

## *A Breakthrough Technology to Transform Algae into Oil*

### **Executive Summary**

OriginOil, Inc. is a public company trading on the NASDAQ Over-the-Counter Bulletin Board (OTCBB) market under the symbol "OOIL."

#### **Overview**

OriginOil, Inc. is developing a breakthrough technology that will transform algae, the most promising source of renewable oil, into a true competitor to petroleum.

Much of the world's existing supply of oil and gas is made up of ancient algae deposits. Today, OriginOil's patented technology will produce "new oil" from algae through a cost-effective, high-speed growth and extraction process. This renewable supply of oil can be used for products such as diesel, gasoline, jet fuel, plastics and solvents without the global warming effects of petroleum.

Other oil-producing feedstock such as corn, soy, and sugarcane often destroy vital farmlands and rainforests, disrupt global food supplies, and create environmental problems. OriginOil's technology is targeted at fundamentally changing the world's source of oil without disrupting its environment or food supplies. Instead of drilling for old oil, OriginOil will produce clean, new oil, anytime and anywhere, to first alleviate, and then replace, world-wide dependence on petroleum.

#### **Market Opportunity**

A perfect storm has brought algae to the forefront in the biofuel arena.

A host of factors, including rising oil prices, global warming, and the rapid industrialization of China and India, have greatly increased the demand for a renewable alternative to petroleum.

Worldwide investment in biofuels rose from \$5 billion in 1995 to \$38 billion in 2005 and is expected to top \$100 billion by 2010, thanks to investors like Richard Branson and George Soros, GE and BP, Ford and Shell, Cargill and the Carlyle Group. Renewable fuels have indeed become a rallying cry for the green movement.

However, new studies show the effects of first generation biofuels to be far from those intended. Corn ethanol, for example, always environmentally suspect, turns out to be environmentally disastrous by emitting more greenhouse gases than it consumes, by containing less energy than gasoline, and by taking away valuable food producing farmland.

The use of food-based crops such as corn, grain and oilseed to produce biofuel is now increasing world food prices and endangering the hungry. In point of fact, the grain it takes to fill an SUV tank with ethanol will feed a person for a year. Grains now harvested to fuel

cars instead of feeding people have prompted the United Nations' World Food Program to declare that the resulting rise in food costs is nothing short of a global emergency.

Still, all experts agree that biofuels can be very beneficial if they don't use arable land. Non-crop feedstocks include municipal trash, agricultural waste, algae, and algae's primary nutrient: carbon dioxide. The primary drawback to these biofuel feedstocks, including algae, has been the lack of technology to produce them economically on a large scale.

OriginOil is developing a technology to solve this challenge by focusing on algae.

### **Algae Oil — Replicating Nature**

All bio-energy used on this planet derives from sunlight, and few organisms use sunlight as directly or as efficiently as algae.

In fact, most of the petroleum now in use was once formed from one-celled plants and animals, such as algae, that floated on the surfaces of ancient oceans. As these organisms died, they sank and settled on the ocean floor where they subsequently were buried under conditions which preserved them. Through millions of years of pressure and heat, they converted to oil.

Of all the biofuel feedstocks available today, only the original source of oil, algae, can offer a realistic potential to replace petroleum due to minimal production footprint, rapid growth rate, and high oil content.

The key lies in the fact that algae creates its own food by combining light, carbon dioxide and water through photosynthesis. This food is then stored as carbohydrates and lipids, making a highly accessible biofuel.

With new technology, algae *can* be grown economically, and on a scale large enough to replace petroleum. The lipids *can* be efficiently extracted from the mature algae. The planet's current and future fuel demands can in fact be met by efficiently cultivating and harvesting algae.

There are three primary challenges in cultivating algae for oil:

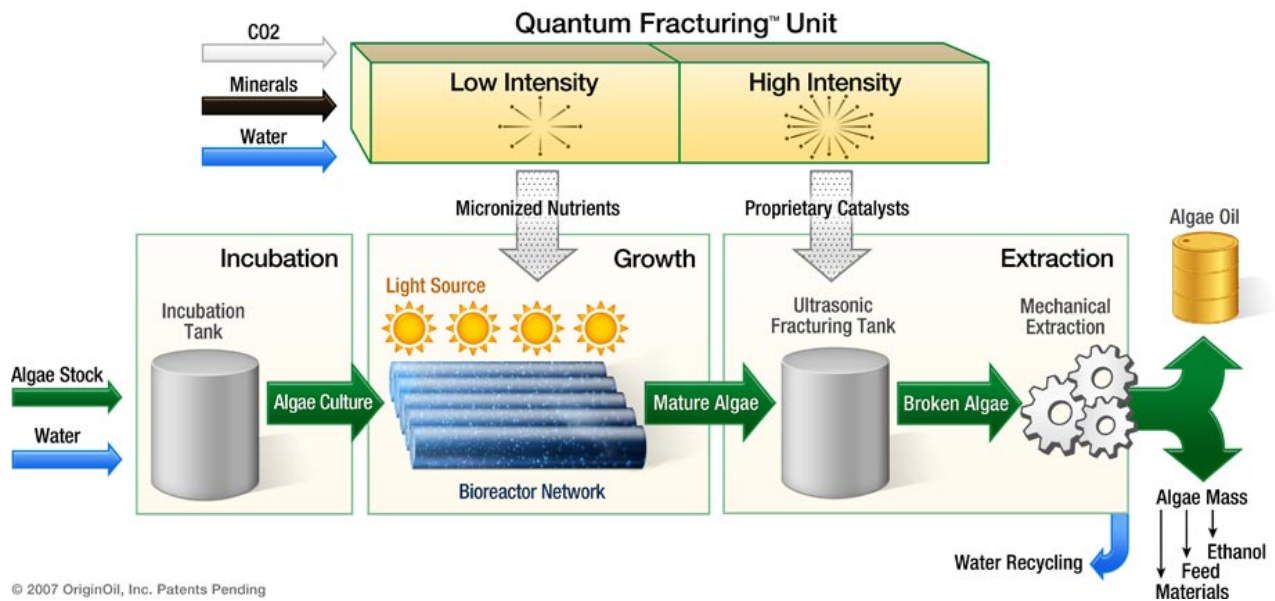
- ❖ Algae growth is dependent on a calm fluid environment; it does not like agitation. One of the primary challenges is how to optimally introduce carbon dioxide (CO<sub>2</sub>) and nutrients needed by the growing algae culture without disrupting or over-aerating it.
- ❖ Algae requires light as a source of energy to fuel its growth and oil production facilities. Algae cultivation systems need to distribute light cost-effectively and evenly within the algae culture.
- ❖ Algae organisms are protected by a tough cell wall. That wall must be cracked — normally an energy-expensive process — to extract the oil. The challenge is to

maximize oil yield by cracking as many of the algae cells as possible with the smallest amount of energy.

### Breakthrough Technology – OriginOil System

The OriginOil System is a complete algae growth and oil extraction system. It employs a portfolio of proprietary technologies, including Quantum Fracturing™ and the Helix BioReactor™, to enable a continuous oil-producing industrial process.

### The OriginOil™ System



### Quantum Fracturing (patent-pending)

Quantum Fracturing™, OriginOil's patent-pending technology, based on the science of mass transfer and fluid fracturing, addresses, and overcomes, all three challenges above. It works at the microscopic level to unlock many biological and chemical properties that massively enhance the efficiency of algae production and oil extraction.

In Quantum Fracturing, water, carbon dioxide and other nutrients are fractured at very high pressure to create a slurry of micron-sized bubbles, which is then injected into the algae culture awaiting it in a lower-pressure growth vessel, the bioreactor.

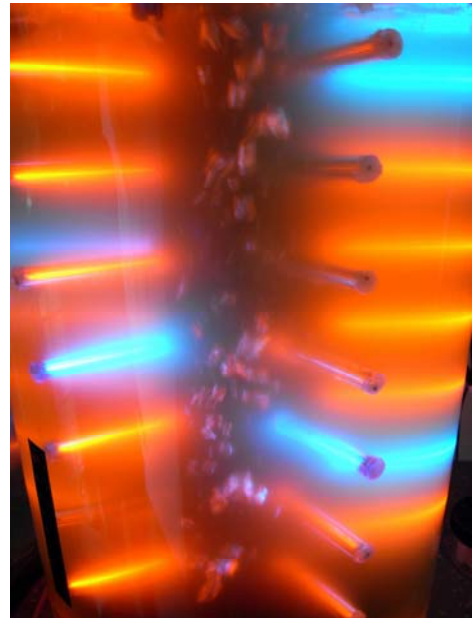
This process can theoretically achieve total and instantaneous distribution of nutrients to every algae cell in the culture without fluid disruption or aeration. The pressure differentials between the two zones substantially increase contact and exchange between the micronized nutrients and the algae cells.

## Helix BioReactor (patent-pending)

The heart of the OriginOil system is the Helix BioReactor™, an advanced algae growth system that can grow multiple layers of algae biomass around-the-clock with daily harvest.

In a natural pond, the sun only illuminates one layer of algae growth, down to about half an inch below the surface. In contrast, the Helix Bioreactor features a rotating vertical shaft with very low energy lights arranged in a helix or spiral pattern, which results in a theoretically unlimited number of layers. Additionally, each lighting element is engineered to produce specific light waves and frequencies for optimal algae growth.

The helix structure also serves as the Helix BioReactor's nutrient delivery system, through which the Quantum Fractured nutrients, including CO<sub>2</sub>, is evenly delivered to the entire algae culture, monitored and tuned for optimum growth.



## Solvent-Free Extraction Process (patent-pending)

Algae walls, which encase the oil, are resilient and difficult to break down, and the process of cracking algae cells to release the oil, known as lysing, has long represented a big challenge for the algae-to-oil industry.

Mechanical methods to do so are energy-intensive and often ineffective; commonly-used chemical solvents such as benzene, ether or hexane are toxic and require careful handling. Such practices increase operating costs and make it harder to site algae production systems.

OriginOil has developed a new algae oil extraction process that does not use chemical solvents. Algae biomass is first sent through a shielded wave guide system where it receives low-wattage, frequency-tuned microwave bursts that break the cell walls. Quantum Fracturing is then applied to the now pre-cracked cells to complete the oil extraction with ease.

This unique approach makes low-energy and environmentally-safe algae oil production a reality.

## Modular and Scalable System (patent-pending)

To reach the production levels necessary to realistically replace petroleum as an energy source, an algae growth system must be fully scalable.

OriginOil’s system to enhance and optimize algae growth allows both horizontal and vertical “stacking” of many Helix BioReactors into an integrated network of fully automated, portable, and remotely monitored growth units.

Further, by the use of such modular design, a large number of Helix BioReactors can be connected to a small number of extraction units to achieve both economies of scale and full industrialization of algae production.

**Enabling a Distributed Oil Model**

In summary, the OriginOil System is, by design, modular and scalable. While it can function as a stand-alone oil producing system, it can also be connected in a parallel network to produce any desired number of barrels per day.

Further, OriginOil systems can be transported and placed anywhere in the world to operate as continuous oil-producing plants, replacing petroleum for use in electricity generation and fuel production.

By enabling distributed oil production we can help decentralize the oil and energy industry, empowering local energy production in villages, townships, communities, states and countries. Someday, we may no longer need to import oil.

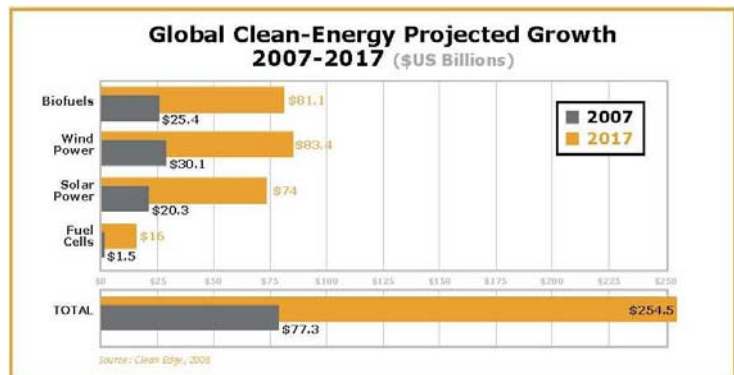
**Entrepreneurs and Partners**

The fastest way to distribute new technology is through existing, proven channels. Therefore, OriginOil is now developing partnerships to exploit applications driven by CO2 availability. Carbon dioxide, currently a major liability for industrial and agricultural players, can become part of their asset portfolio.

Even the petroleum industry is an ally. Large oil companies are investing in algae technology, and the Petroleum Institute has committed the industry to refining biofuels. Therefore, biofuel is not only an environmentally friendly replacement for petroleum; it is the energy source of the future.

**Business Model**

The OriginOil System is a complete system to grow microalgae rapidly and extract its oil content to replace petroleum in various applications such as diesel, gasoline, jet fuel, plastics and solvents. The Company’s business model is based on licensing this technology to customers such as fuel refiners, chemical and oil companies, as well as entering into partnerships with biofuel producers and support



Source: Clean Edge Inc. © 2008 Clean Edge, Inc. (www.cleandedge.com)

organizations. The Company is not in the business of producing and marketing algae-based oil or fuel as an end product.

### **OriginOil's Opportunity**

Algae oil, a renewable crude oil, can be used directly as biodiesel, or it can be refined into gasoline, diesel, kerosene, plastics, and solvents. Algae biomass can also be converted to ethanol, methanol and hydrogen.

According to the report "Clean Energy Trends 2008", biofuels reached \$25.4 billion in 2007 and are projected to grow to \$81.1 billion by 2017.

The U.S. Government target for all forms of biofuels is to triple the 2011 levels to 36 billion gallons by 2022, of which 22 billion are targeted to come from "second generation" fuels, such as algae.

In China, India, Brazil and Europe, economic and environmental security concerns are giving birth to new government targets and incentives aimed at reducing petroleum imports and increasing the consumption and production of renewable fuels.

As governments continue to aggressively pursue targets for second generation biofuels and continue to promote research and development in non-food feedstocks such as algae, the growth of biofuels will be even greater than broadly anticipated.

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### **Corporate Information**

OriginOil was incorporated in the State of Nevada on June 1, 2007, with its principal executive offices at 5645 West Adams Blvd, Los Angeles, California 90016.

OriginOil's fiscal year end is December 31. Its common stock is quoted on the Over the Counter Bulletin Board under the symbol "OOIL".