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Rapid Response Service

Can Brown Grease be Used for Biodiesel Manufacturing in the Puget Sound? Industrial Ecology Roundtable

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Request:

The Industrial Ecology Roundtable is interested in finding out if brown/trap grease could be taken out of the waste stream and used by bio-diesel manufacturers as a feedstock.

Questions:

- Are there any cases where biodiesel producers have used waste grease as feedstock?
- Are there any studies about this?
- Would the use of grease be more expensive for biodiesel producers?
- If there is an interest among local producers, would there be any issues with:
 - 1) the regular quantity of grease generated
 - 2) the "quality" of the grease?
- How many types of waste grease are there?

Key Findings:

- Types of waste grease include:
 - Yellow grease- used cooking grease- (from French fries for example) that is high quality and directly from a fryer
 - Brown grease- grease is brown (after frying burgers, for example).
 - Trap Grease- the dirtiest of the three types of grease. Must be removed from traps in drains or from sewers. Needs to be pre-processed; may need to be separated from water, filtered of sediments and heavy metals in some cases.
- NREL estimates total U.S. trap grease at about 495 million gallons per year.
- Climate Solutions estimates that there are 9 million gallons of waste grease and oil in Western Washington (about 5 million gallons of waste grease)
- Brown grease contains in the neighborhood of 12,000 Btus per pound
- Also may be called "Trap Grease" if it is caught by filter traps or in the sewer where people have to spend money to have it removed
- Restaurants pay to get rid of trap/brown grease, and pumpers pay a tipping fee to dump it. A program creating a valuable fuel product could result in lower tipping fees and disposal fees.
- Waste grease varies tremendously in;
 - Ratio of Water:Grease
 - Amount and types of sediments
 - Melting point – depending on source of organic material

- According to studies done in the Eastern part of the U.S. there is about twice as much trap grease generated per capita than yellow grease; 2 lbs per year per person compared to one lb of yellow grease.
- Trap grease could be a policy opportunity. The State of Georgia has mandated that restaurants show documentation for removing trap grease from traps/sewers and dispose of it to responsible processors. This not only solves a municipal waste grease, “municipal heart attack” issue in which pipes are blocked and sewage overflows, it also insures a steady supply of trap grease to potential biodiesel manufacturers.
- San Francisco has a new program to pick up used grease and to make it into biodiesel to be used by City vehicles. The grease problem costs the city about \$3.5 million/year. This program picks grease up for free and powers city vehicles while eliminating the costs of grease problems in the sewers.
- According to Cargill, refining adds 1.5-2 cents per pound to feedstock costs and large plants add about 1.5 to 2 cents/lb to feedstock costs for deodorization.
- Various companies (New York, Philadelphia are making biodiesel from waste grease. One process for preparing the grease includes:
 - Removing solids
 - Dewatering the greasy solution
 - Randomly testing incoming feedstocks to check for contaminants
 - Grease going through a custom acid stripping process consisting of two conversion phases including a non-sodium based system. Without sodium, the wastewater is cleaner.
 - Contacting an inspectorate lab to test the fuel.
 - Selling the water released to a sod farm for use as fertilizer.

City Program:

SF Greasecycle Program

<http://www.sfgreasecycle.org/thedish.shtml>

Biofuel Program Overview

SFGreasecycle is a citywide effort by the City of San Francisco to create a waste vegetable oil (WVO) recovery program that diverts Fats, Oils & Grease (FOG) out of the trash, away from the sewer and eventually into City fleet. To make this happen, the San Francisco Public Utility Commission (SFPUC) has established a Commercial Waste Oil Transfer Station—located at the Southeast Waste Water Treatment plant—to handle all material from commercial establishments and residents in the City. This waste oil will be processed and sold to the biofuel industry, turning trash into fuel.

Brown/Trap Grease Biodiesel Systems:

North American Biofuels Company (NABFC)

<http://www.nabfc.com/company.html>

“Through NABFC's unique refining method, one gallon of trap grease produces nearly one gallon of renewable energy in the form of a gallon of biodiesel.” NABFC partners with, Russell Reid who provides special trucks to haul grease to processing facilities.

The system can take anything in the wastewater stream that has some form of fat content to remediate to fuel and by-products. They can use trap grease, vegetable yellow fat, rancid vegetable oils, fish oils, tallow, meat scraps, etc.

Philadelphia Fry-o-Diesel, Inc.

Nadia Adawi
Emily Lansberg
Philadelphia, PA
(215) 413-2122
<http://www.fryodiesel.com/>

Founded in 2004, Philadelphia Fry-o-Diesel (PFoD) has developed patent-pending technology for the conversion of extremely distressed waste greases, like [trap grease](#), into high quality diesel fuel. PFoD owns and operates a pilot plant in North Philadelphia demonstrating this technology.

They seem to be in the right business, with inquiries from 22 states and 13 countries in the past year. Plans include worldwide expansion.

The pilot program is operating with donated grease in N. Philly. Their system is geared to municipalities who want a turn key system from collection through manufacture of ASTM 6751 biodiesel. Their system is modular and scalable, so that if a local wastewater treatment plant handles some “front end” functions, such as separation of water from grease and/or filtering of some sediments and impurities, the back end portions of the system can be procured. The system can be co-located with a wastewater treatment plant.

A small plant might accommodate 200,000 gallons of grease per year, and can be scaled up as the demand increases.

Currently the technology is being optimized to reduce processing costs, time and energy inputs. Many municipalities are asking for the breakeven amount of grease that makes the system worthwhile, and they are trying to build a system that will be practical for the smallest possible quantities of grease.

Recommends looking at the regional “Grease Shed”, which is the radius of pickup points, typical quantities and the average % of grease in water content to determine the amount that could be processed.

Their system yields a 1:1 ratio of purified grease to biodiesel produced.

Policy and Enforcement

Ordinances exist in the Philadelphia area that require restaurants to handle grease responsibly, however officials are reluctant to enforce them since there are only two treatment plants that handle waste grease and they are distant. Without good options for the collected grease, the officials are concerned that more enforcement will result in more grease being dumped illegally.

There is a direct relationship between enforcement and the quantity of grease collected.

Resodyne

FX Yang
Butte, MT

Several years ago, Resodyne worked with Kenosha Beef to produce a system to make biodiesel from trap grease as well as beef tallow and other waste greases (all chemically the same). This technology was sold to

Kenosha Beef, who now licenses it to would-be purchasers. Kenosha Beef has six plants and is the third largest biodiesel manufacturer in the U.S. The smallest quantity practical for this technology is 10 million gallons/year. There are 10 separate pre-treatment steps that grease may go through to make it clean enough to process into biodiesel. The steps are modified depending on the impurities that need to be removed.

Currently Resodyne's research is focused on higher value production options for trap grease- such as bio-lubricants. This technology is not ready for the market yet.

Viridia Energy

Allen Ellenbogen
Long Island, NY

License technology or joint venture with waste water treatment plants to accept and process trap grease (as well as other less nasty greases and oils) and to make ASTM grade bio-diesel. Their system separates the water and larger solids from the grease and deodorizes it. Allen claims that this technology is suitable and profitable for quantities as low as 1500 gallons/day of grease (or 50,000 gallons of watery grease with about 3% grease content).

This system has the ability to unload a 35 gallon truck in 15 minutes. Previous programs have been built around partnerships between the grease processor and the hauling company.

Allen recommends that biodiesel from trap grease should be used in off road vehicles since there is a possibility that pre-processing doesn't remove all volatile components. Since about 82% of diesel is used in off-road applications, he feels that it would be easy to separate this biodiesel for appropriate applications.

Recommends that municipalities or state governments legislate cradle to cradle policies that require producers of trap grease prove that the grease has been transported to an appropriate waste water treatment plant as has been done in Georgia.

Feedback from Biodiesel Manufacturers/Associations:

BioLyle

Bio-Lyle is a small company that trains home-brewers on making biodiesel. They also run a co-op selling biodiesel.

Lyle wouldn't consider using brown grease and didn't think home brewers would use it. They look for "yellow grease", which is high quality used kitchen grease that comes directly from fryers.

Imperium Biodiesel

Theoretically, yes, they are interested in using brown grease. The biggest issues are the required pre-treatment.

They would like to get the grease without water, or find a viable method to separate grease from water. Concerned about possible heavy metals. There are "off the shelf" processes that will take sedimentation and heavy metals out.

The biggest issue is if there are high FFA levels which require conversion in order to become fuel grade feedstock.

At this time they only have a rough idea of what the costs would be to prepare brown grease for manufacturing into biodiesel. The cost of the grease would have to be substantially lower than vegetable oil to make its use viable.

They also need a large enough supply to make it worthwhile to invest in the necessary infrastructure. Their Grays Harbor plant was built for a capacity of 100 million gallons per year, so it would be hard to justify major systems changes for a fraction of the 9 million estimated gallons of waste grease and oil in W.WA. The process changes they are considering will be flexible enough to accept other non-virgin vegetable oil sources.

That being said, local, low cost feedstocks are very desirable. Most of their supply now in Canola from Canada.

Northwest Biofuels Association

Northwest Biofuels Association would be very “happy and excited” to participate in an effort to bring more waste greases into biofuel manufacturing. They would be willing to attend Roundtable meetings and to put the issue on the agenda for a broad discussion among the members and would be interested in expanding the effort into the whole Northwest region.

Standard Biodiesel

Standard Biodiesel has run a successful test on making biodiesel from trap grease. Large scale efforts would require a new processing plant to be built.

Currently Standard has relationships and picks up yellow and brown grease from over 1500 restaurants in the Puget Sound. They provide more than 3500 barrels throughout Seattle to collect waste oil and grease. They feel that they have the infrastructure built to extend their service into trap grease within the next year.

Trap grease would be manufactured in a separate stream from yellow oil and grease and could be sold at a lower price to make low cost heating fuel for homes for example.

Standard Biodiesel would be interested in participating in the Roundtable if Brown Grease is selected as a project.

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