

## **EARTH DAY WRITING CONTEST 2012**

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Essay topic 2: Tell us about the pressing environmental issue in your city. How would you go about addressing it?

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Fossil fuel has been an invaluable gift from Mother Nature to human beings since the 19<sup>th</sup> century. I was born in an era when literally everything I am exposed to relates to fossil fuel, in one form or another. In a rebellious moment of mine when I thought that could be completely independent on fossil fuel, I planned to detach myself on all forms of energy consumption for a week. I survived for a couple of hours until my family panicked being unable to get me on the phone. In modern civilizations, we cannot walk away from energy, for it has already become an integral part of essential needs. However, these amenities require energy obtained from the burning of our Mother Nature's gift which includes oil, coal and natural gas. I believe that most people, to some extent, are aware of the nonsustainability of fossil fuels as well as their bad effects to our environment. Therefore, the focus of this essay is to dissect into algae biofuel – a sustainable, eco-friendly, and affordable source of energy and most importantly, its large scale production can be implemented effectively in Vietnam.

Ho Chi Minh residents are facing two problems: high price of gasoline, and toxic air pollution. HCMC is now one of big cities in Vietnam that are “bearing” the consequences of air pollution due to the traffic activities. Complete and incomplete combustions of fuels in the automobile engines may discard the residual gases including CO<sub>2</sub>, CO and the fuels themselves. It has been generally known that the “by-products” from our means of transportation have a great distribution to air pollution. In addition,

there is a “hotter” issue related to traffic: gasoline price. Along with the decline of Vietnam's economy in the backdrop of global economic recession, increasing gasoline prices is of serious public concern. In the current situation, biofuels which is eco-friendly and offers affordable prices should be one of the potential solutions.

The first generation of biofuels is oil extracted from land crops such as corn, soybean, etc. At first, it brought hope to all of us that we would not have to be totally dependent on fossil fuels. Unfortunately, it turned out that biofuels produced from edible sources caused a noticeable negative impact on food market as well as food security. Since land crops have been the only way that the earth feeds its habitants, there would be food crisis if crops are used for other purposes. It would not be that big of a problem if the earth habitants could survive by consuming biofuels instead of eating real tasty food. Therefore we had to walk away from corn and soy biofuels due to affordability, although they are surely sustainable, and eco-friendly.

The problem then became to find a solution for another source of biofuels that is sustainable, yet does not hurt the food stock of the world. The second generation of biofuels was then introduced, whose main source of raw material was algae. The idea of using algae in fact stemmed from its robust biological properties: high efficient photosynthesis, rapid growth, compatibility with both marine and fresh water environment, and low nutrient requirement. As photosynthetic organisms, algae can convert sunlight, water and CO<sub>2</sub> into their biomass. The oil content of percentage of dry weight of algae varies from 20 to 50 percent, allowing much better biofuel yields compared to the first generation coming from foodstuff. More importantly, algae can grow in fresh, to brackish and marine water, which can reduce the use of fresh water source for cultivation. In the Holy Bible, when Moses was leading his people to escape from Egypt to the Promised Land, they suffered from thirst and starvation in Sinai desert. According to the Old Testament, God sent down “manna” to rescue them. Producing algal fuel today is

like the story of Moses and his people. We are making an invaluable source of energy primarily out of CO<sub>2</sub> and sunlight. There then would be no dispute between U.S., European countries and high oil reserves.

While fossil fuels are considered the largest contributor of greenhouse gases to the biosphere, which subsequently cause global warming, algae biodiesel is known as an “eco-friendly” source of energy. Due to the photosynthesis, algae can take part in the biofixation of CO<sub>2</sub>. For example, in the open pond system, in appropriate conditions, algae can utilize up to 90% of the injected CO<sub>2</sub>. Besides, in accordance with the National Biodiesel Board of The United States, using biodiesel can reduce up to 48% emission of CO<sub>2</sub> and other gases such as carbon monoxide and sulfur. In the context of urban areas, wastewaters from municipal, agricultural and industrial activities can actually act as nutrient sources in algae cultivation; two problems are solved at the same time. Thus, in the environmental point of view, algal biodiesel has greater advantages compared to the fossil fuels.

Vietnam has a great potential to invest and develop algae biodiesel industry. In fact, we have a dense river network which is rich in flora and fauna diversity including more than 1000 species of algae. In addition, manufacture of algae oil is fairly simple with advantageous properties: short growth cycle, low demand of land and ecological conditions, etc. Thus, production can be carried out right in the outskirts of Ho Chi Minh city, which consequently reduces the transportation burden of the city.

In brief, algal biodiesel is a potential solution of several environmental and social issues. Using algal biodiesel can not only diminish the greenhouse gas emissions which are the main causes of global warming, but also helps us politically keep the world a peaceful place. It is indeed time to switch from fossil fuels to algae biodiesel. As a biotechnology engineer to be, I whole heartedly hope that we have

opportunities to develop and scale up the production of “made-in-Vietnam algal oil” and make it be accepted as a popular source of energy all over the world.

### **References**

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