

Trash-to-ethanol firms get digging

Posted by [Martin LaMonica](#) [6 comments](#)

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The trash-powered car may someday see the light of day.

[CleanTech Biofuels](#) is developing a multistep process designed to take municipal solid waste from a transfer station and turn out ethanol on the other side.

The company recently purchased the equipment and found a site in Golden, Colo., to test it using trash, as well other agricultural and forest wastes, to make ethanol. On Tuesday, it [said](#) that it trying to identify a site near landfills and garbage haulers to construct a commercial plant.



Fuel for your car? Companies are developing technologies to convert municipal solid waste to ethanol.

Within two years, the company expects to move from a proof-of-concept plant to a commercial plant, said Michael Kime, the company's chief operating officer.

"We can literally take a truck with curbside garbage and put it almost exactly as-is into our vessels--we just have to take out the large things like refrigerators," Kime said.

A number of projects [have been proposed](#) in the United States and Canada to convert solid waste into ethanol, using different techniques.

[BlueFire Ethanol](#) is a cellulosic-ethanol company that uses a proprietary acid hydrolysis process to break down organic wastes. It intends to start construction of a commercial-scale, 3.1 million gallon-per-year facility in Lancaster, Calif., which will be [located next to a landfill](#).

Using gasification and microorganisms, start-up Coskata said it can convert [municipal solid trash into ethanol](#) as well. In its first demonstration plant in Pennsylvania, Coskata intends to demonstrate its ethanol system using trash--and

separately, wood chips--as a feedstock in less than a year, said Wes Bolsen, the vice president of business development and marketing at Coskata.

"Anything that has carbon in it, we're excited by," he said. "I've been talking to all the waste producers in the U.S." The company's target is to get 100 gallons of ethanol from one dry ton of starting material.

CleanTech Biofuels' technology has already worked on turning paper production waste into ethanol through acid hydrolysis. Wood and paper material is soaked in an acid bath, which converts it into sugars. Through fermentation, the sugars are converted to ethanol.

What the company has added to the mix is a conveyor belt system that acts as a high-tech trash sorter.

The waste is treated with steam and pressure in a vessel that removes a significant amount of the volatile organic compounds, according to the company. Plastics that don't break down are collected for recycling.

Broken-down woody materials, which look like wood chips, are collected as they pass over screens and sent to another vessel that converts it to sugars.

CleanTech Biofuels, a public company, anticipates the need to raise equity to finance construction of plants. It also hopes to get some government loan guarantees, Kime said.

The price is right

The company licensed its core two-phase hydrolysis technology from the University of California at Berkeley. But the basic acid hydrolysis process was developed decades ago.

Now, with the rising price of gasoline and government ethanol mandates, this and technologies such as gasification are being pursued to make ethanol.



A picture of CleanTech Biofuels' vessel used to process waste, a first step to converting garbage to ethanol fuel.

(Credit: CleanTech Biofuels)

But in the liquid fuel industry, the cost of feedstock can make or break a company or project.

The price of corn, which most ethanol in the U.S. is made of today, has shot up on demand over the past two years, as [have soybeans for the production of biodiesel](#).

Estimates are that the U.S. could produce 8 billion gallons of ethanol from waste, according to Coskata's Bolsen. The current level is about 6 million from corn. Producers are expected to meet the U.S. government mandate of 9 billion gallons this year.

If trash-to-ethanol plants get approved, and construction starts this year, it would take until late 2011 before municipal ethanol based on solid waste makes a dent in the ethanol supply, he said.

Kime of CleanTech Biofuels said that, ultimately, companies will begin to focus further on municipal solid waste because hundreds of tons are generated in the United States every year. In addition, it already has a collection and distribution system.

"We ultimately believe there will be lots of solutions, given the price of oil and gas today," Kime said. "When you look at the existing waste stream, the price is right. They actually pay you tipping fees."

The key, as with all experimental energy technologies, is to manufacture the ethanol cost-effectively.

CleanTech Biofuels has made some tweaks to the basic acid hydrolysis technique by using nitric acid, rather than sulfuric acid, which will allow it to use less expensive metals in its equipment. The company will also test an enzymatic process to create sugars, Kime said.

Waste power

Garbage, as it turns out, isn't just good for making liquid fuels. Right now, energy is already produced at landfills in different ways.

Trash that is incinerated can be used to make electricity, which is considered a relatively dirty process. The methane given off by landfills can also be captured to turn a generator to make electricity.

Some companies are also developing portable equipment for taking wood waste and [making electricity and heat](#) through incineration.

In another initiative, a start-up called Ze-Gen is [constructing a plant](#) that treats construction debris with high heat and pressure to make syngas that can be burned to make electricity.

Kime said burning waste to make electricity will pollute and cost more than making liquid fuels.

Although there are no competitive uses for trash, as there is for food crops, municipal solid waste is a much less consistent feedstock, which poses challenges.

Bolsen at Coskata said the front-end of its system, which uses gasification, can treat a wide variety of trash, including plastic bottles and tires. It's looking at different ways to recycle glass and metal to remove it from the waste stream.

"I never know what's in a ton of trash. Someone could've put batteries or PVC pipes in there," said Coskata's Bolsen. "It's the inconsistency of the material that makes it harder to deal with. But it makes it a fantastic opportunity while reducing our landfills."

Update: 9:45 am PT: corrected the amount of ethanol Coskata aims to get from a dry ton of feedstock and its pretreatment process.