alarmingly high cost per barrel. Q: Won't scientists discover ways to extract hardto-get oil more cost-effectively?

A: Unfortunately, there are laws of physics involved in how much oil can be extracted by inexpensive means. Sending seawater or Carbon Dioxide into oil wells to force out remaining oil is the only economically realistic means for extraction. There are other ways to extract oil from the Earth, but they are far too expensive.

Q: Why should I care? Doesn't it mean gas prices will go up and we'll just have to drive less? A: Our entire modern civilization is based largely on cheap oil. Most of us associate oil with driving our family vehicles, but personal transportation represents only a fraction of our use for oil. This question has been effectively answered by the authors of "The Community Solution" web site: "...Oil is so ingrained in the way we live that the implications will go well beyond higher gasoline prices. Think about the implications of a higher price at the pump. Factor in that the average distance food travels in the U.S. from where it is made to where it is consumed is 1,200 miles. When it costs more for fuel, it will cost more to move food. When it costs more to move food, food prices will go up. Also, when it costs more for fuel, it will cost more to operate farm equipment. the price of food will go up. Furthermore, if it costs more to manufacture products because it is more expensive to deliver the raw materials to the factory, the price of products will go up and people will buy fewer products. The factories won't be able to justify having as many workers and will let many go. People will have lost their jobs at a time when food is more expensive than ever. This is only scratching the surface of possible implications. Peak Oil will affect every aspect of global industrial society that uses energy directly or indirectly. The price of gasoline is one small part of the picture." Source: http://www.communitysolution.org/peakganda.html Q: When is Peak Oil going to happen? A: None of us know for sure, but most agree it will

happen within the next 50 years. Many scientists believe it will occur in between 2008 and 2010, based on the amount of oil production capacity and the rate of population growth.

Q: What about Hydrogen, coal and ethanol? A: Hydrogen is a product; producing it in quantities requires an electric synthesis process that uses a great deal of energy. Most talk about a hydrogen fuel alternative has to do with its low environmental impact. Our Peak Oil concerns are related to energy use, and Hydrogen is not sustainable because of its production costs. Coal is another matter. Some estimate that the United States has about 200 years' worth of coal deposits—but that number is based on our current use of coal during the "Cheap Oil" era. Once the "Cheap Oil" is gone, using coal as an alternative fuel would buy us only about 50 years, and the effects of using it would be devastating. Coal burning has destroyed over 40,000 lakes and streams in the Northeastern United States and Southeastern Canada. This is due to the residue from burning coal, which travels up into the atmosphere and returns to the ground (and groundwater) with precipitation (Acid Rain). If we turn to coal as an alternative fuel source, we will be creating a chainreaction of pollution, destruction of natural resources and human health crises. Other energy alternatives, such as ethanol from corn, still require a great deal of energy to produce. The cost of planting, watering, fertilizing, harvesting and processing the grain makes ethanol unrealistic. Q: What can we do to be ready for Peak Oil?

A: The first step is to get our elected officials talking about it. Second, we need to begin working together with all parts of our society—economic, scientific, education—to plan and implement ways to minimize the impact of peak oil.

Q: Why won't officials talk about Peak Oil? A: In many other parts of the world, Peak Oil is a topic of daily conversation on every level of industry and government. However, for many reasons, the United States government is unwilling to acknowledge-much less share-the "bad news" with its people. Part of this is because elected officials don't want to be the bearers of bad news. As Americans, we have all been raised in a culture where we expect every new generation to enjoy more ease and prosperity than the previous one. If a politician begins talking about a time when when we will need to cut back on our own convenience-oriented lifestyles, they run the risk of losing their next elections. It's a classic example of the metaphor of "shooting the messenger." Also, because there is so much money to be made in the sale and use of oil, oil companies and the industries they support have enormous influence over elected officials. You have read some of the ways in which expensive oil will cause negative economic effects. Any elected official that tries to move us away from our current economic structure could easily be blamed by the oil industry and other industries for causing economic chaos. Q: But aren't there credible scientists that say we

won't run out of oil for hundreds of years?

A: No matter who is making claims about how much oil is left, there is one fact upon which all must agree: at some point, the Earth's oil reserves will be depleted. Whether we experience it in the next 20 years or our great-grandchildren experience it in 100 years, it is our responsibility to start talking about the issue of Peak Oil and to take meaningful action as soon as possible.



Broadcast 26-Oct-2004 By British Television's Channel 4 National News

# **Oil Supplies 'Over-Estimated'**

# By: Liam Halligan

"Channel 4 News has been told by a top Saudi oil industry insider that the American government's forecast for future oil supplies are a "dangerous over-estimate". Sadad Al Husseini has just retired as vice-president of the Saudi oil company Aramco. His comments could have a significant impact on a jittery oil market which has seen the price of a barrel of crude rocket to record levels over recent weeks. Global oil markets are incredibly stretched. The price of a barrel is around \$55 dollars and rices have risen by around 80% over the last year. The key supplier is Saudi Arabia and the markets are highly sensitive to any news regarding the Desert Kingdom.

We've obtained sensitive US government estimates of how much oil the global economy will need over the coming years. At the moment, the world uses 80m barrels of oil a day, with Saudi supplying around 9 million, around 11%. By 2025, given huge demand rises from China, India and so on, global demand will rocket to 120m barrels a day. And, the US government says, Saudi will supply 22m barrels a day, around 19 per cent. The Saudis very rarely speak publicly about future oil capacity but there are signs the Kingdom is worried their fields are being pushed too hard.

Al-Husseini has just retired as Head of Exploration at Aramco and he told us in a rare interview, that estimates of future global supplies from the EIA, the US government's energy think tank, are simply too high. He also said he didn't see a price move below \$50 a barrel any time soon. Al-Husseini's opinion is a view that is growing in the oil markets, but which no-one wants to admit, that population growth and the emergence of China and India means oil prices are now going to be structurally higher than they have been.

It's also a view articulated by Matthew Simmons, one of the industry's leading financiers, and a former energy advisor to America's Vice President Dick Cheney. He says the main reason the markets won't wake up to permanently high oil prices is what he calls "group think" and "conventional wisdom". He's told us in an exclusive interview that the only way for oil demand, and thus prices to fall, is a global recession. Al-Husseini and Simmons are two of the most senior figures in the global oil industry."

WEBLINK: http://channel4.com/news/2004/10/week\_5/26\_oil.html

# **Questions About this News Transcript:**

1. Why is it news when an official from Saudi Arabia says forecasts for future oil supplies are a "dangerous over-estimate?"

2. Why would a government publish only optimistic over-estimates about the world's future oil supplies?

3. Who stands to gain by delaying the urgency for reducing use of oil and finding alternatives to petroleum?



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# Find out more about 'Peak Oil' by visiting these links:

http://www.communitysolution.org/problem.html http://en.wikipedia.org/wiki/Peak\_oil

http://www.guardian.co.uk/life/feature/story/0,13026,1464050,00.html

# http://www.peakoil.net

http://www.technologyreview.com/articles/05/02/issue/review\_oil.asp http://magma.nationalgeographic.com/ngm/0406/feature5 http://www.msnbc.msn.com/id/4287300 NOTICE: The web sites listed here display content relating to this month's Rustle the Leaf comic strip. We make no claim of responsibility for content on these web sites. The opinions and content published on these sites does not necessarily reflect the opinions of GO NATURT STUDIOS, LLC., or the creators and supporters of Rustle the Leaf.