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It's not simple to grow green

Solix takes biofuel to next stage at S. Ute algae farm

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FORT COLLINS - The Southern Ute Indian Reservation has everything Doug Henston's company needs to make oil - sunshine, water and carbon dioxide.

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Photo by JOE HANEL/Herald
Workers adjust plastic tubes full of algae in water tanks at Solix Biofuels in Fort Collins on Wednesday. The setup, called a photobioreactor, holds algae in thin vertical bags immersed in water tanks. Solix employees designed the system to grow algae as efficiently as possible.

Those three simple ingredients allow algae to grow through photosynthesis. A Colorado company, Solix Biofuels, loves the green-colored microorganisms because they are full of oil that can be refined into diesel fuel.

Solix announced this week that it will start construction in 2009 on its first large-scale algae farm, somewhere on the Southern Ute reservation.

"Algae is easy to grow. If you've got a swimming pool or a coffee cup, you're probably growing algae," said Henston, Solix's CEO and co-founder. "The issue is growing enough of it for commercial yield, and that's very difficult."

But Henston thinks Solix has figured it out. If so, the company and its new Southwest Colorado plant would be among the first to bring "second-generation biofuels" to market.

First-generation biofuels like ethanol and conventional biodiesel have gotten popular recently, but their prices are volatile, and ethanol, especially, takes land and water that previously went to food production.

The Solix plant might be able to get 20 times more fuel per acre than a first-generation biodiesel system, Henston said.

Idea isn't new

The National Renewable Energy Laboratory west of Denver started looking at algae as a fuel source in the 1970s. Henston founded Solix to put the science to work in making oil - and money.

"There's a lot of algae companies out there, but a lot of them are science experiments. We're not a science experiment. We're getting down to business on this thing," Henston said.

The La Plata County plant will be the first in Colorado, and maybe the world, to grow algae for oil at a commercial scale, said Tom Plant, head of the Governor's Energy Office.

How it works

Here's the usual way to make oil: Get a bunch of algae, mix in some plants and animals, maybe a few dinosaurs, bury it all deep underground, turn up the pressure and the heat and wait a million years or so. Here's another way: Grow algae, remove the oil, and send it to a refinery. The concept is simple, but the execution is difficult, according to Solix Biofuels scientists. The company's process is a trade secret, but here is a basic overview: b Biologists select algae species that produce lots of oil under the right conditions. b Algae are

placed in photobioreactors, "It's definitely the first I've heard of," Plant said.

Company officials won't pinpoint the location just yet. But they say it's in the coal-bed methane field and near a gas-processing plant. Solix will use produced water from coal-bed methane wells (which currently is injected underground) and waste heat and carbon dioxide from the processing plant to grow its algae.

Future expansions could use carbon dioxide from Montezuma County's McElmo Dome operation, Henston said. A major CO2 pipeline runs through the Southern Ute reservation on its way to Texas, where the gas is used to pressurize oil fields.

Modern-day moon landing

Solix's low-budget Fort Collins headquarters offer a hint of what the Ute plant will look like.

Plastic bags full of algae bathe in long water tanks that are a few feet deep and about the width of a lane in an Olympic swimming pool. A weather station monitors incoming sunlight, and sensors in the tanks keep constant track of the algae's condition.

Solix scientists code-named their technology after the 1960s space program. The prototype tanks in Fort Collins are the Mercury stage. They will build Gemini on the Ute reservation next year, starting with a couple of acres and expanding to 10 acres.

And if all goes well, they want to shoot for the moon with Apollo - an installation of hundreds of acres of algae tanks, each acre churning out 3,000 gallons of oil or more every year.

Solix's 45 employees and contractors work in no-frills temporary buildings in a parking lot behind a Colorado State University laboratory. The art on the cubicle walls is simple and serious - a National Geographic poster on Peak Oil, a black-and-white printout of trends in the diesel fuel market.

Chief Operating Officer Rich Schoonover has one diploma hanging on his office wall. It's a professionally framed degree with Old English lettering proclaiming him a kindergarten graduate. He hasn't hung up his master's degree in mechanical engineering from CSU.

"It's about what's in here, what's up here," he said, pointing to his heart and head, "not necessarily what your pedigree is."

Local employees to be hired

Schoonover's employees come to work in blue jeans, flannel shirts and fleece jackets.

Many people on staff are engineers, although Solix has biologists to experiment with different algae species. The privately owned Solix was created at CSU in 2006 and still uses space in a CSU building for its biology research.

The lab equipment looks like it was borrowed from a B-movie about a mad scientist. A moving table shakes beakers half full of bright green slime underneath purple-tinged lights.

The La Plata County plant will use species and growing techniques perfected in Fort Collins to grow large quantities of algae. It will employ eight to 12 scientists, engineers and operators to start. When it expands, it could need another six operators.

Some employees will be recruited locally, said Schoonover, who will oversee construction of the Southern Ute plant.

Once the algae grow, Solix employees will harvest them and separate the oil from the carbohydrates in their

bodies. Solix will sell the oil and nonoil products to other companies.

Oil companies are interested in buying the oil to feed their refineries. The largest American refiner, Valero, invested in Solix this week. The Southern Ute tribe also invested in the company.

And it's all because of algae, one of the simplest forms of life on the planet.

"This is a very productive organism that we're using and taking advantage of its natural attributes to make energy for ourselves," Henston said. "Photosynthesis is an incredibly elegant process. It's the source of all life on Earth."

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