

Algae Biofuel

Special Report

Algae Biodiesel Answers from an Interview with OriginOil CEO Riggs Eckelberry

What are the benefits of using algae as a feedstock over other plants or fats?

Algae is better because it's a third generation feedstock.

First generation consisted of other food crops, which not only had implications for the world's food supply, but also impeded the amount of land available to grow it on.

Second generation solved the food problem, but not the land problem. These were feedstocks like switchgrass and miscanthus. And scalability became an issue because of the variety of grasses and locations where they were being grown.

There was no ubiquitous feedstock, grasses still needed high water and fertilizer inputs, and the path to large-scale viability was muddled.

As the third generation feedstock, algae solves many of the previous problems. It has a small foot print, meaning it doesn't need much land or water, and it can actually consume carbon dioxide as fertilizer.

And because it is grown in a closed-loop system, all input factors can be monitored and adjusted. This makes algae the only potentially ubiquitous (able to be grown anywhere) and highly scalable biofuel feedstock.

So algae as a biofuel feedstock solves the food vs. fuel issue, the land issue, the footprint issue, and the scalability issue. And it eats CO₂.

How much can the commercialization of algae biodiesel combat our liquid fuels problem with respect to oil dependence?

Since algae is highly scalable it can do much to combat the liquid fuels problem.

Rather than get into specific numbers, let's cover the ways in which algae can do this.

First of all, there only a few concentrated areas remaining from which we can get large amounts of oil. Producing algal oil close to the end-use site, rather than piping or shipping oil thousands of miles, will soon prove more practical.

And unlike oil, algae is a renewable resource, capable of providing consistent amounts of oil as our fossil reserves grow harder and more costly to find and exploit.

Algae can also be more distributed because it's easier to build refineries for the oil. There are only a handful of traditional oil refineries, which already causes major bottlenecks. But building new ones has proven difficult thanks to NIMBYism and growing environmental concerns.

In the same vein as scalability, algae's ability to be granular (produced and refined near end-use) will do much to help combat fossil oil use.


Could you describe OriginOil's approach and industry advantages?

Well, for starters, OriginOil is a pure technology company. It is not our goal to be a major producer of algae biodiesel.

Instead, we're developing a series of technologies that break down each of the remaining road blocks preventing the widespread adoption of algae oil use.

The end goal is a model that would allow us to license our various technologies to algae producers. We're also pursuing a service model, assisting with the building of algae farms for other businesses. And we expect to ink distribution deals with Original Equipment Manufacturers (OEMs) for integration of our technology in their systems. Our first such prospective partnership is with Desmet Ballestra (more on that below).

The first technology in our suite is Quantum Fracturing™, which allows us to break down carbon dioxide, water, and nutrients to the micron level, called micro-bubbles. The nutrition bubbles are then introduced to the algae, allowing for instant and even absorption.



OriginOil Quantum Fracturing

We also enhance the growth stage through the use of our Helix Bioreactor™. This growth vessel has a vertical shaft equipped with multiple lights allowing algae to be cultivated at multiple levels, rather than just on the surface of an open pond. The unique structure of the device also serves as the delivery structure for the fractured nutrients.

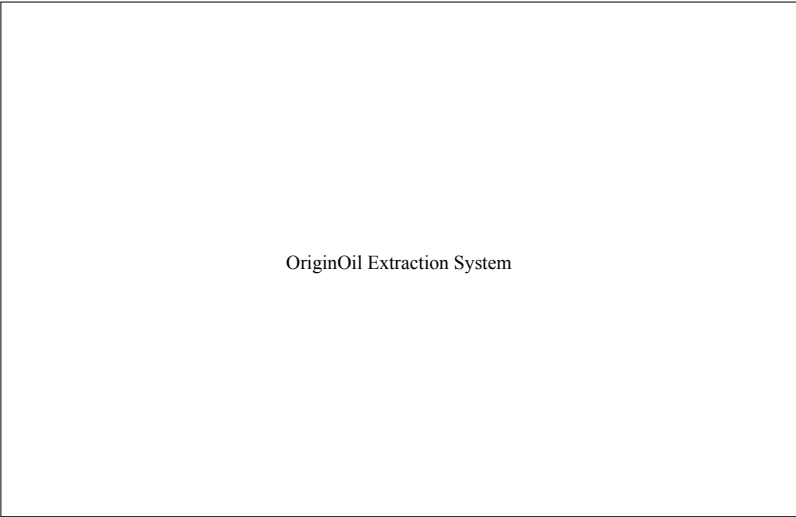


OriginOil Helix Bioreactor

Lastly, we have a unique extraction system to harvest the oil from the algae. Since the mixture in the reactor is 99.99% water, this is often a difficult task.

Our one-step procedure combines the Quantum Fracturing technology with pH modification and electric pulses to break down the algae cells and release the oil. Gravity is then used to separate the water from the oil and the biomass.

This chemical-free, low cost method is OriginOil's major product, and can be used in their systems as well as licensed to other companies.



OriginOil Extraction System

In fact, that process is already beginning through a recent partnership with Desmet Ballestra, an international leader in oil and fat technologies, to commercialize the extraction system. Preliminary tests have already shown it could save 90% of the energy used in traditional extraction systems while reducing capital expenditures.

So when can we expect algae to live up to its promise?

Well, it's living up to its promise in many ways right now. There are many applications being developed for algal oil that don't need large scale production or widespread distribution. This is the low hanging fruit that often isn't heard about.

For example, we know a company with numerous gas-fired kilns. Since they operate in the Kyoto zone, they have a substantial CO2 penalty. In this case, the operator plans to attach an algae growth system to these facilities, using the excess CO2 as nutrients, and the excess heat energy from the kilns to run the algae lights, pumps and chillers. The algae itself, a fast-growing oil-free version, will be gasified on the premises to be fed

right back into the kilns, creating a perfect closed-loop solution.

There are hundreds of similar applications for this technology that can be exploited in years to come.

Also, we will see local, entrepreneur-driven community projects springing up. This is a huge shift from the old-time centralized energy model to a true distributed energy system that serves the exact needs of each community as they develop - always in a carbon-neutral way.

When it comes to algae replacing oil or providing all our transportation needs, that is still several years away.

Given algae's potential, where is the Federal support? Where's Big Oil?

Federal support is actually strengthening. Several national laboratories are pursuing algae research, working with companies to improve the refining process.

And there's also been support for using algae in water treatment applications. Recent water funds have gone to researching algae anaerobic digesters that would have clean water outputs.

Some money has also been set aside via the stimulus to research algae as a biomass fuel.

Big Oil has even shown limited interest. Shell entered a joint venture with HR BioPetroleum to build a demonstration facility. And Chevron has partnered with Solazyme to get a piece of the action.

With so much interest, where do you see the algae industry in three to five years?

There will be literally thousands of companies, with a strong resemblance to the early dot com era.

China will undoubtedly pursue this technology and spawn hundreds of companies, much like the solar industry is seeing right now.

There will also be a strong service industry--maintaining equipment, training workers, making small efficiency gains. And consolidation will follow, as big players pursue acquisitions and try to foster start-ups.

It'll be a multi-billion business, with applications that haven't even been discovered yet. That's why OriginOil is perfecting the core steps in the process today, so it can be a technology and service leader in the field as it develops.

P.S. The Alternative Energy Speculator is dedicated to taking profits from up-and-coming clean technologies. And algae biofuels certainly fit in that category. If you want to be in a position to profit when this industry takes off, you may want to consider [becoming a member today](#).

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