

THE LAW OF ALGAE
—Commercial Contracts for Algae Biofuels Projects—

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I. Overview. The preceding chapters have described steps for establishing an algae biofuels facility: deciding on the algae cultivation technology, gathering the capital, securing the land, and building the physical facility. The operation of the actual business enterprise will be based on: purchasing the raw materials for the algae biofuels facility, selling the finished products, and managing the commercial operations of the facility. Ideally, the planning and development of these contracts will influence all aspects of the project development process. The enterprise's ability to execute on these contracts will dictate the success of the business venture. The following decisions must be finalized and translated into commercial agreements:

- What raw materials (*e.g.*, nutrients, carbon dioxide, energy) will the facility require for the algae biofuels production process and to what scale?
- Will in-bound and out-bound logistics use truck, rail, barge, or ship movements or a combination of these modalities?
- What finished products will the algae facility produce and to what standards of quality?
- What price structure(s) will be used for the purchase of raw materials and the sale of finished goods?
- What risk management techniques will be used to mitigate the accompanying risks?

A variety of end products can be produced from algae for commercial sale including oil, biocrude, biodiesel, ethanol, biomass, animal feed, and nutritional supplements. Contracts for the sale of animal feed or nutritional supplements may be subject to specific feed laws or FDA requirements and should be reviewed carefully. This chapter generally focuses on the commercial contracts for the production and sale of biofuels using algae oil as the feedstock.

II. New Model for Historically Commodity-Driven Business. Typically the term “feedstock” means the predominant raw material used in biofuels production, *e.g.*, corn in ethanol and soy oil in biodiesel. The term “raw materials” means other necessary inputs to the process, including methanol and catalysts such as sodium hydroxide in biodiesel production. In the case of algae biodiesel, the feedstock is the algae oil and the raw materials are the nutrients and components required to grow the algae and extract the oil, and the inputs for the conversion of the algae oil to biodiesel. Unlike the traditional feedstock model, an algae biofuels facility that produces its own algae oil largely independent of the traditional commodities feedstock market. A producer of algae biofuels will have a good idea of the cost to produce algae oil. Generally these costs will be fixed, subject to variables in raw materials costs.

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A. The Fuels Industry: Biofuels vs Petroleum Based Pricing. The biofuels industry has rapidly evolved in structure and scale over the last twenty years and particularly over the last five years the evolution of “Big Oil” that defines the current transportation fuel market. Since its development in the early 1900s, oil has powered the tremendous expansion in human capabilities, but consumption has begun to overtake availability. The world's dependence on oil is due to the fuel's abundance, vast distribution network, and diverse uses. In energy-hungry countries like the United States, citizens have access to a ready supply of high-quality oil-based products, and this convenience conceals the processes of extraction, refinement, and delivery that have to comply with stringent quality, safety, and environmental specifications.

Biofuels enter the petroleum distribution river at several insertion points. Bulk ethanol, with its larger-volume scale, properties as an oxygenate, and specialized handling requirements, is typically blended at the terminal level, whereas biodiesel, that meets ASTM standards, is usually introduced at the bulk plant level. Terminals are large-volume wholesale distribution facilities and can be co-located with refineries where crude oil is processed and piped to storage tanks. Other terminals receive deliveries of only finished products.

Biodiesel, which currently enjoys approximately 10 percent of ethanol's market penetration, has reached terminal scale (or been mandated) in only a few states. Biodiesel's relative ease of handling, its varying blend levels, and the potential margin opportunities for petroleum distributors have supported its introduction at bulk plant facilities. These bulk plants are typically controlled by independent petroleum distributors that store modest quantities of diesel, fuel, lube oils, and specialty products to distribute to their customers.

The wholesale market in refined petroleum products is characterized by diversity in market participants, pricing transparency, and market-based pricing. Vertically integrated major petroleum companies maintain separate earnings and profits, refinery, wholesale, and retail departments with complex internal pricing structures. Independent petroleum distributors typically "buy off the rack," where pricing fluctuates at least daily if not hourly. Though there are grumbles when pricing moves up, typically the entire rack complex in a market follows suit and petroleum distributors are no worse off than their competitors-unless they filled their bulk plant at the wrong time or bought substantial quantities forward. Because of the high risk in forward speculation, bulk contracts to encourage rack loyalty are based on "discounts to rack" or a certain price reduction from the posted market price. Thus, when independent petroleum distributors buy biodiesel, they want to see this same pricing structure.

In the case of biofuels, market-based pricing poses several challenges. The primary one is that the independent petroleum marketers are not looking for biofuels market-based pricing; they want petroleum fuel-based pricing. This presents a fundamental inconsistency because the cost of biofuels is not determined by petroleum costs. Even if buyers will consider biofuels market-based pricing, the biofuels market is typically unsatisfactory from their perspective due to its relative immaturity, limited number of suppliers, and lower quantities of product. Biofuels sellers typically lack the ease of delivery, volume, pricing transparency, and fungibility present in petroleum markets.

In mandated markets, the integration of biofuels has become a cost of doing business. In economic markets, biofuels provide profit opportunities for the market participants most able and willing to make money from them. Depending on their motivation, petroleum market participants will buy biodiesel at a fixed price, on a petroleum index, on a cost-plus basis, or on a biodiesel index. They will buy spot or fixed, short- or long-term. However they buy the fuel, they likely will demand that it be delivered on schedule at the agreed-on pricing and quality level.

B. The Bank's Perspective. The final factor that comes into play in the algae biofuels market is the impact of financing. Projects that are self-financed can make unilateral decisions about pricing structures and business opportunities; determine their appetite for risk; and act accordingly. Companies that rely on loans and equity investors cannot be so flexible. The project lenders or investors require oversight of the project and risk mitigation.

Integrated algae biofuels facilities do not have the same issues as traditional biofuels plants that must acquire agricultural feedstocks. The cost of the algae oil is not directly tied to the commodities market. The predictability of the cost to produce algae oil can be a great advantage for an algae biofuels plant if the algae oil

production cost is competitive. Currently, algae companies have claimed they can or will in the near future produce algae oil biodiesel for approximately \$3 to \$6 per gallon, although a June 2009 study by Algae 2020 indicated the cost ranged between \$9 to \$40 per gallon, depending on the technology used. New technologies hopefully will help to drive down the costs to commercially competitive prices.

III. Conclusion: Plan and Execute. Commercial agreements are critically important to the success of an algae biofuels facility. For algae biofuels plants financed by outside investors and selling to the petroleum market, these contracts must recognize and somehow reconcile the conflicting perspectives and priorities of different industries. The company's background, business plan, and competitive advantages should inform the company's approach to this challenge. The chosen strategy must then be integrated into the company's pricing structures, financing requirements, and risk management program to be properly executed. In the rapidly changing environment of algae biofuels, it is the rare company that flawlessly threads this needle.