

## **Transportation Project**

### **Reference e<sup>2</sup> energy episodes “Paving the Way” and “Growing Energy”.**

1) Read the background essay and discussion questions for e<sup>2</sup> energy episodes “Paving the Way” and “Growing Energy”. Watch the episodes and discuss the post-viewing questions.

2) Research alternative fuels for automobiles from the list below. Based on your research, choose a source you think is the most environmentally friendly and cost-efficient. Be sure to research different perspectives and opinions when making your decision and contact experts in the field. A helpful place to start is:

[www.fueleconomy.gov](http://www.fueleconomy.gov)

- Ethanol
- Natural Gas
- Bio-Diesel
- Electricity
- Propane
- Hydrogen
- Methanol

3) What are the pros and cons of using your choice of fuel? Points to consider include:

- Environmental effects – short-term vs. long-term. Does it emit greenhouse gases? Pollutants?
- Accessibility - How much is there? Is it easy to get? Is it renewable?
- Timeline for starting production – Is it available now? When will it be?
- Does the fuel require manufacturing of particular automobiles?

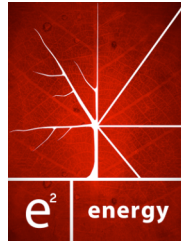
4) Create a five-minute presentation advocating your choice of an alternative fuel source. Be sure to reference resources and data and have a question and answer session. Visual aids are fantastic.

5) Share your work! Invite additional peers and teachers into the classroom during your presentation. Videotape your presentation and post it on [www.teachertube.com](http://www.teachertube.com) and/or [www.schooltube.com](http://www.schooltube.com)!

### Online Resources/Links

Fuel Economy- [www.fueleconomy.gov](http://www.fueleconomy.gov)

National Resources Defense Council- [www.nrdc.org/energy](http://www.nrdc.org/energy)



## e<sup>2</sup> energy “Paving the Way”

### Background Essay

The largest share of oil consumed in the United States – nearly 70% -- is used by transportation. In America alone in 2007 cars will burn through 143 billion gallons of gasoline and, at current retail prices, fueling up will cost Americans up to \$360 billion a year. Cars are not just an American problem; they’re also a global one that’s only likely to grow. Currently there are 850 million cars and trucks traveling on the earth’s highways and it’s projected that by 2020 the global number of automobiles is going to grow to about 1.1 billion. If you took those cars, parked them end-to-end and wrapped them around the earth, they would go around it 125 times.

Because it is unlikely that the demand for automobiles will decrease, we need to find ways to make them more efficient and find alternatives to gasoline. Rising oil prices, hiking global temperatures caused by the emission of greenhouse gases, and growing conflict in the Middle East are three of the main problems caused, in part, by the world’s addiction to automobiles. While carpooling, relying on public transportation or simply driving less and walking more could help to solve these problems, they won’t take us far enough. In order to slow the negative effects of the transportation industry, we need to design with the future in mind; we need to design ourselves out of oil dependence.

In this episode, General Motors unveils *The Volt*, a super-hybrid vehicle and the fuel cell-powered *Sequel*, while technology firm Fiberforge shows off the latest in ultra-lightweight materials for car manufacturing. These are only a few of the advanced technologies being developed for the future of the automobile industry. Which solution or solutions will emerge as the most cost-efficient, energy-efficient and ultimately the most popular cars of the future?

For more information about the GM Volt, visit [www.chevrolet.com/electriccar](http://www.chevrolet.com/electriccar)

For more information about the GM Sequel, visit [www.gm.com/company/gmability/adv\\_tech/400\\_fcv/index.html](http://www.gm.com/company/gmability/adv_tech/400_fcv/index.html)

For more information about FiberForge, visit [www.fiberforge.com](http://www.fiberforge.com)



## e<sup>2</sup> energy “Paving the Way”

### PRE-VIEWING QUESTIONS

1. What types of energy currently power cars? What types of energy show promise for powering cars in the future?
  2. What are the challenges of fueling cars on gasoline, both from an environmental and political perspective?
  3. What percentage of the gasoline in a car do you think is used to move it forward?
  4. It is often said that people “love their cars”. What do cars represent in our society? How dependent are you, your family and your city/town on automobiles? Do you use other forms of transportation?
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### POST-VIEWING QUESTIONS

1. What is a hybrid vehicle and how does it function? What are the positive aspects of owning one? Negative aspects?
2. What problems do we currently face due to our society’s dependence on oil? Are there benefits behind our current system?
3. How could using lightweight materials to manufacture cars help the environment?
4. Why wouldn’t every car manufacturer want to use lightweight materials right now? What are some of the risks with being the first company to use a new technology? What are some of the benefits of being the first?



## **e<sup>2</sup> energy “Growing Energy”**

### Background Essay

During the oil crisis of the 1970s, Brazil recognized the vulnerability of its economy, because of its dependence on foreign energy sources. Since that time the country has implemented an ethanol industry that is thriving on all levels, from production, to distribution at gas stations, to nationwide adoption of flex-fuel cars.

Changing the entire automobile industry wasn't easy, but through consistent policies and a dedication to building an infrastructure, Brazil was able to emerge as an energy independent country with a thriving flex-fuel automotive industry. Because of Brazil's tropical climate, large expanses of land, and an already established sugar-cane industry, it was able to use sugar cane to produce ethanol fuel without creating a shortage of sugar cane for other uses. In the early eighties, the public was buying ethanol cars, gas stations were providing ethanol fuel, and the industry seemed to be responding well to the country's energy needs. But in the late eighties the ethanol industry nearly perished when oil prices dropped significantly, leaving owners of ethanol cars with higher fuel prices and no choice but to pay them. Ethanol fuel production dropped, resulting in shortages and forcing consumers to think twice before buying ethanol cars. However, Brazil's policies, ranging from tax incentives to mandates for government vehicles, continued to encourage the establishment of a vibrant ethanol industry and the market responded.

Recognizing that consumers didn't want to be limited to one fuel choice when they purchased a car, Volkswagen was the first company to introduce a flex fuel car that would run on gasoline or ethanol. After the introduction of flex fuel cars, consumers felt more comfortable purchasing new cars, and the ethanol industry was given a second chance. According to Newsweek, as of July of 2007, flex fuel cars make up more than 80% of new car sales in Brazil.

Strong federal policies, infrastructure, manufacturing, and consumer acceptance were the keys to longevity that led to the remarkable success of Brazil's ethanol industry. What can the United States learn from this model?

For more information about Flexible Fuel Vehicles, visit [www.fueleconomy.gov/feg/flextech.shtml](http://www.fueleconomy.gov/feg/flextech.shtml)



## e<sup>2</sup> energy “Growing Energy”

### PRE-VIEWING QUESTIONS

1. What do you know about ethanol? Where does it come from and what is it used for?
  2. Where does most of the oil that we use in the United States come from? What problems do we currently face due to our society’s dependence on oil?
  3. Why do you think farmers in the United States are sometimes paid to not grow on their land?
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### POST-VIEWING QUESTIONS

1. Should the United States consider pursuing ethanol as a fuel for cars? Why or why not?
2. Describe the difference between ethanol made from corn and ethanol made from cellulosic sources. Is one preferable to the other? Why or why not?
3. Even though the United States doesn’t have the climate to duplicate how Brazil created ethanol, can the United States gain knowledge from the success that Brazil has had with ethanol?