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Big iDeas at SMU: Real Fuel on Campus

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Real Fuel on Campus

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Faculty cooperators:

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Problem Statement:

The main focus of our big iDea is to address one of the causes global warming in the Dallas area. As stated in the Dallas Sustainable Skyline project, one of the seven ways to help clear the skies in Dallas and improve the quality of life is to replace small diesel-powered engines with more efficient, sustainable technologies.

As a leader in the Dallas community already striving towards a "greener" future with LEED certified buildings and extensive recycling programs, SMU needs to set the benchmark on sustainability with a program that would directly tie into the Sustainable Skylines program.

Methodology and Rationale

Our primary iDea is to reduce emissions at the site by using an on campus processor to convert SMU food service waste vegetable oil to biodiesel. David Randolph, district manager of Aramark food services, is in charge of waste vegetable oil and has promised us the full amount they produce. Mr. Randolph mentioned that the current system of removal is inefficient and not bound by contract: two separate companies collect the waste oil; the university is paid for the oil from Umphrey Lee, while they must pay for the oil to be removed from Mac's Place and Hughes-Trigg.

A rough estimate of yearly waste oil production at the university is one thousand gallons. In the 2008 fiscal year, the university purchased 1674 gallons of diesel and 587 thus far in FY09. At the peak price of $4.75 per gallon, this equates to $7,951.50 spent on diesel for FY08. On average, biodiesel costs around $0.83 per gallon to produce. Assuming a production capacity of a thousand gallons of biodiesel, this would have saved the university $3,920. Although diesel prices have significantly dropped, biodiesel is still more cost effective at $0.83 per gallon versus the current price of $2.27 per gallon. The cost of biodiesel processors runs from $2,500 up to $8,000 depending on need and labor input requirement.

There are two options for the consumption of the biodiesel. One option is to burn the fuel at the Central Plant, which will not require significant changes in infrastructure and would help provide the campus with electricity. The current burners could be switched for a day to burn a month's supply of waste vegetable oil based fuel fed from an auxiliary thousand gallon tank, which could also serve as a backup. Newer burners have the ability to switch automatically, and the fuel will only require a small amount of processing to be used at the Central Plant.

Another option is the installation of a biodiesel fueling station on campus. There are nine diesel vehicles on campus and four diesel generators, including a recycling truck and two backhoes, which the City of Dallas has already proposed be run solely on biodiesel. Instead of purchasing the fuel off-campus with a fuel card, a portion of the necessary diesel could be acquired on-campus at a fraction of the cost. With constant construction on campus, there are also more diesel vehicles on campus than the university itself maintains: contractors could be invited to fill their vehicles and equipment with biodiesel to further offset

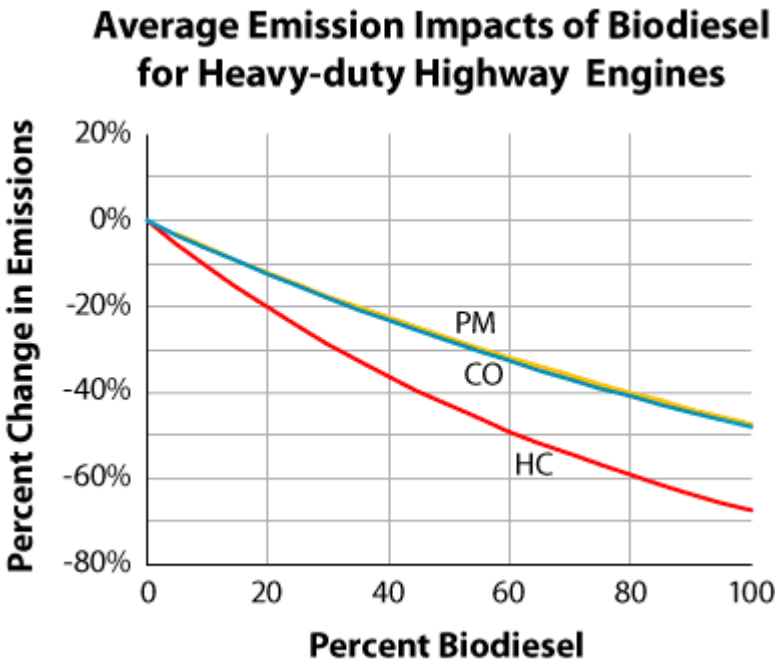
emissions, if biodiesel production allowed for this. In the future if sources of waste vegetable oil multiply (such as oil donations from neighboring restaurants including Chik-fil-A, Bubba's, etc. on Hillcrest), biodiesel production could be expanded such that fuel could be offered at a discounted price to not only faculty, staff, and students with diesel vehicles but also to the general public.

Necessary research includes the process and cost of retrofitting current diesel engines with the equipment to run biodiesel, which normally consists only of retrofit hoses and fuel lines. We will also research the possibility of running a diesel-biodiesel blend to mitigate any possible detrimental effects and eliminate costs of retrofitting. Eventually, the university could be petitioned to purchase flexfuel vehicles to be used by the police force and other campus vehicles. Fueling on campus at a cost-effective source could save SMU substantial amounts of money in the long term and improve its image in the community.

Our project will begin by researching these different options and selecting the ones that give the maximum benefit to campus sustainability, then carrying out the project through funding on this project or finding funding through other campus or government resources.

This program could be tied into the environmental engineering major or even the engineering minor to increase student involvement. One possibility is a senior design project linked to biodiesel on campus. Also, a student arm to the sustainability committee could be created.

As mentioned above, the usage of biodiesel would significantly cut emissions, in addition to the financial benefits described above. The chart below, from the U.S. Department of Energy's Alternative Fuels & Advanced Vehicles Data Center, shows the percent change in emissions of hydrocarbons, particulate matter, and carbon monoxide.



5. Proposed Timeline

February: Research all options as stated above and any new insights garnered from faculty and staff cooperators

March - April: Organize funding and begin implementation, including any necessary changes in infrastructure

May: Finalize details of project to maintain sustainability post-graduation, including possibility of expansion; begin evaluating actual financial and environmental impact
Post-graduation: Maintain contact with university officials to ensure continuation and expansion of project

6. Anticipated Budget:

The only concrete cost will be $300 for copying and printing supplies. This leaves $4700 for implementation of the project, including the purchase of the fuel processor, storage tanks, fuel lines, and other necessary equipment. However, some of these costs could be subsidized by the university or grants from the government, since the project will improve sustainability while at the same time significantly cutting operation costs.

Printing supplies	$300
Equipment costs	(up to)$4700
Total anticipated budget:	$5000
Person responsible for funds:	Jon Daugherty
Signature of person responsible for funds:	_____