Instructions for the Research Paper and the Informative Speech.

1. This project must be informative – that is, your paper/speech should explain or define, describe or narrate something. (No persuasion or attempts to convince someone of something.) Sample titles might include "How to Change a Tire," "What to Wear to a Football Tailgate Party," or "Deep Sea Vents Grow Abundant Life in an Arid Zone."

2. You must use at least 5 sources, including an interview, as resources for your speech/paper. Only two of the sources may be from the same category – e.g. the internet, books, magazines, newspapers etc. These sources must be cited at appropriate places in your paper and speech, using MLA style.

3. The paper must be at least eight pages long, not including a work cited page, and must be typed, double-spaced. It must include an introduction, body and conclusion. Proof your paper for grammar and spelling.

4. The paper must include a work cited page in proper MLA form.

5. Topic – your choice. You must, however, write a thesis statement at least three sentences long and submit it to Mrs. Petrides for approval.

6. Due dates: Thesis statement _____ Paper and Speech_____

Additional Instructions for your Informative Speech:

1. Your speech must be based on your research paper.

2. You must cite sources at appropriate places in your speech.

3. You should use note cards to speak from, NOT your paper.

4. Your speech must be 5 –7 minutes long.

5. You may use visual aids.

We will discuss these requirements in class to assist you in preparing for and delivering your speech and in writing your paper.

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April Grant

February 15, 2010

Mrs. Petrides

Biofuels

Over the last century it has come to our attention that fossil fuels will run out soon. Biofuels are one of the options for replacing fossil fuels. There are different kinds of biofuels. There are pros and cons to using biofuels compared to fossil fuels. Also, there is a lot of money being spent on research for biofuels.

Biofuels are "Fuels such as methane produced from renewable biological resources such as plant biomass and treated municipal and industrial waste." (Company, H). There are four catagories in which biofuels are placed, first generation, second generation, third generation and fourth generation.

First generation biofuels are produced in two ways. One way is through the fermentation of either a starch-based food product, such as corn kernels, or a sugar-based food product, such as sugar cane, into ethanol, also known as ethyl alcohol, or "gasohol." Another way is by processing vegetable oils, such as soy, rapeseed and palm, into biodiesel, a nonpetroleum-based diesel fuel (Chevron). First generation biofuels are known for their manifold problems. When made from grains such as corn or canola, they have negative impacts on food prices (this is not the case with sugarcane). When relying on a crop like palm oil, they threaten biodiversity. Their carbon balance is bad in that they don't reduce the main greenhouse gas much or because conventional farming

techniques (e.g. releasing nitrous oxide) offset the reduction (this isn't the case for sugarcane ethanol). Their overall energy balance isn't that strong either (some have found that for corn ethanol it can even be negative; for sugarcane, the balance remains good). Finally, these first generation biofuels rely on relatively inefficient conversion technologies such as fermentation by conventional yeast strains or on transesterification by alkali catalysts (Biopact team). First generation biofuels consist of biodiesel, vegetable oil, bioalcohols and Ethanol Fuel.

Second-generation, or "advanced", biofuels, made from nonfood sources, hold significant promise as a low-carbon, renewable transportation fuel that can complement traditional petroleum-based fuels in meeting the world's future energy needs." (Chevron). Second generation fuels involve a change at the bioconversion step and get rid of the apparent fuel versus food dilemma. Instead of only using easily extractible sugars, starches or oils as in the previous generation, these techniques allow for the use of all forms of lignocellulosic biomass. Grass species, trees, agricultural and industrial residues can all be converted via two main pathways: a biochemical and a thermochemical route. Synthetic biofuels and cellulosic ethanol have an excellent carbon balance and may reduce carbon dioxide emissions by up to 90% compared to petroleum based fuels. The World Energy Council recently estimated these fuels could replace approximately 40 percent of all petroleum based transport fuels, by 2050. (Biopact team). "Many scientists believe second-generation biofuels made from plant wastes, or from crops specially grown for the purpose on land not suitable for food production, offer greater promise than the biofuels being produced today. But the technology to make these newer fuels is in its infancy and the claims of its advocates have yet to be proved" ("Biofuels"). Second

generation biofuels consist of Biohydrogen Gas, Wood Diesel, Mixed Alcohol and bio-hydrogen diesel. Biohydrogen diesel is produced from animal waste, mostly cow manure.

Third generation biofuels are based on advancements made at the source - the production of biomass. This generation takes advantage of new, specially engineered energy crops. With higher yields and easier bioconversion, less energy is needed to grow, harvest and transform a given amount of biomass. (Biopact team). One of the most common known and studied third generation biofuels is from algae.

Fourth generation biofuels are a work in progress. In fourth generation production systems, biomass crops are seen as efficient 'carbon capturing' machines that take CO2 out of the atmosphere and lock it up in their branches, trunks and leaves. The carbon-rich biomass is then converted into fuel and gases by means of second generation techniques. Crucially, before, during or after the bioconversion process, the carbon dioxide is captured by utilizing so-called pre-combustion, oxyfuel or post-combustion processes. The greenhouse gas is then geosequestered - stored in depleted oil and gas fields, in unmineable coal seams or in saline aquifers, where it stays locked up for hundreds, possibly thousands, of years. The resulting fuels and gases are not only renewable, they are also effectively carbon-*negative*. Only the utilization of biomass allows for the conception of carbon-*negative* energy; all other renewables (wind or solar) are all carbon-*neutral* at best, carbon-positive in practice. Fourth generation biofuels instead take historic CO2 emissions out of the atmosphere. They are tools to clean up our dirty past. These fourth generation biofuels - fuel production coupled to CCS - are not a fantasy. The first step towards them is already being taken. Recently at the U.S. Department of

Energy's National Energy Technology Laboratory (DOE/NETL) and the U.S. Air Force (USAF) released a report which focused on the production of fuels made from combining the liquefaction of both coal and biomass, and then coupling the system to carbon sequestration technologies. (Biopact Team).

Biofuels have limited uses right now but have a promising future according to many. Biodiesel for instance, according to Paul Lucas, can be used in all engines. Now that is only theoretical and most companies do not recommend allowing one hundred percent biodiesel be the source of fuel. It is recommended to use a combination of biodiesel and regular diesel. At most gasoline stations about a five percent biodiesel solution is used. It has also been proven that biodiesel waste from cooking oil freezes in the winter. All of this gives us something to think about.

While the geopolitical and environmental risks of oil dependency may be obvious today, it was not always so. In the early days of motorized transport, fuels derived from plants lost out to fuels refined from crude oil, which could be obtained cheaply in many parts of the world just by poking holes in the ground. Not only were gasoline and diesel the cheapest fuels for many decades, but they are about as energy-dense as liquids can be, which makes them superb choices for carrying vehicles long distances. Replacing them will not be easy, and the struggle to do so has produced some of the most intense controversies of modern society (New York Times).

When seeking an alternative we must look at the pros and cons of production and uses. Looking at the environmental effect of biofuels we have the positive aspects such as biofuels are renewable, meaning their sources can be re-grown. And depending on the feedstock, the processing technology and the type of fuel produced, they can offer

environmental benefits such as lower carbon emissions and lower sulfur compared with conventional petroleum-based fuels. (Chevron). The aim of all biofuels is to be carbon neutral. Biofuels prove to be substantially more environmentally friendly than their alternatives. (Lucas). Then we have to look at the negative aspects. In reality, biofuels that are in use today are not carbon neutral simply because it requires energy to grow the crops and convert them into fuel. The amount of fuel used during this production (to power machinery or to transport crops) does have a large impact on the overall savings achieved by biofuels. (Lucas). A fear among environmentalists is that by adapting more land to produce crops for biofuels, more habitats will be lost for animals and wild plants. It is feared for example, that some Asian countries will sacrifice their rainforests to build more oil plantations (Lucas).

Looking at the positive statistics of biofuels we see, according to a technique called Life Cycle Analysis (LCA), first generation biofuels can save up to sixty percent of carbon emissions compared to fossil fuels. Second generation biofuels offer carbon emission savings up to eighty percent. This was backed by a recent UK Government publication which stated biofuels can reduce emissions by fifty to sixty percent. Some biofuel protestors push concerns of the increase of food prices due to the land being used for biofuel instead of food (Lucas). There is also a positive impact from what the biofuels can do for the world as well. Biofuels are helping to tackle poverty around the world. For example, the Overseas Development Institute has pointed to wider economic growth and increased employment opportunities along with the positive effect on energy prices, as reasons to back biofuel production (Lucas). It uses simpler technology and lower transportation costs alongside increased labour (Lucas).

Another concern is that if biofuels become lucrative for farmers, they may grow crops for biofuel production instead of food production. Less food production will increase prices and cause a rise in inflation. It is hoped that this can be countered by second generation biofuels which use waste biomass – though again, this will impact the habitat of many organisms. The impact is particularly high in developing countries and it is estimated that around 100million people are at risk due to the food price increases (Lucas).

"In the search for replacements, biofuels have attained the greatest political momentum, in part because they promise lucrative new markets for farm products. In the United States, Congress had adopted extensive mandates and subsidies to get a biofuels industry off the ground, and other countries have also adopted renewable-fuel policies" ("Biofuels"). News Week is saying that the "Energy and Independence Act of 2007 has high demands. They are asking that 36 billion gallons of biofuel be produced yearly by 2022. That is more than five times the amount that is currently produced. Also by the year 2015 the minimum amount of biofuel produced will be 15 billion gallons. This is corn-based ethanol. To produce these amounts it will take 20 million more acres of corn. As of right now the car industries have only produced 6 million vehicles that run on mixed ethanol and gasoline, like E85 (Ramirez).

The car industries have a lot on their plate. Different companies have different goals. Some are already taking big steps in pushing for the future of Biofuels. "As part of Chevron's strategy to invest in renewable energy technologies, we have formed a business unit to advance technology and pursue commercial opportunities related to the production and distribution of advanced biofuels. We are actively investing in the

acceleration of the scientific, technical and commercial breakthroughs necessary to bring nonfood biofuels to large-scale commercial production" (Chevron). A major concern is the price of oil. "With agricultural commodity prices approaching record lows, and petroleum prices approaching record highs, it is clear that more can be done to utilize domestic surpluses of vegetable oils while enhancing our energy security. Because biodiesel can be manufactured using existing industrial production capacity, and used with conventional equipment, it provides substantial opportunity for *immediately* addressing our energy security issues" (Benefits).

William B. Craven, who manages for the Safety development and laws department of Daimler/Mercedes-Benz has a little insight to the future goals of Mercedes. "I help create the goals for the safety Department at Mercedes-Benz. I also discuss other kinds of goals for future vehicles that we will produce. We tend to be a step ahead of the other car companies when it comes to safety and development of our vehicles. One of our "Hopeful" goals is to be able to create all of our future vehicles to run on biofuels. We have also discussed vehicles that run on either or. Another part that I play for Mercedes is a lobbiest. I speak to Congress as well as other diplomats about changing laws to suit our goals for our vehicles. It was a step closer for us when the act was passed stating the goals for future biofuel use in vehicles. We were so pleased because we are already stepping in that direction. I can't say much more because simple words tend to be taken as promised to the public. But all in all the future for Mercedes is molding its way to other fuel options, specifically biofuels" (Craven).

"The outlook for global biofuels will depend on a number of interrelated factors, including the future price of oil, availability of low-cost feedstocks, sustained

commitment to supportive policies by governments, technological breakthroughs that could reduce the cost of second-generation biofuels, and competition from unconventional fossil fuel alternatives." (Coyle).

Biofuels are looking to be the future replacement of fossil fuels. The different generations of biofuel are all still being researched. There is a lot to think about when it comes to the pros and cons of biofuels. The way that the car companies a are turning looks to be toward biofuels. The future is still uncertain, but with everything considered it looks like the future of biofules has no end in sight on this planet.

Work Cited

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