Citizens' Greener Evanston
Act Locally. Breathe Globally.

Biofuel from Biomass

Recommended Initiative

The leftover frying oil from restaurants in Evanston can be converted to either waste vegetable oil fuel (WVO fuel) or biodiesel. There are at least 141 restaurants in Evanston. The local Steak and Shake, for example, produces up to 52 gal/week. Another restaurant, Pomegranate, produces10-15 gal/week. According to a study done in Brooklyn, the average Asian restaurant produces 71 gal/week ("Biofuel Industry Development"). These figures represent fast food, restaurant dining, and oil-heavy Asian cuisine. The fuel from this oil can then be used in the city's fleet of non-compressed natural gas (CNG) service vehicles (and possibly the general public).

Option 1: Build a waste vegetable oil filtration plant that will lead to the production of WVO fuel. In addition, retrofit vehicles with a WVO fuel tank and heating system .

Option 2: Buy biodiesel from outside sources that can be used in service vehicles and by the general public. Two such potential sources are The Columbus Foods Company in Chicago, IL, and Stepan Company in Northfield, IL.

Note: Because biodiesel solidifies in colder weather, a 5% (B5) or 20% (B20) biodiesel/diesel blend should be used during the winter months. Biofuel is a good choice for the City bus fleet, for example, because the bus engines are continuously in use and therefore do not suffer from the cold weather effects as much.

Currently, some of the City of Evanston's vehicles are run on CNG. Although CNG is better than diesel for the environment, biodiesel and WVO fuel go far beyond CNG is reducing carbon dioxide emissions.

One benefit of biodiesel is that it better for an engine than WVO fuel. In addition, its use does not require tank modification or construction of a plant. However, biodiesel is inferior to WVO in that it freezes in cold conditions and must be replaced by a biodiesel blend. WVO fuel is better than biodiesel in that it reduces carbon dioxide emissions to a greater extent. In addition, no changes must be made through the seasons. When biodiesel is replaced by B20 or B5 in the winter, WVO fuel becomes even more advantageous in terms of emission reduction.

Though biodiesel may seem to be the easy option for other cities, it is not so for Evanston. The cold climate forces the use of biodiesel blends, which are much less effective than pure biodiesel. Therefore, WVO fuel must be considered. However, because WVO fuel shortens engine life, it is not ideal.

Amount of CO2 Abatement

WVO fuel: The use of waste vegetable oil reduces carbon dioxide emissions by 78% ("Vegetable Oil Fuels…").

Biodiesel: According to the EPA, using 100% biodiesel reduces greenhouse gas emissions by over 50% and using B20 reduces greenhouse gas emissions by at least 10% ("Biodiesel").

In both these cases, the fuel is considered carbon neutral. The oil comes from plants which absorb carbon dioxide through their lifespan. When combusted, the oil produces less or just as much carbon dioxide as the plants had originally absorbed. (Note: The emissions are reduced by less than 100% because shipping and processing accounts from some carbon dioxide production.)

In general, biodiesel and WVO fuel reduce harmful emissions significantly more than CNG ("Comparison of Clean…").

Because there is such a wide range of fuel and vehicle types, these are definitive calculations. However, it seems that an number that could be used is that biofuels on average have 50% lower CO2 emissions, assuming a diesel to average U.S. soy oil comparison. For every ten City vehicles (assume 12,000 miles per year per vehicle, and further assuming an average of 12 mpg) the annual usage of 10,000 gallons of fuel. At 22.2 lbs. of CO2 per gallon of diesel, this equates to 222,000 lbs of CO2 or 100.7 metric tons of CO2. Switching to biodiesel, on average, would abate approximately 50% of this, 50.35 metric tons annually.

Cost

WVO fuel: The cost of building a filtration plant is unknown and should be looked into further. It costs up to $3500 to retrofit a commercial truck with a WVO tank and heating system and around $800 to retrofit a personal vehicle (Hargrieves).

Biodiesel: While the price of pure biodiesel was $.31 higher than diesel, the price of B20 was the same as diesel. B5 was $.12/gal cheaper than diesel. Though prices are constantly changing, the general trends are the same. B20 is around the same price as diesel, pure

biodiesel is slightly more expensive, and B5 is slightly less expensive. On another note, CNG is cheaper than diesel by $.87/gal ("Clean Cities Alternative…").

If the City of Evanston wishes to implement this system, there would be a cost to the City to set up the infrastructure as required. It is possible that an experienced private company in this field could set up the infrastructure and be compensated via fuel sales if the City wishes to forego the upfront set up costs.

Relative Rating Scale and Advantages/Disadvantages for Implementation in Evanston

Biodiesel is rated at a 5 out of five for the City, and a 2 out of five for the community. This is due to the differences in the vehicle types between the City and the community. Most citizens do not currently own diesel vehicles.

Operational and Financial Requirements

WVO fuel:

1. Determine which Evanston vehicles and/or public vehicles should be converted to be WVO fuel friendly.
2. Assess the accessibility of waste vegetable oil produced in Evanston.
3. Decide on the amount of oil needed to be filtered each day and accordingly determine the cost of building a plant.
4. Retrofit the specified vehicles with WVO fuel tanks and heating systems.
5. Instruct drivers on how to run the new tank system.
6. Potentially create incentives for WVO fuel filling stations for public use.
7.

Biodiesel:

1. Determine which vehicles will run on biodiesel.
2. Find a reliable source of reasonably priced biodiesel.
3. Further assess the different blends of biodiesel that should be used during the different seasons.
4. Potentially create incentives for biodiesel filling stations for public use.

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