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Algae's growing popularity

Established investors, including one notable oil major, are putting money into early-stage companies developing algae-based biofuel. A handful of algae companies are among various entrepreneurs racing to commercially produce a next-generation biofuel.

ExxonMobil Corp. recently joined the race to develop algae-based biofuels, saying it will invest $300 million with Synthetic Genomics Inc., a San Diego company founded by J. Craig Venter. ExxonMobil is spending another $300 million internally on algae research.

Emil Jacobs, vice-president of research and development at ExxonMobil Research & Engineering Co., shared some of the company's thinking about its collaboration with Synthetic Genomics.

The collaboration likely will last 5-6 years, Jacobs told reporters during a July conference call in which ExxonMobil announced its investment.

Jacobs said he is unsure what fuels ultimately might result from the collaboration. He and Venter would not discuss specific technology with reporters, saying researchers will investigate all options.

Synthetic Genomics plans to build a test plant in San Diego to study growing algae in open ponds and in closed photosynthetic bioreactors. The test plant's researchers also will study oil-extraction techniques.

The gist of Venter's research involves genetic engineering on an industrial-scale culturing of algae to yield hydrocarbons. Previously, Venter worked on sequencing a human genome. He likes to describe his current algae research as biomanufacturing.

ExxonMobil estimates that ultimately billions of dollars worth of investment could be needed before achieving commercial production of an algae-based fuel. The initial $300 million investment is intended to help Venter tweak a biochemical path to alter the molecules of algal oil, leaving a hydrocarbon.

ExxonMobil's thinking

The major's decision came after its executives quietly investigated biofuels in general for more than a year. After considering the technical challenges of potential next-generation biofuel options, algae rose to the top of ExxonMobil's list.

"As far as products to expect from this program, our intent is to make hydrocarbons that look a lot like today's transportation fuels," Jacobs said. "We want to produce hydrocarbons that can go into a refinery to be

processed along with other petroleum streams and then used in the transportation fleet or even jet fuel."

ExxonMobil planners want a biofuel that can attain large-scale production. Environmental footprint was another consideration. ExxonMobil considered water use, land use, and carbon emissions likely to result from the production of various biofuels.

ExxonMobil Corp. is financially assisting Synthetic Genomics Inc.'s research into algae-based biofuels. *Photo from Synthetic Genomics.*

The initial plan is to come up with a modular design involving an optimal plant size. Then other production sites can be built as needed, Jacobs said.

Others react

Paul Dickerson, a partner with Haynes & Boone LLP, welcomes ExxonMobil's involvement in algae research. Dickerson launched the law firm's clean technology practice group. Formerly, he was chief executive of the US Department of Energy's Office of Energy Efficiency and Renewable Energy.

"All alternative energy provides a wonderful opportunity for incumbent energy companies," Dickerson said. "Exxon has been focused on energy production and distribution for generations. If we are bringing Exxon's expertise to alternatives, we as a nation are stronger."

He sees the clean technology industry entering a development phase where oil and gas companies can provide financial backing and also can provide valuable experience on converting successful laboratory results into practical commercial application.

"Clean-tech entrepreneurs are now looking to scale up, and oil companies know this drill," Dickerson said. "Oil companies have a long track record of planning, financing, and overseeing large projects. There are many areas for potential technical collaboration."

Michelle Ashby, chief executive officer of MINE LLC, and an organizer for energy investor meetings, notes algae may be the first in a new age of biofuels in which researchers carefully examine the whole life cycle involved in creating a fuel.

"There are a lot of tracks moving at the same time, one of them will emerge," to become mainstream, she said.

ExxonMobil believes any significant algae-based commercial development is still years away. "This is very early days," Jacobs said. "We've got a lot of work ahead of us."

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