

The rising cost of virgin vegetable oils is increasing the popularity of turning waste vegetable oil, animal fats or domestic waste into biodiesel

From trash to cash

Anyone who is familiar with the smell of used cooking oil or chipper grease in a diesel vehicle will have to get ready for a new experience – the smell of chicken or bacon diesel. Until recently, yellow grease, waste vegetable oil (WVO) and animal fats have played a small part in a larger, growing biodiesel industry.

Over the last 18 months, the price of virgin vegetable oils such as rapeseed, soyabean oil and palm oil have nearly doubled. This is of great concern to biodiesel producers, since the cost of feedstock comprises approximately 80% of total operating costs at a biodiesel plant. When the prices of vegetable oils increase biodiesel producers start looking for lower-cost feedstocks to offset risks, diversify supplies, and improve chances of a profitable, sustainable, economic business.

There are three defining characteristics of renewable diesel that differentiate it from traditional WVO and animal fats for use in biodiesel – price, process, and petrochemical properties.

Price

Price is driving the growth of renewable diesel markets worldwide. Compared to rapeseed, palm and soyabean oils, tallow and pork lard is approximately 35% less, the price of chicken fat is 50% less, and the cost of WVO is anywhere from 60% less to free, depending on the source and availability of the chipper grease. Evidently this is the primary attraction for renewable diesel via

Feedstock	Product	Application	Producers
Vegetable Oil	Biodiesel (methyl ester)	On road diesel (blends, B2, B5, B20+)	many
Animal Fat	Renewable Diesel (co-processed)	On road premium, pipelines	Tyson, Conoco-Philips, BP, UOP, Eni, Petrobras
Animal Fat	Renewable Diesel (isomerized)	Defense, Jet Fuel, On road premium, pipelines	Neste, OMV, Nippon Oil, Dynamic Fuels
Biomass (veg oil, animal fat, waste, wood chips)	Renewable Diesel (pyrolysis, BTL)	Defense, Jet fuel, On-road premium, pipelines	Shell/Choren, ConocoPhilips/ADM, Neste/Stora Enso

sources: Emerging Markets Online, Biodiesel 2020, Tyson Foods, ConocoPhilips, DynamicFuels

alternative, lower cost feedstocks. For biodiesel producers facing tighter profit margins with virgin vegetable oils, the smell of chipper oil and chicken fat is a welcome relief.

For new producers entering the market and for petrol

big oil majors (Conoco-Philips) and food companies (Tyson Foods – the US’ largest meat producer) team up to produce biodiesel, it is clear this is big business.

The Tyson-Conoco venture to produce renewable diesel

size of all the 150+ biodiesel plants in the US in 2007 was approximately 12mgy.

The market for renewable diesel projects is growing quickly. Another large plant underway is by Dynamic Fuels, a joint venture between Tyson foods and Syntroleum, to produce 85mgy using chicken fat. Sanimax, the largest renderer in the US, already operates a 20mgy facility and has announced plans to build more plants. NovaSource biofuels is another emerging player in the US market with a planned capacity of over 200 mgy.

Outside the US, there are other opportunities in renewable diesel. Finland-based NesteOil has just announced plans for four large projects to produce over 800,000 tonnes/year using yellow grease and tallow in a multiple feedstock environment along with virgin rapeseed,

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companies mandated in the EU and the US with producing clean fuels, these waste-feedstocks are becoming a sought-after commodity. When

from chicken fat is the largest biodiesel plant on record in the US estimated to produce 175 million gallons a year (mgy). Comparatively, the average

palm and other oils. Brazil, the largest cattle producer in the world, has enormous potential for renewable diesel and is starting several new operations. In China, over 90% of the biodiesel produced comes from WVO and wok-fry restaurants. For China, recycling waste products into clean fuels is crucial to ensuring crucial food supplies are not used for fuel production. China has even turned municipal waste and human sewage into biodiesel for use on metro buses.

In the US, dozens of new biodiesel operations emerged in 2007, producing between 500,000 gallons a year and 2mgly from yellow grease. Clearly, the attractiveness of lower-cost grease and WVO is spawning many new businesses aimed at recycling waste products into affordable, cleaner fuels using various processes. Among these ventures are many of the city

governments in the US, Europe, China and other countries aiming to recycle grease and municipal waste for use in school buses and metro transit systems.

Processes for renewable diesel

The second defining characteristic of renewable diesel is the way it is processed. Compared with biodiesel, which combines virgin vegetable oils with alcohol, renewable diesel uses traditional refinery processes to produce clean biofuels. Many petrol companies now tasked with mandates to produce fuels want to co-process feedstocks at their own refineries, while others are building new stand alone biorefineries to receive tax benefits. These processing methods cook fat and grease at high temperatures to separate waste products into their basic elements: water, oil,

and by-products. These processes are called fast pyrolysis, Fischer-Tropsch gas-to-liquids, and thermal depolymerisation, each producing a bio-crude from organic materials that can then be refined into clean diesel fuel. Conoco, Tyson, NovaSource, NesteOil, and Sanimax, among others, argue they can use these processes to produce clean diesel fuels at a lower cost, given available feedstock choices.

Properties of renewable diesel

The third defining characteristic lies in the chemical properties of the fuel. Petrol companies want to produce and use fuels that will have optimal chemical properties for transport and storage at the lowest cost. These producers argue traditional biodiesel fuels leave behind residues, contain higher oxygen and NOx levels, and are

more difficult to store, whereas renewable diesel fuels can be shipped via existing pipelines and used more readily in petrol storage facilities. This translates into a cost savings up to \$0.30 (€0.2) per gallon less than via barge or railroad shipping, a preferable option.

Agricultural lobbying groups and advocates that seek higher values from their vegetable oils via biodiesel may not welcome the competition from renewable diesel. But the aim is the same – to produce clean fuels from renewable sources. As vegetable oil prices continue to rise in 2008 the production of renewable diesel is likely to play a key contributing role in helping to add clean, affordable options to the total transport fuel pool. ●

More information

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