

SCIENCE TIMES

Up to date information and issues related to Science, Technology and the Environment

STUDENT ACTIVITIES – Special Edition: *Prepared by Student Teachers*

Fats Into Fuels

Research and Inquiry

In small groups, students will organize air pollution facts (printed and cut into strips) according to categories that they create. A spokesperson from the group will share their headings with the class, or students can do a gallery walk to see how other groups organized the facts. **(All levels)** <http://www.cleanairprogress.org/clean-air-pollution/air-pollution-facts.asp>
Approach the topic of biofuels by discussing how current forms of fuel are affecting our environment. Students will use a jigsaw method to research the affects that gas emissions have on each of the biospheres. Each group of students works together to research and discuss the effects of pollution on their particular biosphere. Then students are put into groups with an ‘expert’ on each biosphere to share their research with the other group members.

This website provides an experiment that demonstrates the greenhouse effect. Students can observe these effects firsthand.

(Elementary) <http://www.energyquest.ca.gov/projects/greenhouse.html>

(Submitted by Christine Fornika)

Our sources of natural gas are quickly diminishing and will one day soon be entirely depleted. Recently, there have been many new attempts to create alternative forms of fuel that are environmentally friendly.

Research the different kinds ‘alternative fuels’ that exist. Compare and contrast each of these. How do they compare in terms of their effectiveness as a fuel, their ease of production, their cost of production, are there risks, and what about benefits? Weigh out all of the pros and cons for each type of fuel and decide which one you would choose, as well as which one you most certainly would not want to use. Justify your answers. **(Middle/Junior-Secondary)**

<http://e85.whipnet.net/index.html> **(Secondary)**

<http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20070518-18371300-bc-us-biofuel.xml> **(Secondary)**

This would be an activity based directly on the article for senior science students (specifically chemistry, or maybe even biology).

The article describes that process of turning any type of fat into fuel with four steps. Illustrate these steps with coloured diagrams in a flow chart. Make sure your pictures are clear and simple enough so that any intermediate science student could understand.

An extension could be to have these senior science students actually go into a junior science class and explain their diagrams to these students.

Other questions for discussion and research from the article are:

The process is said to be 100% green, what exactly is meant by this?

Why is this biodiesel process said to be better than others out there?

(Submitted by Lauren Enright)

Create an ad (a poster, commercial or pamphlet) advertising a new biofuel technology that can convert any fat into fuel. Who would be the target of your ad campaign? **(Secondary)** <http://www.newswise.com/articles/view/527706/>

How is the biofuel created by Centia different from other biofuels? Create a Venn diagram comparing and contrasting Centia biofuel with other biofuels. **(Secondary)** www.diversified-energy.com/index.cfm?s_webAction=centia

There are many different types of biofuels that have been developed or are in the process of being developed. Research different types of biofuels on the Internet and construct a mind map showing the positive and negative sides of at least 5 different biofuels.

(Middle/Junior-Secondary) <http://en.wikipedia.org/wiki/Biofuel>

(Submitted by Brandy Turner)

Begin with a background lesson on the environment so students have an understanding about why people would want to turn fats into fuels. You could possibly connect this activity to Earth Day. **(Elementary)**

<http://teacherlink.ed.usu.edu/tlresources/units/Byrnes-celebrations/earthday.html>

Examine the causes and effects of air pollution by carrying out an experiment. Students place one plant in a heavy traffic zone and the other away from traffic. Students then monitor and record the effects of pollution on plants and begin to construct their own ideas about whether or not turning fat into fuel is a good idea. **(Elementary)**

http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Environmental_Education/ENV0003.html

This is another great lesson that relates to the one above. Students tally all the cars that drive by their school. They can then discuss the implications as a whole class and how this affects the air, environment and people’s health. This then can relate back to the original article about whether or not it is beneficial for cars to be fueled with fats. **(Elementary)**



http://www.foe.co.uk/resource/guides/lesson_plan_mad_about_air.pdf

Depending on the age level and grade you could do some sort of jigsaw activity with this article. Each group could examine one part and then have to explain it the class talking about the connections that they made to their part. This would be a great way to do group work and to get everyone involved. **(Middle/Junior-Secondary)** <http://www.actionbioscience.org/newfrontiers/ekre.html>
(Submitted by Alaina Bird)

You just finished reading the article on *Science Times*, now read this article on *Science Daily*. Find out who discovered this new technology, what this new technology is called, who or which company/university is currently refining their findings and list some quotes about what some scientists say about the technology that is more advantageous than other biodiesel products. **(Secondary)**
<http://www.sciencedaily.com/releases/2007/03/070319175853.htm>

Read the PDF file from Diversified Energy Corporation and NC State University. This executive report goes into more detail about turning fats into fuels. List out the reasons as to why this innovative product may be valuable for airlines. **(Secondary)**
<http://www.insidegreentech.com/ctcfiles/Centia%20Executive%20Summary.pdf>

Is biodiesel really 100% green? There has been some conflict with this statement because there is reason to believe that the creation of biodiesel consists of using hazardous chemicals. Click on the Google link below and search for recent news about the use of hazardous materials to create biodiesel. **(Secondary)**

<http://news.google.com/news?hl=en&ned=us&ie=UTF-8&q=biodiesel+hazardous+chemicals>

(Submitted by Valerie Tiglao)

Discussion and Debate

After students have explored the pros and cons of using fats as fuels, the class could hold a debate. Other classes could be invited to attend as the audience and judges. **(Middle/Junior-Secondary)**

http://curtrosengren.typepad.com/alternative_energy/2006/08/biofuel_sustain.html

(Submitted by Christine Fornika)

New technology developed by Diversified Energy called Centia can apparently convert any fat into a renewable energy source. However, it is easier to use vegetable oils rather than animal fats (although animal fats are cheaper). Yet there is fear that 'energy crops' could potentially become invasive species, harming the local ecosystems. Research these two views and debate the use of Centia. **(Secondary)** www.renewableenergyaccess.com/rea/news/story?id=47429

www.physorg.com/news78069543.html

(Submitted by Brandy Turner)

After researching about the new technology and how there are some who believe that biodiesel causes pollution, divide the class in two groups and have a debate. One group will be for the research of this new technology, the other group will be against the research since biodiesel still causes pollution. **(Middle/Junior-Secondary)**

Things to think about:

Think about the process of how the conversion of fats into fuel is made, how is it different or similar to the creation of other biodiesels?

What other alternatives to biodiesels are there?

Is this a more environmentally friendly way to dispose of the animal fats or other fats that we use?

Who will win in the end, nature or those profiting from the patent?

(Submitted by Valerie Tiglao)

What kind of car will you drive? This excellent project gives students the opportunity to look at the different types of cars and fuel consumption and have a debate about what kind of car they would choose to drive and why. **(Elementary)**

<http://www.need.org/needpdf/WhatCar.pdf>

(Submitted by Alaina Bird)

Take Action

Have a walk to school day. The students could be involved in organizing the day and letting other classes know about why they are doing it. The students could do mini- presentations on the implication of air pollution to each class. This would be a great way to build community in the school and would be a great activity that everyone would benefit from. **(Elementary)**

(Submitted by Alaina Bird)

Food or Fuel? (The Chemistry and Efficiency of Biofuel Lesson Plan)

This is a downloadable lesson plan for grades 9-12 students. The purpose of the lesson is to investigate the relationship between fuel properties and chemical structures by making a batch of biodiesel from virgin olive oil. **(Secondary)**



http://www.pspb.org/e21/media/Food_or_Fuel_v_104_LP.pdf

(Submitted by Christine Fletcher)

Related Links

This is a 29-minute video about the effects of air pollution on children. It is a video that an older grade could watch and then discuss. They could talk about their feelings towards air pollution and what information they learned from the video. **(All levels)**

<http://video.google.com/videoplay?docid=-2117014148897138889>

(Submitted by Alaina Bird)

“Fuel Cells: Energy of the Future”

This website presents step-by-step instructions used to build and study a fuel cell. **(Secondary)**

http://www.virtualsciencefair.org/2005/burr5d0/public_html/

1st Grade Introduction to Energy Resources

This site offers 5 one-hour lessons that introduce students to the basic concepts of energy sources and the difference between renewable and nonrenewable sources. Students will also become familiar with common energy uses. **(Elementary-Middle/Junior)**

<http://www.cubiodiesel.org/documents/1st%20grade.pdf>

Clean, Green Power

This lesson plan targeted at grades 1-4 educates students about alternative energy sources and the disadvantages of using fossil fuels. Before going into science experiments about fats and fuels, it would also be crucial to review what fats and fuels are, especially for the younger students. Are there different kinds of fats and fuels? How did scientists come up with the original idea to convert fats into fuels? **(Elementary)** http://www.rustletheleaf.com/0506_Lesson.pdf

(Submitted by Christine Fletcher)

UPD8 (*pronounced 'update'*)

This site has a list of activities for students to compare the efficiency of biodiesel, ethanol and hydrogen. You will need to sign up for a free account. **(Elementary)** <http://www.upd8.org.uk/activity/71/Pump-Wars.html>

Biodiesel Presentation Day (Soybean song, biodiesel newscast, making a commercial, making an educational brochure, write letters to local food restaurants) **(All levels)** <http://www.need.org/needpdf/biodiesel2004.pdf>

How to make biofuel **(Secondary)** <http://www.attra.org/attra-pub/PDF/biodiesel.pdf>

This activity works well with the curriculum taught in Chemistry 11/12. **(Secondary)** <http://journeytoforever.org/edu.html#biofuel>

Online Biofuels Library

This site is a list of various biofuel sites and activities. Students could do general research or an activity comparing some the fuels listed. **(Middle/Junior-Secondary)** http://journeytoforever.org/biofuel_library.html

