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Running Beer Trucks On Byproducts

As part of zero-waste initiative, Cleveland brewer operates vehicles on vegetable oil and biodiesel

As part of its zero-waste initiative, Cleveland's Great Lakes Brewing Co.'s Ford E350 "Fatty Wagon" and International delivery truck have both been modified to operate on Straight Vegetable Oil (SVO) and B20 biodiesel.

While the Great Lakes Brewing Co. (GLBC), Cleveland, Ohio, is noted for the high-quality beer and food served in its historic Brewpub, it is also earning a reputation for its commitment to operating a brewery and restaurant that is environmentally and socially friendly. This includes its "zero-waste initiative" intended to make full use of the by-products generated from the brewing process and from the Brewpub.

Daniel and Patrick Conway, owners of GLBC, are attempting to operate their business so 100% of the input resources are used in closed-loop ecosystems. This is accomplished by innovations ranging from selling discarded grains from the brewing process to organic farmers raising livestock for the all-natural beef, pork, chicken and cheeses served in the Brewpub and to a baker making cracked barley beer bread, pretzels and pizza shells sold to GLBC customers.

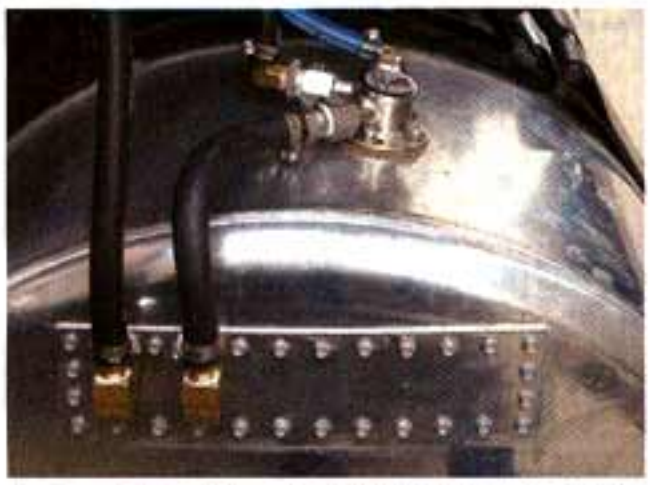
The GLBC also operates a couple of its diesel-powered vehicles on straight vegetable oil (SVO). This includes its "Fatty Wagon," shuttle bus used to carry Brewpub patrons to and from Cleveland Indians home games. The Ford E350 vehicle's, 7.3 L, powerstroke V8 diesel engine has been modified to operate on SVO. GLBC also operates a heavy-duty beer delivery truck that operates on SVO with its International tractor's Cummins M11 diesel engine similarly modified.

The engine modifications were made with the assistance of Ray Holan, founder of Biodiesel Cleveland. The modifications to the International tractor feature a kit from Golden Fuel Systems that consists of two coolant heat exchangers added to one of the truck's existing saddle tanks. This system includes an Artic Fox Corp. HotFox in-tank diesel fuel heater and a heated fuel pickup. A Racor Filter is mounted on the rear of the cab, and a fuel selector valve allows switching between commercial B20 biodiesel (20% biofuel and 80% petroleum diesel) and heated SVO.

GLBC's vehicles are essentially bi-fuel vehicles. One tank holds B20 and a second, much larger tank contains the SVO or waste vegetable oil (WVO). Unlike commercial biodiesel that is created from various feedstock materials, the SVO is merely filtered before it is supplied to the engine. The cold engine is started on B20 to pre-heat the SVO fuel. The SVO is heated to approximately 10° below that of engine coolant temperature to reduce its viscosity so it flows properly through the standard injection pump and fuel injectors.

After running on B20 diesel for about seven miles, at the flip of a switch, the truck then operates solely on SVO for the duration of the trip. Before shutting down the engine, the fuel supply is switched back to B20 to ensure the engine can be restarted later. The diesel engine needs to be started on the B20 fuel because SVO is too thick to flow properly at temperatures under about 150°F.

A Racor 1000FH fuel filter is used with an electric heater wrap insulated



On Great Lakes Brewing Co.'s International delivery truck, the saddle tank is modified to handle SVO. The plate covers an opening that was cut to allow installation of a large transmission fluid cooler unit that acts as a heat exchanger to warm the vegetable oil in the tank. On the top is an Artic Fox heated fuel pickup. The vehicle also uses a 2 micron Racor 1000FH fuel filter designed to remove any particles in the SVO that were missed by the 2 micron pre-filtering.

with standard foil insulation. The filter contains a 2 micron element that removes any particles in the vegetable oil that were missed by the 2 micron pre-filtering that was done prior to vehicle fueling.

Only about 2 gal. of diesel or B20 are needed for one 100 gal. trip. Based on this ratio, cost savings from running on the B20 diesel/SVO combination vs. running on diesel alone are over 50%, or roughly $5000 for the year, according to GLBC. This is based on assuming an average cost of $2.60 per gallon for diesel vs. about $1.11 per gallon for SVO. While waste from the restaurant is free, GLBC also purchases "off-spec" canola oil, packaged salad/frying oil that has exceeded its "sell by" date for food purposes.

The SVO provides slightly better fuel economy, GLBC said. For example, the 100 gal. SVO tank on the tractor-trailer rig provides a range of about 785 miles, or 7.85 mpg compared to about 7 mpg when operating on petroleum diesel. Based on the previous uses, the all-vegetable fuel produces fewer harmful emissions, less exhaust smoke and the exhaust smells better, having the faint aroma of french fries.

Like commercial biodiesel, SVO is also said to improve lubrication of fuel injectors compared to regular diesel, especially the new ULSD (ultra-low sulfur diesel). **dp**

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