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Algae - like a breath mint for smokestacks

By [Mark Clayton](#) | Staff writer of The Christian Science Monitor
BOSTON – Isaac Berzin is a big fan of algae. The tiny, single-celled plant, he says, could transform the world's energy needs and cut global warming.

Overshadowed by a multibillion-dollar push into other "clean-coal" technologies, a handful of tiny companies are racing to create an even cleaner, greener process using the same slimy stuff that thrives in the world's oceans.



A 'GREEN'
SCRUBBER: Isaac Berzin, an MIT scientist, is using algae to clean up power-plant exhaust.
MELANIE STETSON
FREEMAN - STAFF

Enter Dr. Berzin, a rocket scientist at Massachusetts Institute of Technology. About three years ago, while working on an experiment for growing algae on the International Space Station, he came up with the idea for using it to clean up power-plant exhaust.

If he could find the right strain of algae, he figured he could turn the nation's greenhouse-gas-belching power plants into clean-green generators with an attached algae farm next door.

"This is a big idea," Berzin says, "a really powerful idea."

And one that's taken him to the top - a rooftop. Bolted onto the exhaust stacks of a brick-and-glass 20-megawatt power plant behind MIT's campus are rows of fat, clear tubes, each with green algae soup simmering inside.

Fed a generous helping of CO₂-laden emissions, courtesy of the power plant's exhaust stack,

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the algae grow quickly even in the wan rays of a New England sun. The cleansed exhaust bubbles skyward, but with 40 percent less CO₂ (a larger cut than the Kyoto treaty mandates) and another bonus: 86 percent less nitrous oxide.

After the CO₂ is soaked up like a sponge, the algae is harvested daily. From that harvest, a combustible vegetable oil is squeezed out: biodiesel for automobiles. Berzin hands a visitor two vials - one with algal biodiesel, a clear, slightly yellowish liquid, the other with the dried green flakes that remained. Even that dried remnant can be further reprocessed to create ethanol, also used for transportation.

Being a good Samaritan on air quality usually costs a bundle. But Berzin's pitch is one hard-nosed utility executives and climate-change skeptics might like: It can make a tidy profit.

"You want to do good for the environment, of course, but we're not forcing people to do it for that reason - and that's the key," says the founder of GreenFuel Technologies, in Cambridge, Mass. "We're showing them how they can help the environment and make money at the same time."

GreenFuel has already garnered \$11 million in venture capital funding and is conducting a field trial at a 1,000 megawatt power plant owned by a major southwestern power company. Next year, GreenFuel expects two to seven more such demo projects scaling up to a full production system by 2009.

Even though it's early yet, and may be a long shot, "the technology is quite fascinating," says Barry Worthington, executive director of US Energy Association in Washington, which represents electric utilities, government agencies, and the oil and gas industry.

One key is selecting an algae with a high oil density - about 50 percent of its weight. Because this kind of algae also grows so fast, it can produce 15,000 gallons of biodiesel per acre. Just 60 gallons are produced from soybeans, which along with corn are the major biodiesel crops today.

Greenfuel isn't alone in the algae-to-oil race. Last month, Greenshift Corporation, a Mount Arlington, N.J., technology incubator company, licensed CO₂-gobbling algae technology that uses a screen-like algal filter. It was developed by David Bayless, a researcher at Ohio University.

A prototype is capable of handling 140 cubic meters of flue gas per minute, an amount equal to the exhaust from 50 cars or a 3-megawatt power plant, Greenshift said in a statement.

For his part, Berzin calculates that just one 1,000 megawatt power plant using his system could produce more than 40 million gallons of biodiesel and 50 million gallons of ethanol a year. That would require a 2,000-acre "farm" of algae-filled tubes near the power plant. There are nearly 1,000 power plants nationwide with enough space nearby for a few hundred to a few thousand acres to grow algae and make a good profit, he says.

Energy security advocates like the idea because algae can reduce US dependence on foreign oil. "There's a lot of interest in algae right now," says John Sheehan, who helped lead the National Renewable Energy Laboratory (NREL) research project into using algae on smokestack emissions until budget cuts ended the program in 1996.

In 1990, Sheehan's NREL program calculated that just 15,000 square miles of desert (the Sonoran desert in California and Arizona is more than eight times that size) could grow enough algae to replace nearly all of the nation's current diesel requirements.

"I've had quite a few phone calls recently about it," says Mr. Sheehan. "This is not an outlandish idea at all."

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