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Race to algae-based biodiesel heats up

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Can the lowly algae ease a growing food-versus-fuel debate?

[Yahoo! Buzz](#)

A growing number of start-ups are betting against the dominant biofuel crops--corn and soy--and looking to sidestep the backlash against biofuels, which are being [blamed in part](#) for higher food prices and [deforestation](#) around the world.

Melbourne, Fla.-based [PetroAlgae](#) says that it hopes to test a commercial system as early as next year.

The company licensed strains of freshwater algae bred by Arizona State University and is developing the bioreactors and harvesting methods to grow the algae at large scale, said Fred Tennant, PetroAlgae's vice president of business development.

The algae harvested from open-pond farms can be converted to oil that can be refined into biodiesel. The remaining material can be sold as high-protein animal feed, Tennant said.



Bioreactors used to grow algae for use as fuel and

Because algae needs a source of animal feed. carbon dioxide to grow, PetroAlgae is (Credit: PetroAlgae) seeking to set up joint ventures with electric utilities looking to reduce their carbon emissions.

"The laws that are being debated right now will change a power company's life. They will have to have a lot more renewable energy and get rid of CO₂," Tennant said. "Any power company in the world will be happy to pay us to take their CO₂ away."

There are several other companies pursuing a similar path to PetroAlgae.

GreenFuel Technologies ran a [multi-year program with Arizona Public Service](#) to grow algae and is said to be close to closing a large [algae biodiesel production deal in Europe](#).

Solayzme is using [fermentation](#), rather than photosynthesis, to grow algae oil that can be tuned for [different purposes](#), such as jet fuel or edible oils.

Another company, LiveFuels has said that it has a target of producing [100 million gallons by 2010](#) using genetic manipulation.

Great green hope for biodiesel

These companies are pursuing algae because its potential as a fuel is so promising: it's a non-food crop, removes large amounts of carbon dioxide from the air, and grows fast.

Algae has a relatively high energy density compared to soybeans, which means more soy on more land needs to be planted for the same amount of fuel yield.

"What's happening is there has been more focus recently on the food-versus-fuel debate, more focus on the price of feedstock, and more understanding that using an agricultural-based crop as a fuel is not sustainable," said Michael Weaver, the CEO and co-founder of Seattle-area algae start-up [Bionavitas](#). "We're seeing that reflected in the marketplace."

Similarly, many biofuels companies are trying to develop methods for making ethanol from [wood chips, grasses, or agricultural wastes](#), rather than corn.

But for all of algae's promise, the technology to make fuel still remains experimental. And the biggest challenge facing any biofuel company is cost, say algae company executives.

"Anybody can grow algae if cost is no object. Lots of algae companies have done a great

job, but the system doesn't look like a massively scalable system," said PetroAlgae's Tennant.

PetroAlgae needs to have its farms located in sunny, hot places to speed up the drying process; their tiny algae strains are 98 percent water.



An aerial view of a open-pond algae farm being used by PetroAlgae.

(Credit: PetroAlgae)

He said the company envisions its pond farms will be deployed across 1 to 10 acres at a site that generates a lot of carbon dioxide.

Growing pains

As with most new technologies, early entrants have had their glitches. In its Arizona Power pilot test, GreenFuel Technologies found that its bioreactors produced too much algae and that the cost of harvesting it was high.

Algae also needs a lot of water to grow, so producers need to develop systems to recycle their water and find a suitable place to grow their crop.

Another key technical problem is that traditional bioreactors--shaped as tubes or plastic bags--

ultimately hit a wall in terms of how much light they let in, said Weaver of Bionavitas, which is developing equipment to address "self shading."

"If you have a series of tubes or plastic bags on the desert floor or wherever, you are still limited by the amount of photons that get in from the sun to create more algae. When the algae gets slightly dense, it starts blocking its own light," he said.

Rising prices of traditional soybeans, which is what most biodiesel is made of today, is helping spur more [research into algae](#). The price of soybean oil has more than doubled in the last two years, prompting some refineries to [shut down operations](#).

In the meantime, there's a wide range of predictions for when algae will make a dent commercially.

"There are varying guesses as to when that will becoming commercially available--from a couple of years out to several years out," said a representative for the [National Biodiesel Board](#).



Martin LaMonica is a senior writer for CNET's Green Tech blog. He started at CNET News in 2002, covering IT and Web development. Before that, he was executive editor at IT publication *InfoWorld*. [E-mail Martin](#).

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