

# INTRODUCTION:

## What is Biodiesel?

**Georgia Performance Standards:** SCSH3, SCSH5, SCSH6, SCSH7, SCSH8, SCSH9, SC2 a & b

**National Science Standards:** Content Standards: A, B: structure of atoms, structure and properties of matter, chemical reactions, conservation of energy, E, F: natural resources, environmental quality, natural and human-induced hazards, science in local, national and global challenges

**Objective:** Students will learn about the biofuel called biodiesel. Students will investigate general information about the fuel. They will find out what it is, how it is made, where it is used, how much it costs, and what environmental advantages it has.

**Essential Questions:**

- What is biodiesel?
- Is biodiesel a viable alternative to petroleum fuels?
- What are the economic and environmental impacts of using biodiesel?
- How does biodiesel fit in to the BIG picture of fuel use in America?

**Background:** The students will research background information themselves using a webquest.

**Procedure:** Using this [webquest](#), have students research information about biodiesel. Students should be given a month to complete this project with a couple days of class research time in the media center. Class time should also be given to the presentations.

**Materials:**

- Access to books, computers, and the internet.
- Microsoft PowerPoint
- Word Processing software

**Assessment:** Two rubrics provided with the webquest.

## **INTRODUCTION:** **Notes to the Instructor**

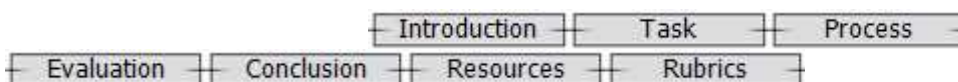
The webquest can be found on the website in the lessons section.

<http://www.teachbiofuels.org>

Also included is a hard-copy of the webquest that can either be copied or can be rewritten as a word document or webpage.

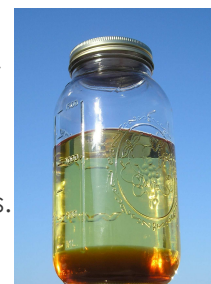


# Webquest: Using Biodiesel as an Alternative Fuel



## Introduction

Your team has been asked to give a 15-20 minute presentation to the school board convincing them to run the school buses on biodiesel (or blends of biodiesel). In order to be prepared for the presentation you need to thoroughly research different aspects of biodiesel. Each member of the team will pick one topic concerning biodiesel to research and will write a paper answering different questions about that topic. Then you will come together as a team and put together one Microsoft PowerPoint presentation covering all the topics. You will need to practice by presenting to the class.



## Task

You will need to have one group of six people. Each person will pick one of the topics below to research and write a paper on. As a group, you will put together one 15-20 minute presentation covering all six topics.

Topics:

1. What is biodiesel and how is it made:
  - Really research the CHEMISTRY involved here.
  - Look at the chemical reactions, and the process for creating
  - Include information about manufacturing plants
  - Advantages/disadvantages to blends?
2. Immediate costs vs. petroleum fuel:
  - Costs of modifications (if any)?
  - Costs of biodiesel itself
  - Tax credits
  - Money that you get back from any co-products?
3. Engines and modifications:
  - How does a diesel engine work?
  - What modifications need to be made to engines
  - How does biodiesel help/hurt the engines?
  - Warranties voided if biodiesel is used?
  - How do blends effect engines?
4. Environmental effects:

- Are there long term environmental impacts?
  - Are there short term environmental impacts?
  - What are some governmental hurdles to overcome?
5. Are there negatives to using biodiesel? What are the useful co-products of biodiesel production?
    - Can you find all the negative arguments for using biodiesel?
    - Can you turn those negative arguments into positives?
    - Are there useful by-products?
  6. How do we get biodiesel? How do we increase availability?
    - What vehicles are biodiesel-ready?
    - Where can we go buy biodiesel?
    - How do we get someone to offer it where we live?
    - What are the biggest hurdles?

Check the rubric to see how you will be graded for this project.

## **Process**

1. After the groups and topics are assigned you will need to consult several print and web resources to gather information.
2. Each member of the group needs to submit a 3 page paper answering the questions for each topic. The format should be standard MLA style with proper citing/quoting of sources. You will also need a bibliography page in addition to your three pages of content
3. You will need to create ONE presentation using Microsoft PowerPoint. You will need to make it long enough for a 15--20 minute presentation. I recommend 15-20 slides.
4. You will practice by presenting to the class in a randomly selected order.

## **Evaluation**

See [this rubric](#) listing the criteria for your written papers. Use [this rubric](#) for your oral presentations. You will be graded on how well you work as a team, the quality of your information, the visual appeal of your presentations, and how well you speak.

## **Conclusion**

Alternative fuels (biodiesel in particular) are an important part of today's culture. Many aspects of biodiesel can be understood with a small amount of chemistry knowledge. Now that you have had a chance to work on a project involving biodiesel you should be able to answer the following questions

What benefits to the environment do buses running on biodiesel (or blends of biodiesel) provide?



Does it require any modifications to the buses to run on biodiesel? Are the benefits worth the time, work and money?

How can a community benefit from having a vehicle run on biodiesel in the school?

Is it hard to make or get biodiesel to run in the buses?

## Resources

Various current magazine or newspaper articles

"From the Fryer to the Fuel Tank" by Joshua Tickell

<http://www.journeytoforever.org>

<http://www.afdc.doe.gov/altfuels.htm>

<http://www.biodiesel.org>

## Rubrics

### Research Report : Biodiesel

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

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

| CATEGORY               | 10  | 7   | 4   | 1  |
|------------------------|---|---|---|--|
| Quality of Information | Information clearly relates to the main topic. It includes several supporting details and/or examples.                                    | Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples.  | Information clearly relates to the main topic. No details and/or examples are given.  | Information has little or nothing to do with the main topic.   |
| Organization           | Information is very organized with well-constructed paragraphs and subheadings.   | Information is organized with well-constructed paragraphs.  | Information is organized, but paragraphs are not well-constructed.  | The information appears to be disorganized. 8)   |
| Amount of Information  | All topics are addressed and all questions answered with at least 2 sentences about each.   | All topics are addressed and most questions answered with at least 2 sentences about each.  | All topics are addressed, and most questions answered with 1 sentence about each.   | One or more topics were not addressed.   |
| Paragraph Construction | All paragraphs include introductory sentence, explanations or details, and concluding sentence. There are no grammatical/spelling errors. | Most paragraphs include introductory sentence, explanations or details, and concluding sentence. There are only one or two grammatical/spelling errors. | Paragraphs included related information but were typically not constructed well. There are three or more grammatical/spelling errors. | Paragraphing structure was not clear and sentences were not typically related within the paragraphs. There are many grammatical/spelling errors. |
| Sources                | All sources (information and graphics) are accurately documented in the desired format.   | All sources (information and graphics) are accurately documented, but a few are not in the desired format.  | All sources (information and graphics) are accurately documented, but many are not in the desired format.                             | Some sources are not accurately documented.  |

## Oral Presentation Rubric : Biodiesel Presentation

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

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

| CATEGORY                 | 10   | 7   | 4   | 1   |
|--------------------------|--|---|---|---|
| Collaboration with Peers | Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together.      | Usually listens to, shares with, and supports the efforts of others in the group. Does not cause "waves" in the group.          | Often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member.                         | Rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member. |
| Content                  | Shows a full understanding of the topic.   | Shows a good understanding of the topic.  | Shows a good understanding of parts of the topic.   | Does not seem to understand the topic very well.  |
| Speaks Clearly           | Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words. Always (99-100% of time) speaks in complete sentences. | Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word. Mostly (80-98%) speaks in complete sentences. | Speaks clearly and distinctly most ( 94-85%) of the time. Mispronounces no more than one word. Sometimes (70-80%) speaks in complete sentences. | Often mumbles or can not be understood OR mispronounces more than one word. Rarely speaks in complete sentences.  |
| Comprehension            | Student is able to accurately answer almost all questions posed by classmates about the topic.   | Student is able to accurately answer most questions posed by classmates about the topic.  | Student is able to accurately answer a few questions posed by classmates about the topic.   | Student is unable to accurately answer questions posed by classmates about the topic.                             |
| Posture and Eye Contact  | Stands up straight, looks relaxed and confident. Establishes eye contact with everyone in the room during the presentation.              | Stands up straight and establishes eye contact with everyone in the room during the presentation.                               | Sometimes stands up straight and establishes eye contact.   | Slouches and/or does not look at people during the presentation.  |