

The global biofuels industry is entering a new decade of emerging opportunities and considerable challenges in reaching 2020 targets

Algae 2020: Advanced biofuels insight

The global economic recession is already shaking out many of the would-be players in a crowded algae space, and favouring new players with improved strategies. Why are some algae companies attracting capital, and scaling up their enterprises while others remain stuck between the laboratory and the pilot phase?

For any algae producer or advanced biofuels company to receive investment, and grow out of the lab into a commercial enterprise, the practice of strategic due diligence across a range of domains is paramount to success. This requires dedicated research, development, collaboration and diversification to prepare for rapid, transitional changes in regulations, mandates, markets, technologies and subsidies.

The companies that have successfully attracted capital and graduated from the lab into pilot and demonstration projects have four fundamental elements in common: 1) the production of advanced drop-in fuels; 2) the ability to demonstrate proof of concept to investors beyond the lab/bench scale 3) most use molecular biology or advanced systems engineering platforms and, 4) a diversified portfolio of

fungible, advanced drop-in biofuels, green chemicals, as well as biodiesel.

Proof of concept

Of the 80 or so companies involved in the algae space, less than 25 have moved from the laboratory to the pilot phase during the economic recession. Even fewer have been able to convince investors to risk placing \$1 million (€0.7 million) or more to make this necessary transition. If an algae venture is not (a) able to demonstrate and prove its technology works on a small scale or (b) produce more than 1,000 tonnes of algal biomass or at least 100 gallons of algal oil with its partners, it is unlikely investors will take serious notice. Notably, some companies have been able to attract investment based on initial proof of concept at the lab/bench scale via strategic partnerships, early-stage VC money, and government grants (for better or worse).

Advanced drop-in fuels

A common theme is found among the leaders of the field that have progressed into pilot and demonstration scale projects. These organisations are able to produce drop-in replacement fuels from microalgae, and

blue-green algae also known as cyanobacteria, and other microbes. Drop-in fuels from created from algae and other forms of biomass are the molecular equivalent of kerosene or JP8 aviation fuels, diesel and petrol and are otherwise known as green diesel or renewable diesel, bio-petrol or green petrol.

What explains the rising investment trends in advanced algae biofuels during an economic recession?

Mandates and markets. In the biggest markets in Europe, the US, Brazil, China and India, government mandates are requiring large oil and gas refiners to blend in biofuels to their existing infrastructure. In 2008, the US government enforced mandates for ethanol.

The corn ethanol industry is fast approaching the blend wall at 10% of total petrol consumption or nearly 13 billion gallons. Petrol is the dominant fuel in the US, representing approximately 140 million gallons of consumption per year. Most oil and gas companies facing blending mandates, and auto manufacturers and transport companies considering fleet-wide upgrades to E15 or E85 wish to find fungible fuels that are compatible with existing engines, pipelines, storage systems and petrol stations.

The aviation industry faces similar challenges. In 2012,

US airline carriers flying into Europe will have to endure imminent carbon penalties, and cannot use traditional ethanol and biodiesel fuels in their engines or at high altitudes. Advanced drop-in fuels provide answers to systemic problems and challenges in regulations, infrastructure and sustainability criteria. It is a tall order to fill, and most algae producers have barely scratched the surface in this regard to date with the exception of a few.

Experience matters

To meet the specs for advanced drop-in fuels, every molecule counts. Molecular biology pioneers are leading the charge in developing platforms from algae, cyanobacteria, and microbes to turn carbohydrates (biomass) into hydrocarbons (fuels). This is one of the reasons US-based Sapphire Energy has attracted more than \$100 million in investment on the concept of green petrol and aviation, and why US-based Solazyme has been successful in attracting more than \$100 million by deploying a diverse platform for producing drop-in aviation fuels, green diesel, green chemical and polymers, and biodiesel.

This trend also explains BP's \$10 million investment in experienced US-based algae producer Martek, and

Exxon-Mobil's unprecedented \$600 million collaborative R&D venture with US-based Synthetic Genomics to create drop in fuels and biochemical products from advanced molecular and biochemical engineering methods.

Diversification: key to success

In a world of fast-changing regulations, there is a lot at stake in the biofuels arena. At the start of 2010, uncertain and impending sustainability criteria in the

EU and US first generation biodiesel and ethanol markets are effectively limiting the growth of traditional biodiesel and ethanol markets.

The full impact of these regulations in the EU and the US continues to present a major risk for biofuels stakeholders, as seen in the 2010 CARB announcement and 2009 EPA-biodiesel impacts.

In the capital markets, investors have far more confidence in market demand as a measure of long-term opportunity in transport

fuels and petrochemical derivatives. For this reason, the early leaders in advanced algal and microbial fuels are diversifying and targeting existing petrol, diesel, and aviation markets, as well as related biofuels markets for green chemicals, polymers and power generation.

The diversification of biofuels companies beyond ethanol and biodiesel to include advanced biofuels represents a wise long-term strategy to inspire investor confidence. Over the next decade, the US, EU and

the big emerging markets of China, India, Brazil, and Africa will demand more energy. Governments and investors are keen to see more algae producers rise to the challenge, demonstrate proof of concept, and deliver on promises for advanced drop-in fuels. ●

For more information:

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