

Beaming solar energy to algae

May 4 2009, Michelle Ma, Seattle Times

Flasks bubble with red- and green-colored concoctions. Across the building, an engineer fiddles with glass rods and flickering fluorescent lights.

These are the offices of Bionavitas, a Redmond-based company developing ways to grow [algae](#) to create biofuels, nutritional supplements and an environmentally friendly way to clean up pollution.

The company is one of dozens of startups nationally vying for a place in the young algae industry.

Algae doesn't take much to grow: light, nutrient-rich water and carbon dioxide. But experts acknowledge that many hurdles remain before it becomes a useful tool.

Extracting oil from algae for biofuel is difficult, and it would be expensive to grow and harvest enough to serve the market.

Scientists are divided over whether it's best to grow algae in open ponds or enclosed containers known as bioreactors.

Scientists have refined algal oil to produce gasoline, jet fuel and [biodiesel](#), but the oil costs far too much right now to be competitive with petroleum-based fuel, said John Holladay, manager of Pacific Northwest National Laboratory's biomass market sector.

"It's very hard to take these wonderful results seen in the laboratory and

scale them up," he said.

The Bionavitas team of entrepreneurs and scientists formed in 2006, then set up shop in a nondescript office building in Redmond about a year ago.

The six full-time employees have decided to pursue algae and are trying to find answers to some of the problems perplexing the industry. Bionavitas also employs up to 12 contract workers.

New technology

The company recently announced it has devised a way to grow algae thick within ponds, instead of just along the water's surface where light naturally reaches.

The process would allow companies to grow more algae in the same amount of space.

Bionavitas proposes to place thin glass rods inside a pond or container and let light from the surface travel down the rod.

Each rod transmits solar energy beneath the surface, allowing algae to grow at depths otherwise darkened by surface-growing organisms.

"We're releasing the energy out where we want it," said Michael Weaver, the company's chief executive. "You're picking a length that's going to distribute it best through the bottom reaches of the pond."

Bionavitas said it hopes to sell its light technology to other firms producing algae for biofuel.

It also plans to use the light rods itself for growing algae that can soak up

heavy metals and other contaminants at old mining sites.

The company already has drawn revenue from one of these projects. Algae grown at its Redmond headquarters also could be used to create health products, such as nutritional supplements.

Boeing recently performed two test flights with commercial airplanes fueled on a mixture that included some algal oil.

Bionavitas says it hopes its algae-growing technology could one day supply the market for green jet fuel.

Private startups rare

The concept of using algae to make fuel isn't new, but private startup companies and investor interest are, said Brice Freeman, project manager of environmental controls with the Electric Power Research Institute.

University researchers in the 1950s tried algae as an alternative fuel, and the U.S. Department of Energy funded research in the 1980s. But interest and funding declined, and algae fell in priority.

Concern over climate change and higher oil prices brought algae back as another solution, Freeman said. Not only could algae one day provide an alternative fuel, the organisms also suck up carbon dioxide, a greenhouse gas.

"There's kind of the right people at the party right now who would be willing contributors and profiteers," Freeman said.

Showing promise

Still, only a handful of companies -- mostly in California -- have the scientific knowledge, money and infrastructure needed to be competitive in the industry, he said.

Freeman is aware of Bionavitas, and said the company's new technology could help address the light issue if costs are kept low.

Other startups showing promise include Solazyme, Aurora Biofuels and Sapphire Energy, all in California, A2BE Carbon Capture in Boulder, Colo., and Seambiotic in Israel, Freeman said.

Bionavitas is self-funded by its founders, and several angel investors also have provided funding.

The company's leaders say they are looking for outside investors -- including venture capitalists -- and hoping for money from the federal economic-stimulus package.

Several other companies in the Seattle area also are interested in algae, including Blue Marble Energy, which is harvesting wild algae to produce specialty chemicals for the food and fragrance industries.

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