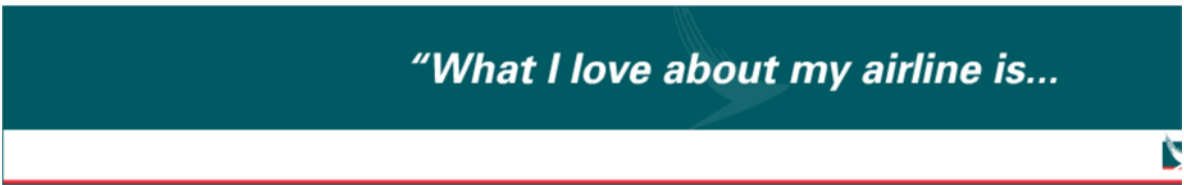


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LOCAL NATION WORLD BUSINESS SPORTS ENTERTAINMENT LIVING TRAVEL OPINION

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ENERGY

Interest in algae's oil prospects is growing

Firms and scientists are racing to figure out how best to separate the oil produced in the organisms for biofuel. The San Diego area has become a hotbed for these efforts that are drawing investors.



General Atomics of San Diego produces a large quantity of algae in a pool of circulating water. The goal for scientists is to separate the oil from the algae and create a clean biofuel. (Mark Boster / Los Angeles Times)

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QUOTE



Photos: Making biofuel from algae

MOST VIEWED

Video: Tiffany Hsu talks about turning algae into biofuel

By Tiffany Hsu

September 17, 2009 | 8:16 a.m.

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To many, algae is little more than pond scum, a nuisance to swimmers and a frustration to boaters.

But to a growing community of scientists and investors in Southern California, there is oil locked in all that slimy stuff, and several dozen companies are racing to try to figure how best to unleash it and produce an affordable biofuel.

The companies and several research labs have set up shop in the San Diego area, many of them in an area nicknamed

Biotech Beach. There, about 200 biotech companies of all kinds are clustered near La Jolla on the mesa above Torrey Pines State Beach.

Together, the firms and organizations conducting algae research employ nearly 300 people with more than \$16 million in payroll and bring \$33 million annually into the local economy, according to the San Diego Assn. of Governments, and local officials see the potential for much more.

"It's a critical industry, and it's kind of exploded," San Diego Mayor Jerry Sanders said. "There's a long pattern of huge companies being spawned out of [UC San Diego] and our other research centers, and it's going to create a tremendous number of jobs."

National energy companies are converging on the fledgling industry. Exxon Mobil Corp. announced a \$600-million partnership with La Jolla biotech company Synthetic Genomics Inc. in July. San Diego companies General Atomics and Science Applications International Corp. have received nearly \$50 million from the Defense Department for algae fuel research.

Last year, \$176 million was invested by venture capitalists to develop biofuel from algae, according to industry publication Biofuels Digest in Miami.

With the region's proximity to the ocean and its history with biotech businesses, San Diego is a familiar spot for clean-energy investors, Biofuels Digest editor Jim Lane said.

"It has all the magic conditions for the emergence of business life," he said. "San Diego wants to be associated with algae, while other cities have other fish to fry and think of algae as just one of many things."

Supplementing the research is experimental aquaculture, as farming in fresh- and saltwater is known. The arid Imperial Valley to the east is now home to several massive algae farms, one with nearly 400 acres of ponds in all shades of green being swirled by paddles to expose the organisms to more sunlight.

All of this activity has drawn its share of doubters.

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Skeptics say that it's a beachcomber's fantasy, that it's too costly to cultivate any significant amount of algae, that fuel inside -- whether in the form of oil, ethanol, gas or hydrogen -- is too expensive to extract or produce on a large scale.

But in recent years, San Diego, along with Silicon Valley, St. Louis, Seattle and a few other cities, have disregarded the skeptics and emerged as hotbeds of algae biofuel research.

One of the nascent industry's major annual events, the 2009 Algae Biomass Summit, is headed to San Diego next month. It is put on by the Algal Biomass Organization, a Preston, Minn., group that seeks to promote commercial uses of algae products.

Seeking to unite and enhance much of the algae work underway in San Diego County is a new research consortium. It aims to help clear barriers to commercializing algae biofuels by identifying new algae strains and harvesting methods.

The San Diego Center for Algae Biotechnology was launched in 2008 with 16 founding partners from UC San Diego, the Scripps Institution of Oceanography, Salk Institute for Biological Studies, biofuel companies and more.

Until recently, "algae has been this complete backwater of scientific research," said the center's founding director, Steve A. Kay, who is also dean of biological sciences at UC San Diego.

"But we've all woken up with the realization that we are junking the planet."

Known as "nature's solar panels," the "amazingly clever little chemical factories" soak up carbon dioxide and sunlight, which is converted into oil through photosynthesis, Kay said.

Algae, he said, can be harvested more often and at greater yields than many other potential biofuel crops such as soybeans or grasses.

Unlike food and several other biofuel sources, algae is being eyed because it can thrive in difficult environments such as salty or polluted water or in the desert, freeing up valuable agricultural space.

Fuel from the microorganisms has already been tested in airplanes and is being groomed for use at NASA test facilities and in the Navy. Last month, San Diego-based biofuel gorilla Sapphire Energy unveiled its Algaeus plug-in hybrid vehicle, which will run on an algae-based renewable gasoline.

Scientists also envision using algae for more than just fuel, tapping it instead for fish or livestock feed, antibacterial products, foams for windmill blades and, in one futuristic vision, in cancer therapies.

In the 1990s, early research into algae biofuels stagnated as oil prices dropped and funding was siphoned off to cancer, AIDS and bioethanol studies, Kay said. Algae is now making a comeback, buoyed by the eco-friendly movement and concerns about dependence on traditional fuels. But the slimy stuff is no magic wand, experts say.

Expecting algae to make a meaningful dent in fossil fuel usage is still a tall order, experts said. The algal biofuel production process is often lambasted as inefficient by other biofuel competitors.

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"We can certainly come very close, but we're not there yet and I'm not sure when we'll ever get there," said John R. Benemann, an algae biofuel consultant with Benemann Associates in Walnut Creek. "It's a significant challenge to get down to the price point, or even just the ballpark of fossil fuels."

The problem is translating successful lab experiments to an industrial scale. Mass algae biofuel production could require enormous pools or photobioreactors while growing a proportionally small amount of algae. Technology needs to be developed to systematically extract the oil from the organisms.

Algae-generated oil currently costs \$20 to nearly \$33 a gallon to produce, with some estimates soaring to \$60. Conventional gasoline costs less than \$5 a gallon.

"There's a valley of death between research and development and commercial development," said Lisa L. Mortenson, chief executive of Community Fuels in Encinitas.

Add California's heavy regulations, and algae biofuel production becomes an even more difficult business proposition, some complained.

Biofuel companies often have to wade through a tangle of permits, taxes and compliance measures in California. Aquaculture alone requires more than 15 permits, with more for waste disposal and water use.

The intensity of the algae hype is making some investors wary.

"The majority [of the efforts] are a gigantic hassle of time and capital because they're trying to make coal out of diamonds," said David Andresen, a clean-tech investment banker at Oracle Capital Securities. "There's such a high level of scientific illiteracy in the investment community that investors have a very hard time picking winners and losers."

Still, even Andresen is an investor in the clean-tech industry, advising Kai BioEnergy Corp., a San Diego company named after the Hawaiian word for "ocean."

Although Kai can process only about 20 gallons per minute while it needs 300 gallons a minute to be commercially viable on a large scale, Chairman Mario C. Larach is optimistic.

"It's just a matter of scaling at this point," he said. "If nature can do it, we can do it."

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