

CASE STUDY: Clean School Buses for South Carolina

OBJECTIVES:

- Research and analyze the status of the South Carolina school bus fleet with regard to
 - the current cost of maintaining the diesel fleet,
 - fuel costs per school bus,
 - concerns with the age of the current fleet;
- Research alternative fuel sources for clean school bus fleets;
- Evaluate the best clean school bus choice for South Carolina using a Decision-Making Grid;
- Research the emissions impact on the environment for the current diesel bus fleet and the selected clean school bus;
- Conduct a cost-benefit analysis for clean school buses.*
 - *This is an optional component of the activity.

CONTENT STANDARDS: Science Standards: 8-1.3, 8-1.4, 8-3.5

ENERGY SCENARIO:

South Carolina is one of the few remaining states that owns and operates its public school bus system. The state also has one of the oldest school bus fleets in the United States. Secretary of Education, Dr. Mick Zais, reported that “many students are riding the same school buses their parents rode twenty-five years ago.” South Carolina has updated its current fleet through the purchase of “used” school buses from other states and by retrofitting older buses with improved diesel engines.

Despite these measures, the state is operating with an aging fleet on a fifteen-year replacement cycle (250 thousand miles per bus) instead of the suggested ten-year cycle. The average cost of operating a school bus is one dollar per mile. According to data on the South Carolina State Department of Education web site for 2011, the school bus fleet included 5,630 active buses that traveled eighty-one million miles consuming twelve million gallons of diesel fuel in order to transport 647,000 students daily. The average cost of a new school bus is \$57,000, and new buses operate with a twenty-nine percent increase in fuel efficiency.

TASK:

After researching and analyzing the current status of the public school bus fleet, investigate alternative fuel sources for clean school buses and determine the best clean school bus choice for South Carolina to purchase as the state modernizes the school bus system. As an extension of this activity, you may conduct a cost-benefit analysis for the clean school bus you have selected. In addition, you can evaluate the emissions impact on the environment by comparing and contrasting the current diesel fleet with the clean school bus of your choice.

PRESENTATION:

The presentation will need to address the objectives and include all tasks and the related questions. Project options include, but are not limited to, a tri-fold poster board, power point, video, Public Service Announcement, or written report. Be sure to reference all sources of information used to complete the presentation.

Suggested Websites for Research

These websites are suggestions to aid in the initiation of your research and evaluation. You will also need to investigate additional sources.

<http://www.blue-bird.com/>

<http://ed.sc.gov/agency/os/Transportation/>

<http://www.epa.gov/cleanschoolbus/csb-overview.htm>

<http://www.thestate.com/2012/12/27/2569483/sc-buys-new-school-buses-to-replace.html>

<http://www.wistv.com/story/22249522/mick-zais-children-are-riding-the-same-buses-their-parents-rode-to-school-in>

Research Questions

Task / Objective #1 – Research and analysis of current school bus fleet.

1. What types of buses are currently being used by South Carolina?
2. What is the average age of a current South Carolina school bus?
3. What are the main concerns with maintenance of the buses?
4. What costs are incurred with the running of the fleet?
5. How does retrofitting the existing buses affect the current fleet?

Task / Objective #2 – Research of alternative fuel sources for clean school buses.

6. What types of alternative fuels are available for a clean school bus fleet?
7. How efficient are these fuels?
8. What are the costs of using these fuels?
9. How does the cost of alternative fuels compare with the cost of diesel fuel?
10. What is the cost of purchasing clean school buses to replace the existing fleet?
11. How do the costs of operating the clean buses compare with the existing fleet?

Task / Objective #3 – Complete the PACED Decision-Making Grid (attached).

P – What is the **problem**?

A – What are the **alternatives**?

C – What are the **criteria**?

E – **Evaluate** the alternatives?

D – Make a **decision**.

12. Which fuel source is the most desirable? Why?
13. What are the trade-offs among the different fuel sources?

Task / Objective #4 - Emissions impact on the environment.

14. How does retrofitting the existing buses affect CO2 emissions?
15. How clean are the alternative fuels? Which fuel source will have the least environmental impact? Compare the CO2 emissions of the alternative fuels to diesel fuel.

Task / Objective #5 – Cost-benefit analysis.

15. How did you make your decision about the fuel choice?

Decision-Making Grid

	Criteria				
	Plus/minus (+/- or +/-) or numerical point rating (1-5)				
Alternatives					
Bio-Diesel					
Compressed Natural Gas					
Electric					
Hybrid					
Propane					

Retro-fit kit (low sulfur diesel)					
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REFERENCES:

Economics in Action: 14 Greatest Hits for Teaching High School Economics, edited by Jane S. Lopus, Amy M. Willis, National Council on Economic Education, 2003.

Energy, Economics, and the Environment – Case Studies and Teaching Activities for High School, Office of School Assistance, Center for School Improvement and Performance, Indiana Department of Education, National Council on Economics Education, Revised 2006.

<http://www.blue-bird.com/>

<http://ed.sc.gov/agency/os/Transportation/>

<http://www.epa.gov/cleanschoolbus/csb-overview.htm>

<http://www.heraldonline.com/2013/05/19/4874730/upgrade-bus-system.html>

<http://www.icbus.com/ICBus/>

<http://www.schoolbusfleet.com>

<http://www.starcraftbus.com/>

<http://www.thestate.com/2012/12/27/2569483/sc-buys-new-school-buses-to-replace.html>

<http://www.stnonline.com/>

<http://www.thomasbus.com/>

<http://www.wistv.com/story/22249522/mick-zais-children-are-riding-the-same-buses-their-parents-rode-to-school-in>