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Technology Spotlight: Algae-based Oils

Featuring:

In the latest edition of the newsletter, LRI staff interviewed Mr. Riggs Eckelberry of OriginOil, Inc. OriginOil is a critical technology player in the mid-stream algae-production process chain. Their technologies are designed for all algae-based applications, including fuels, pharmaceuticals, foods, or fertilizers. Recently, OriginOil has been focusing on developing on-site bio-crude capabilities for algae growers. Their product, ***The Algae Appliance™****, is a harvesting technology already proven to be scalable and versatile for algae oil production.*

Enabling growth in the algae market

As developers of algae harvesting technologies, US-based OriginOil have spent the last few years proving the integrity of their systems in the field. They chose Australia as the first location to investigate the scalability of their technology, capitalizing off government greenhouse gas regulations that viewed algae farms as a way to reduce large CO_2 loads being emitted by nearby brown-coal power plants. In December 2010, the test system was validated, and followed up with larger units, the largest of which can work in parallel, each processing up to 75 gallons per minutes of algae dilute. OriginOil's strategic method for layout means that they can scale up to any size algae farm, building the installation in functional pond sections, helping also to prevent possible invasions of disease from spreading throughout the whole ecosystem.

For some time, OriginOil wasn't able to gain much traction beyond financiers in America, but their reach has quickly spread in the past two years. Along with Australia, they have since made headway with partnerships and business development in Belgium, France, the UK, and Brazil.

OriginOil's most recent breakthrough is a joint venture with an initial private sector funding commitment of $4.5 million. Formed to carry out bankable feasibility studies to investigate bio-refineries for the demands of U.S. and NATO military forces, the venture would look to contract with the U.S. Department of Defense (DOD).The DOD has a target for the U.S. military to be operating on 50% biofuels by 2020. It is a huge undertaking, especially considering that the U.S. military is the single largest purchaser and consumer of oil in the world. OriginOil expects this 50% biofuel quantity to be a mix of products. The DOD is working with the USDA and U.S. Department of Energy to ensure that in achieving their goal, they will not disrupt food or water supplies, thus mandating that most of the biofuel will be sourced from waste products and algae. Algae oil will likely serve as a 'force multiplier' for the biofuel blend, boosting caloric content and providing the product with a more petrochemical profile.

About Us

GreenTechEurope.org (GTE) is a production of London Research International, a global research and consulting firm with expertise in the energy, environment, and chemical sectors. GTE is a video-based technology platform showcasing innovative technologies from Europe.

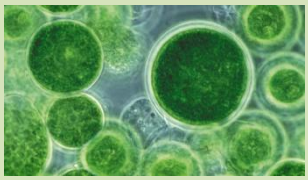
The GTE Newsletter

Our monthly interview-based newsletter features innovative energy technologies and businesses from around the world.

Announcements

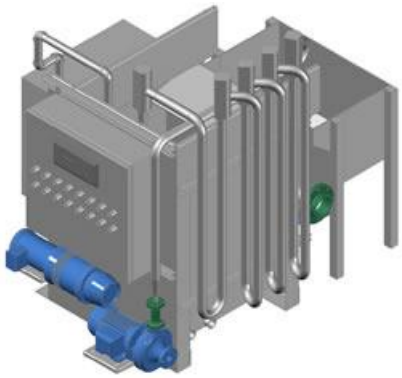
LRI has signed publication distribution agreements with ReportLinker and MarketResearch.com. See either of these sites to purchase LRI's latest publication: 2011/12 Renewable Electricity Incentives in the OECD, China, and India.

Algae to Fuel: How does it work?



Algae can take many forms. Macro-algae is often referred to as seaweed or kelp, but for oils, the single-celled microalgae are typically used. These microscopic organisms are commonly found in ponds, lakes and marine environments. In the right environment, fresh algae cells grow and divide exponentially, doubling every few hours, while absorbing all available nutrients, CO_2 and light energy. Instead of waiting hundreds of millions of years for algae to become oil, industrial processes can transform algae into oil in a matter of days. The oil produced from algae can replace all but the heavier fractions of petroleum, including jet and heating fuel, while algae biomass left over after extraction can be used for a number of "green" applications, like creating biogas, fertilizer and ethanol.

(Picture Source: mnn.com)



The Algae Appliance

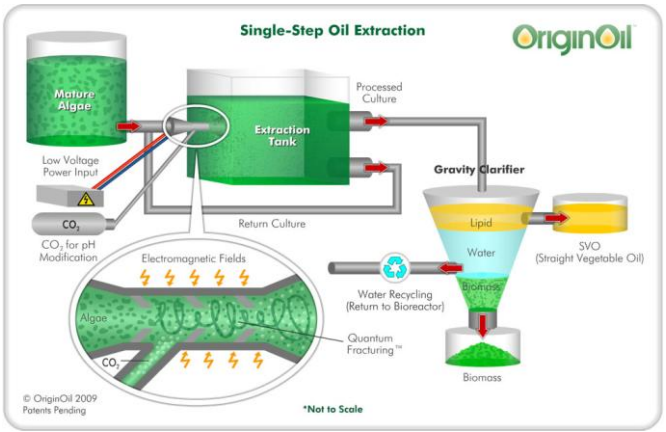
Low-cost, low-energy, no-chemicals

Retail Price: $200,000

Deployment: 6-8 weeks

In October 2011, OriginOil announced that they would be productizing an algae harvesting "starter's kit" called the *Algae Appliance.* The intent of this entry-level product is for industry users to learn about OriginOil's technology, experience its value, and then build their capacity from there. As OriginOil sees it, what the industry is using now for algae harvesting and refining is not sustainable—large quantities of chemicals, inefficient methods of water recycling, and equipment that requires high power use, ultimately making the energy balance negative for end-product oils. The *Algae Appliance* brings a zero-chemical, continuous high-flow, positive energy solution to the marketplace.

The product is an integrated unit for de-watering, concentrating, and "cracking" algae feedstock, thus completing the harvesting process all in one location. The system has a variable flow rate of between two and twenty litres per minute, with the potential to significantly expand after initial operation. The benefit of the *Algae Appliance* to algae growers is that they do not have to transport their crop long distances for processing or refining, but can complete the synthesis on-site. Furthermore, the process does not involve the addition of chemicals, it is easy to install, it is effective in reducing algae water content by up to 90%, and it is extremely low-energy—decreasing OPEX and CAPX.



QUICK FACTS

Flow Rates:

Min: 2 LPM (0.5 GPM) – processing 3,000 litres per day in continuous harvest.

Max: 20 LPM (5 GPM) – processing 30,000 litres per day in continuous harvest.

Dimensions:

Length 214cm, width 152cm, height 214cm

Weight:

1,140 kg (2,500 pounds).

Power Usage: Approx. 0.002 kWh at 10 LPM.

Price:

Including the concentrator, an *Algae Appliance* currently retails for $200,000, plus whatever services are needed for training. However, as the product is still in a field-test phase, customers are offered a break on the price.

Deployment Process:

Algae Appliances are currently in production, with orders reaching clients within six to eight weeks. In the event that the purchaser is not near an OriginOil reference site, then it will be encouraged for a representative to visit with OriginOil technical specialists for training and instruction.

Competition: Momentum is Everything

Industry experts forecast the algae market will be worth $1.5 billion by 2015, with enabling technologies constituting one-third of the share. With this market becoming accessible, plenty of companies, large and small, are lining up to take a piece. OriginOil feels they occupy a unique place for their readily implementable process, high-flow rates, low-use of chemicals, low consumables compared with other systems, minimal related labour costs, and low energy requirements.

The field for next-generation algae harvesting is thin. Although OriginOil often comes across companies who have interesting and competitive technologies, these start-ups have felt the recession, and lack the revenue, momentum, and financing that OriginOil now enjoys.

Looking ahead, OriginOil intends to leave the equipment sales business and become a technology licensor. Their transformation would be comparable to Qualcomm's, who started out by making cell phones until pulling back to sell technologies and licenses. Essentially, OriginOil hopes to do the same and become a technology and field services company versus a heavy manufacturer and distributor. "Enough people who have the manufacturing and distribution lines would be delighted to do what we currently do," said Eckelberry.

Future directions for OriginOil include its current development of ways to make biofuels through a default system that is hooked onto the *Algae Appliance*. OriginOil is also working on adding upstream and downstream capabilities to their portfolio; upstream technologies that will help growth for algae producers, and downstream products for bio-crude distillation and refining on-site. These innovations look to further cement OriginOil within the core of the algae-oil industry and its growing market.

Algae biofuels in 2020

Q: Looking forward, what is OriginOil's vision for the algae biofuel market?

"If you look at the US Navy requirements alone, that will create a demand of eight million barrels per year of alternative fuel by 2020. This will certainly be a mix [of fuels], and we see algae as being more of a qualitative ingredient…so the fuel would be 10-15% algae-based. This is still a huge number compared to previous goals. So along with the rest of the military—Army and Air Force—I think one million barrels per year of algae biofuel per year by 2020 is a very realistic figure. The demand could be much higher in terms of what's achievable, but if the industry can get to one million barrels, then that will be an real inflection point for the market."

- Riggs Eckelberry, CEO, OriginOil

Work with OriginOil

OriginOil is interested in creating strategic partnerships and investments, particularly on an international scale. They welcome investment and cooperation either in their core company or through a joint venture.

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Related Upcoming Events – Algae & Biofuels

• Algal Biomass Organization (ABO) Legislative Fly-In

29 February – 1 March 2012 | Washington D.C.

The ABO encourage their members to take advantage of an opportunity to meet with Members of the 113th US Congress to advocate for ABO's legislative agenda. This has been scheduled the same week as the ARPA-E Technology conference, also being conducted in Washington, D.C. The ABO will schedule and coordinate meetings with U.S. Senators and Representatives.

• World Biofuels Market Congress & Exhibition

13 – 15 March 2012 | Rotterdam, Netherlands

The event will include sessions on aviation, algae, advanced biofuels, finance and investment, energy crops, transport, biogas and more. The event is co-located once again with Biopower Generation and Bio-based Chemicals.

• 2nd Annual Algae World Australia

16 – 17 April 2012 | Perth, Australia

This event will focus on scaling up to the next level & developments in algae processing technology from harvesting, separation to extraction. Highlights include an assessment of the possible scale of algae cultivation & bio-crude potential across Australia.

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