Team A

Green Proposal

In 2000 the United States Census Bureau released their report stating that there was currently some 6 billion people in the US and are predicting there will be an estimated 9 billion people by the year 2050. It has come to our attention that if the world's natural resources were evenly distributed by the year 2050 the people will only have twenty five percent of the resources per capita that the people had in 1950. This is of great concern to us and is becoming our obligation to try and rectify this problem by doing all that we can now so our children of the future have the recourses they need to succeed.

Recycling

Even by taking the smallest steps into the right direction would make an impact. Recycling, one of the easiest steps for our school to take, has an extraordinary impact. By recycling just one aluminum can we can save enough energy to power a television for six hours. Or even recycling one glass bottle can save enough energy to power a one hundred watt light bulb for four hours. More astonishing by recycling one ton of paper we can save seven thousand gallons of water, three hundred eighty gallons of oil, and saves enough energy to power a house for six months!

Waste Management started this year recycling here at Northwestern. We recycle what is called Commingle. This is a mixture of: all colored glass bottles and jars, aluminum cans, bi-metal cans, steel cans, and plastic containers # 1 and 2 (located under side of container in the center of the recycling symbol). They are currently supplying the schools with 96-gallon totes. So here at Northwestern we do have the facilities to recycle, our next step would be to educate the students and staff about how this works to utilize it to the fullest. We should take steps to mark what type of products go into each bin to help get things where they should go and put more emphasis on enforcing this so that it becomes second nature to us. This will greatly help our environment.

Alternative Fuels

Northwestern school may not be largest in population but when in comes to square miles we beat the rest of the area. Our transportation system, consisting of forty buses (34 used daily), nine, nine passenger vans and three minivans, traveling a total of 759,414 miles last year with a daily total of 4,219. With this being said, not only could it be argued that our bussing and transportation unit has a greater impact on the environment, considering our district has more miles to cover, but also, our consumption of diesel to fuel our bus fleet is greater. This in mind it would be of great interest to look into alternative fuels. The advantage would not only been seen in our school budget because our fuel savings would be evident but we would also be saving our environment by using something that is more friendly to it.

Petroleum made products, such as gasoline and diesel, are so expensive these days and they are so harmful to the world around us. Today most of the buses in use at schools are diesel powered. Diesel has been scientifically proven to be more environmentally safe, but it is still a petroleum product and is still dangerous to the environment. Why do we still use these products if we know they are so dangerous? That question is one for the books. Luckily, there are alternative fuels that can be used that are much more environmentally safe and in some cases cheaper than diesel. The three alternative fuels that were researched for this project are natural gas, biodiesel, and propane.

Compressed natural gas, (a.k.a. CGN), is a cheaper way to fuel a school bus than diesel. A savings of $2,000 can be achieved because CNG is seven cents cheaper than diesel! The exhaust produced from used CGN contains less smog and green house gasses.

The amount of carbon monoxide (CO) is reduced by seventy per cent. Similarly, non-methane organic gas is reduced by eighty-per cent; nitrogen oxide (NO_x) by eighty-seven per cent; and carbon dioxide (CO_2) by twenty per cent. A CNG bus may cost more in the beginning, but in the long run the lower fuel prices and low maintenance will allow the buses to start paying for themselves. Or if buying a new bus is out of the question, for only $18,000 a fleet of thirty buses can be converted from diesel to natural gas.

The second alternative fuel is biodiesel. Biodiesel can be used in its purest form, B100, but it is usually mixed with normal diesel. While biodiesel sounds a lot like diesel, there are some major differences between these two cousins. First off, biodiesel is totally biodegradable so if it is spilt or there is a leak in the fuel tank, the surrounding ecosystem will not be harmed. Because biodiesel is non-toxic, it is totally safe to handle. The worst that has been shown to happen from skin contact is mild irritation, and that was over a period of twenty-four hours. Another astounding fact about biodiesel is just how low the toxicity rate is: table salt is ten times as toxic as biodiesel. Second, biodiesel is manufactured from vegetable oils and animal fats so there is no need for that pesky petroleum. Some people may doubt the effectiveness of biodiesel, but fear not for biodiesel is shown to have the same horsepower, torque, etc. as diesel. Also, a low biodiesel mix, up to B20 (twenty per cent biodiesel, eighty per cent diesel), may be used in a normal engine with no adverse affects and will not void any warranty. Biodiesel is also a very lubricant and cleansing material so any deposit build ups in the engine will be cleared out, even with a low mix of B2.

Propane is the last form of alternative energy presented here. When a person thinks of propane, they may think of grills, and indoor heating units. Well, this handy-

dandy gas can also be used to power buses very efficiently. Also, on average, a propane powered bus can save up to $25,000 over a normal diesel powered bus. It should be pointed out that propane is made from petroleum, but it is also non-toxic and not harmful to soil or water. The smog created by the burning of propane is sixty to seventy per cent less than that of diesel and other petroleum based fuels. The by-products that propane gives off can be anywhere from eighty-three to ninety-nine per cent less than that of other petroleum fuels. For example, carbon monoxide is decreased by eighty-three per cent, and nitrogen oxide levels drop by ninety-six per cent. Propane sure is amazing stuff.

Lighting

Another thing to take into consideration is the lighting. If everyone changed one light bulb to a Energy Star light bulb we could save enough energy to light more than three million homes for a year, more than $600 million in annual energy cost, and prevent greenhouse gasses equal to emissions of more than eight hundred cars. Could you imagine what the school could save by changing our bulbs to more efficient CFL's, LED or even taking initiative in turning more lights off while not in use.

There are a couple different options for our school when it comes to lighting. Such options include Compact Fluorescent Light Bulbs (CFL's), LED light bulbs, and even turning out lights that are not being used.

The compact fluorescent light bulbs have many advantages. One CFL saves about thirty dollars over its lifetime. This is largely in part to the fact that they last about ten times longer than normal incandescent bulbs. So it only takes about six months for the CFL to pay for itself. Another large advantage to the CFL's over our normal incandescent bulbs is it uses about 75% less energy. That adds up to a huge savings over the bulbs lifetime. These lights also produce about 75% less heat so they are safer to use and cut energy associated with cooling.

Another option to consider for lighting is LED lights. These lights are even more astonishing than the CFL's. The LED lights last about ten times longer than the CFL's and twenty times longer than incandescent bulbs. LED lights have no filament making it hard for them to break. Also containing no mercury makes them easier on the environment and easier to dispose of. Benefits from LED lights would include: produces flicker free light which is shown to reduce stress in children, LED light units with correct

light wave length make children more productive, longevity massively reduces maintenance costs and liability risk for failed lights, and the power consumption reduces electricity bills. It would only cost two dollars a year if an LED was on for eight hours a day and an incandescent would cost about twenty dollars and have to be changed 2-3 times a year.

Alternate Energy

Over the years, our school district (excluding Weisenberg) has invested a ton of money to power our schools and surrounding developments (field house, bus garage, etc.) In 2007 and 2008, we used about 3,900,000 kWh. This is quite a bit of electricity, which results in a lot of money spent. We spent about $390,000 for all this electrical energy. This means every kWh is roughly $0.10.

The area we live in is very windy. What if we could use our environment to our advantage to save money and to conserve energy? Wind Turbines would be great for our school district. Depending on the size of the wind turbine and the placement of it, it could conserve energy and leave us with extra money.

As the blades turn, this is what creates the electricity. This area usually has a constant flow of wind so this method can conserve up to 80% more electricity. We would be able to benefit from our wind and turn it into electricity, cheaper and more efficiently.

Wind Turbines come in many sizes. We have the choice to get one very large one or a couple smaller ones. One option could be the Vestas V47- 660kW wind turbine. This turbine is very large but it turns our wind into valuable energy for us to use. Every year, it can produce up to 1.5 million kWh. This means we could save $0.03 on every kWh. This may not seem like a lot but after a whole year of it's existence, it would save us $100,000-$120,000 a year. This is a massive figure and a lot of extra money for the school district.

The construction and installation may be expensive, but in the long run it will save us thousands yearly. The wind turbine lasts 20-25 years also, so if it lasted 20 years, it would save a total of $2,000,000-$2,400,000. For such a large structure, its

maintenance is fairly cheap. For every year, its maintenance cost would be about 1.5-2% of its original cost.

Green Cafeteria

Moving on to the lunchroom. One problem is our plastic portion cups. They are un-recycled polystyrene, which is non-biodegradable material. This product is often abundant in the outdoor environment and particularly along shores, waterways, and is a form of pollution. It is very harmful to wild animals if it gets ingested. These portion cups cannot be easily recycled because of its lightweight and low scrap value and for this reason is not accepted in curbside collection. These reasons should sway us away from the use of these plastic cups and consider the option of putting our condiments either directly onto the lunch trays or consider purchasing a more environmentally friendly cup that can be recycled.

These portion cups are made with HCFC blowing agents, which has been shown to effect ozone depletion and global warming. Another issue is that if these cups are burned without enough oxygen or at a low enough temperature it will produce carbon monoxide. All these things are very harsh on our environment.

We have figured that we use about 2 cups with lids per student each day. There are approximately 600 students and staff at NHS that use the condiments and there are about 160 days of lunch (half days included). So for the HS we would need about 192,000 of both cups and lids. We purchase 77 cases of both lids and cups each year spending an astonishing $4,502.96. Through our research we have found that there are better alternatives. There are products that are made from renewable resources such as 100% corn. Those are biodegradable products institute certified, they also have lids that fit all sizes making it more eco-friendly.

Also we currently use small ketchup packets that are not recyclable. 50 ketchup packets are equivalent to a 14 ounce plastic bottle. An alternative to the ketchup packets is going back to a plastic ketchup jug. Jugs are $0.31 per ounce compared to $0.28 per ounce for packets, a negligible price difference for being able to recycle.

Hand Dryer

Even going greener in our school bathrooms is an option to consider. Going through 153 cases of paper towels each years isn't easy on the trees and the environment. With this in mind we could have a more eco-friendly hand dryer. This will simply blow hot air onto your hands to dry them. So instead of killing hundreds of trees each year for the students to dry their hands, we can just use the air we breathe and only a little electricity.

These eco-friendly hand dryers turn off after 40 sec and we figured they are used about 50 times daily in each bathroom. They would be in use about 8.9 hours a day costing nine cents a kw/hr, which would cost us about $8 a day and $1,442 a year. That number is low considering we spend $2,790 a year on paper towels. This would save us about $1,348 a year, and countless numbers of trees.

Paper

Our school purchases approximately 1,080 boxes of paper a year. Each box costs $27.57 and contains 10 reams, with 500 pages, so in one box total there is 5,000 pieces of paper. During one year Northwestern uses 5,400,000 pieces of paper and spends $29,775.60. The idea of not using the technology we have is absurd. Northwestern has just received new laptops; we should be utilizing these supplies. We could save $15,990.60 a year if our school decided to purchase only 500 boxes of paper reams. An alternative is giving each student his or her own personal e-mail address. Teachers and students could send homework assignments back and forth. In both Mr. Kleinert's Econ class and Mr. Smoyer's College Math class, we use Internet sites such as Aplia and Blackboard. Each of these sites a student can take tests and send in assignments with no paper involved. Using these sites would help on cutting down our paper usage.

We need to start now to make our future better. One and a half boxes of paper is equal to one tree, this means we are cutting down 720 trees just for paper! If Northwestern Lehigh purchases 500 boxes instead, we would save 387 trees. Our environment in depleting and we cannot afford to be using this abundant amount of paper for only one year.