

Algal Biomass Organization



2010 Finance Summit | Conference Report

About the Algal Biomass Organization

Founded in 2008, the Algal Biomass Organization (ABO) is a non-profit organization whose mission is to promote the development of viable commercial markets for renewable and sustainable products derived from algae. Our membership is comprised of people, companies, and organizations across the value chain. On behalf of our more than 170 members, we work to:

- Facilitate commercialization and market development of microalgae biomass specifically for biofuels production and greenhouse gas abatement
- Deliver information to the public on initiatives, funding opportunities, and industry development
- Provide networking and collaboration opportunities
- Establish cutting edge research and commercialization summits and other meeting opportunities
- Develop a high quality interactive repository of information on algal biomass technology, science, products, processes, patents, and economics
- Facilitate IP aggregation, licensing, and royalty management
- Develop quality and measurement best practices for algal biomass, products, systems technology, and econometrics
- Afford career advancement and consultant opportunities

More information about the ABO, including membership, costs, benefits, members and their affiliations, is available at our website: www.algalbiomass.org.

The Algal Biomass Organization is a 501(c)(6) not-for-profit organization.

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Algae Biomass Summit 2010

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Introduction: Algae — Model Organisms

Entrepreneurs, investors, technologists, scientists, policy makers and end users are increasingly looking to algae as a promising resource for high-quality and sustainable commodities, including food, feed and fuel. That's also why, in 2009, *The Wall Street Journal* described algae-based energy technologies as one of the "Five Technologies That Could Change Everything." As one investor has put it, given their ability to grow rapidly on non-agricultural land in non-potable or brackish water, to consume carbon dioxide, and their high oil content, algae are "model organisms."

As one investor put it, algae are "model organisms."

How the emerging algae industry can move more quickly towards commercialization was the topic of discussion at the Algal Biomass Organization's (ABO) first-ever Finance Summit, held in May 2010 in New York City. Featuring representatives from leading algae production companies, government regulators, legal experts, financial analysts and investors, the goals of the day-long event were two-fold: first, help the financial community better understand the investment risks and opportunities involved with algae finance in order to make more informed investment decisions; and, second, to provide algae companies and producers with a clearer picture of what potential investors are looking for regarding investment opportunities in the algae industry.

Together, the participants and panelists in ABO's 2010 Finance Summit broadly outlined three ways the algae industry can realize its strong potential and move towards commercial-scale production:

- increased private equity
- balanced government support and involvement
- increased investments and business relationships with strategic partners

The State of the Industry

The algae for fuels industry has come a long way in a short time. A combination of increased concern about carbon emissions, national security and domestic economic development has led to accelerated investment in the industry in both the public and private sectors. "The algae industry has changed considerably in the last ten years, in the last five years, and even in the last two years," said Chris Cassidy, Business and Renewable Energy Advisor to the United States Department of Agriculture (USDA).

The U.S. government has helped support the industry's growth and development in the last decade. Fourteen years after it discontinued the Aquatic Species Program (1996), the Department of Energy's (DOE) Office of Renewable Energy and Efficiency (EERE) is once again investing in R&D in algae-based biofuels. In fact, in 2009 alone the DOE's Biomass Program invested \$180 million in the algae industry. A significant portion of the DOE's funding came through monies allocated as part of American Recovery and Reinvestment Act of 2009, including \$78 million for two cost-shared algae consortia teams.

In addition, the DOE awarded nearly \$125 million in stimulus through its Integrated Biorefinery Program for two cost-shared pilot scale and one cost-shared commercial-scale biorefineries that will produce algae-based fuels. In total, the federal government has invested more than \$800 million in algal biomass research and algae-based biofuels.

Also in 2009, through its Biorefinery Assistance Program, the USDA made its first ever algae-based fuel award in the form of a loan guarantee amounting to more than \$50 million.

On the regulatory front, the U.S. Environmental Protection Agency has also begun to address the promise of algae-based energy solutions, recognizing in its February 2010 Final Rule to the Renewable Fuels Standard that algae-based diesel and renewable diesel reduce greenhouse gas emissions by at least 50% compared to petroleum diesel.

Equally important to the federal government's renewed interest in algae has been the significant investments in the industry from venture capital and private equity investors,

including Bill Gates Jr., as well as major strategic investors like ExxonMobil and Shell. Since 2000, the private sector has invested more than \$2 billion into the algae industry.

Increased federal support for and private investment in the algae industry has led to renewed research and the development of numerous pilot demonstrations. Drawing on the legacy of the Aquatic Species Program, numerous national labs and academic research institutions are actively engaged in algal research, while there are now dozens of private companies actively doing research, lab testing, pilot testing, and designing and building demonstration plants. In 2009, Continental Airlines and Japan Airlines conducted successful test flights powered in part by a blend of petroleum and algae-based biofuels.

“The algae industry is going to play an important part” in providing the country alternatives to petroleum-based fuels.

John Mizroch, Wilson Sonsini Goodrich & Rosati and former DOE official

Several key participants argued that policy makers needed to be sure that they did everything they could to support the continued development of the industry. “I think the algae industry is going to play an important part” in providing the country alternatives to petroleum-based transportation fuels, said John Mizroch, Counsel at Wilson Sonsini Goodrich & Rosati and a former official in the DOE’s Office of Renewable Energy and Energy Efficiency. “But I think no one is listening carefully enough yet. I hope there will be an opportunity to go to our policy makers and re-stress the importance of this industry.”

The Opportunities: More Than a One Trick Pony

While much of the public attention has been focused on the promise of algal biomass as a feedstock for renewable fuels, there was broad consensus among the participants that the industry is much, much larger. In fact, there are really three markets: food, feed and fuels.

Among the three, the participants noted, the market for derivatives of algae in the food market is the most mature. Nutraceuticals, such as supplements made from algae, is where “most of the market is right now,” observed Thomas Byrne, President and CEO of Byrne & Company Limited.

Furthermore, several panelists observed that regardless of the market for other products such as biofuels, the size and projected growth of the nutraceuticals markets means that algae produced for nutraceuticals will be an “economic reality” for years to come.

Along with demand for algae-based nutraceuticals for human consumption, several key participants at the Finance Summit noted that growing demand for animal feed will also present significant market opportunities for algae producers. As global demand for animal protein continues to grow rapidly, so will the market for animal nutrition. Given the high-protein and high-carbohydrate content of many algae strains and the reality that algae-based products are already being used by a number of producers of animal feed, this is market particularly well suited for the algae industry.

“Algae is positioned to become a major food and industrial crop to satisfy a growing demand for animal feed,” observed Ben Cloud, President and Chief Operating Officer of Phyco BioSciences, Inc., a company working to commercialize algal biomass for nutraceuticals and animal feed and currently developing a commercial production facility near Phoenix, Arizona.

“The advantage that this industry has at this point is that there are some very high value markets that can help get the systems up and operational.”

Thomas Byrne, Byrne & Company, Ltd.

Like the market for nutraceuticals and animal feed, rising demand for domestically produced renewable fuels means that the biofuels market will continue to grow in importance for the algae industry, participants said. But because the biofuels market remains the least developed of the three, it will be all the more important for companies in the industry to leverage the food and feed markets in order to develop their businesses to the point that they can address the fuels market.

“There are a lot of other products [like nutraceuticals and animal feed] we can use to get to scale in order to solve the fuel problem,” said Mark Allen, Chief Executive Officer of A2BE Carbon Capture, a Colorado-based company developing technologies that use algae to convert carbon dioxide into biofuels, food and fertilizers.

“The advantage that this industry has at this point is that

there are some very high value markets that can help get the systems up and operational,” added Tom Byrne.

Within the fuels category, algae strains and production processes can be optimized to address four distinct secondary markets: ethanol, gasoline, biodiesel, and aviation fuel. While companies have been making advances in all four areas, participants said, given the emergence of the military as a chief proponent of renewable jet fuel, it’s likely that the renewable aviation fuel will be a major commercial market for algae-based biofuels.

“I think the Department of Defense, along with the USDA, is really going to be taking the lead in promoting the development of jet fuel derived from renewable feedstocks such as algae,” noted John Mizroch.

Assessing the Risks, Identifying the Obstacles

While the market opportunities outlined will only grow over the next 5-10 years, participants agreed the industry nevertheless faces several risks and key obstacles that must be overcome in order for the industry to continue in its development and achieve widespread commercial-scale production.

Foremost among these obstacles is the lack of comprehensive, transparent benchmarking data from companies within the algae industry. Understandably, the privately-held companies in the sector have a compelling right to protect their intellectual property. The result, however, is that there are numerous competing claims about various metrics, such as yield per acre, cost per pound, production potential, etc. This has led to confusion in the marketplace about what is truly possible, and when.

Going forward, participants agreed that the industry must provide more verifiable detail on operations and results in order to build credibility in the eyes of policy makers, end users and investors. Second, as the industry looks to make the transition from pilot- to commercial-scale production, bringing down costs to be competitive with incumbent products such as petroleum-based fuels will be crucial.

“The costs of harvesting must come down to a reasonable level for the math to work,” said Charles Costenbader, Associate Director with Macquarie Cook Power Inc. in Houston, Texas. A number of other panelists echoed a similar theme. “Algae

farming is no different from any other crop, which means we need to understand the overall economics” of the production of algal biomass, said Karl Leitz, CTO of Heliae Development LLC, an Arizona-based company developing renewable aviation fuel made from algae. And in the sense that algae production processes must be understood in terms of the major inputs that drive costs, “the algae industry is not that different from other production industries,” said Tom Byrne, who has developed economic models for the ethanol and algae industries.

“Algae farming is no different from any other crop, which means we need to understand the overall economics.”

Karl Leitz, Heliae Development

Third, the fact that algae has not been accorded the same financial and regulatory incentives accorded to other first- and second-generation biofuel feedstocks has made it more difficult for companies and investors alike to analyze the cost competitiveness of algae-based products compared to petroleum-based fuels. Attendees and panelists alike agreed that addressing each of these different risks and obstacles will be key for the industry to move forward.

Towards Commercialization

The final panel of the day focused on financing strategies for the industry, with broad consensus on three topics: the continued importance of the private sector involvement; the delicate balance between government funding as an accelerant versus an enabler; and the importance of relationships with strategic partners.

First, emerging companies in the algae industry cannot rely on government largess alone – they must be able to attract private capital on their own merits.

“Tax equity is not really chasing the algae industry right now, so this is a sector that really needs early-stage VC money,” said Charles Costenbader.

In addition to being able to attract private equity on their own merits, increasingly companies must be able to demonstrate a path to economic viability. Gone are the days of investments in purely speculative ventures or companies still in the research phase. Companies must be able to demonstrate that commercialization is reachable. More importantly, they must be able to show that their business can exist without completely relying on subsidies or regulatory schemes.

“Business that rely on subsidies don’t have legs to stand on. They need to show some ability to be self-sufficient,” said

Bill Lese, Managing Partner of Braemar Energy Ventures, an energy venture firm with investments in the algae industry.

Doug Cameron, Managing Director and Chief Science Advisor at Piper Jaffray, who is leading the effort to build the firm's global franchise in renewable energy and clean technology, agreed. "It is a big turnoff to talk to company that spends too much time talking about how great business is because of all these government guarantees."

That said, the participants said there still is a very important role for the government to play in helping to create a market, or provide critical "first customer" support in order to help companies get over the "hump" towards commercialization. Government support alongside the private sector can be a powerful combination.

"What I like to see is when government support goes into areas that have been able to attract private support as well, because then you have a mechanism for growth," said Doug Jamison, Chairman and Chief Executive Officer and a Managing Director of Harris & Harris Group, Inc., a publicly-traded venture capital company that has invested in a major producer of algae-based fuels.

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If there was one approach that garnered universal agreement from the panelists, it was this: algae companies must continue to develop strategic partnerships and investments from companies within the larger agriculture and oil industries. Even with private sector capital and government support, the path forward will run through traditional companies in the space.

"We think that strategic investors are one of the key things moving forward in this industry. The key is to get the first commercial plant up and running and get that strategic investor involved, whether it be an oil company, a big ag company – somebody who has access to those markets," said Doug Cameron.

Bill Lese agreed, saying "Once you've shown you have something scalable, you do need a strategic partner. If you don't have a large player from the big oil or chemical company, you lack credibility."

While traditionally "strategics" have been later stage investors, Doug Jamison noted a shift in this trend. "Strategics are now are willing to lead and come in and go about it more like a financial investor. As a financial investor, it's always great to know that the big industry players are willing to write checks," he said.

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Perhaps the true value of a strategic partner is one who can offer not just capital, but also industry knowledge, contacts and distribution.

"Being able to partner with a large chemical company or large fuel or ag company that has distribution, that has ability to help capitalize, a joint venture ... these are the things that can take you to the market with confidence," said Bill Lese. "Because once you have somebody else's balance sheet to work off of, and you are bringing something that is extremely valuable to those entities, you will most likely be able to sell your product through their channels, reaching customers much more efficiently than if you do it yourself."