



## POWER AND PITFALLS: PATENT GUIDELINES IN THE BIOFUELS MARKET

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Biofuels are gathering steam. The technologies that make them as well as the regulations and economic factors that encourage them, have also gained momentum. The Canadian biofuel industry has developed in the past decade but still has a ways to go before bio-derived alcohol, hydrogen or biodiesel blends are commonly found at the pumps.

It is widely agreed that efficient, competitive and sustainable technologies are pivotal for the continued development and staying ability of the biofuel economy.

Accordingly, patents are of crucial significance in this field where R&D is in full bloom.

### Patents in the modern economy

Nowadays, intellectual property (IP) is a cornerstone to any business in an emerging technology field. A patent, which is one type of IP, confers an exclusive monopoly right for an invention in a given territory and thus enables the patent owner to exclude others from making, using, selling and constructing the invention for a maximum of twenty years from the patent application filing date. To be patentable, however, the invention must satisfy three basic criteria: novelty, non-obviousness and utility.<sup>1</sup>

A patentable invention is more than just a desired result, but must include the technical elements of *how* the result is achieved. In exchange for the patent rights, the inventor has to disclose the elements and characteristics of the invention that enable it to function, so that after the expiry of the patent the general public can freely use and benefit from the technology.

### Patentable types of biofuel technologies

Biofuel technology is extremely rich in terms of the many different types of inventions that may be protected by a patent. From feedstock to combusted fuel, biofuel production cycles have many steps and bottlenecks where improvements are sorely needed.

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<sup>1</sup> In Canada, the *Patent Act* and *Patent Rules* prescribe patent criteria, procedures and formalities.

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Primary materials such as plant varieties that have a faster growing cycle, higher sugar, starch or triglyceride content, or better pest resistance, could enable higher yields per acre. For instance, several soybean-related patents have been obtained in the U.S. for new cultivars and varieties that can be used as a more appealing biodiesel feedstock.

Superior processing techniques could also help tip the profitability scales of biofuel production. Processes can be improved at many different stages: pre-treatment of feedstocks, reaction steps such as microbe-assisted fermentation or transesterification and separation methods to isolate the biofuel from unwanted by-products. Such improvements could come in the form of effective cellulose-converting enzymes, up-scalable methods for producing ethanol or oils from algae or membrane-aided separation.

Novel fuel compositions that result in better mileage or fewer emissions are also in demand along with economical analytical techniques and devices for ensuring quality control.

As most biofuels combust differently than gasoline and diesel, new combustion engines and related apparatuses could also help high bio-content blends burn safely and efficiently.

### **Strategies for biofuel companies**

Given that intellectual property is a cornerstone to technology-based businesses, how should biofuel companies use patents? Though strategies should ultimately be determined on a case-by-case basis, there are some general guidelines and notions to help companies protect their business operations and garner a competitive advantage in the market.

### **Patent landscape awareness**

On the one hand, companies involved in producing, blending, distributing or researching biofuel should be aware of what is patent protected in their field and where development is available. It is often useful to see whether patent applications are being filed at a prolific rate, in what countries they are being filed and who is seeking protection. Biodiesel technology, for instance, has seen a sharp spike in patent application filings in Canada over the past decade.<sup>2</sup>

On the other hand, companies not traditionally engaged in the biofuel industry should evaluate whether they own any patented technology that is being used in this field. Patents covering technologies—transgenic microbes, catalyst structures, separation techniques, chemical additives or analytical methods, for example—that were developed for other applications may be profitably exploited through licensing in the biofuel industry.

Canada's relatively late emergence into the realm of biofuels—Germany and the United States, for instance, have more mature industry infrastructures—while implying certain disadvantages is not without its benefits. One up-side is that many technological developments have been made and patented abroad while protection was not sought in

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<sup>2</sup> Lawson, Jeremy et al. « The Biodiesel Patent Landscape in Canada », Biofuel Canada Magazine, Vol. 1, October/November 2007.

Canada. Patents are published documents that are enforceable on a country-by-country basis. By conducting patent landscape studies in the United States and Germany, Canadian players can obtain information about biofuel technology without the R&D investment. It is nevertheless important to make sure that corresponding patents do not exist in Canada before exploiting such technologies. If, however, there is no Canadian counterpart patent, then producers may be free to use those inventions in Canada or at least build off them to conjure up improvements.

### **Patents as competitive assets**

Patents not only have the ability to protect core technologies from copy-cats, they also can be bought, sold and licensed like tangible property.

In burgeoning markets, competition can come from many fronts and a one-dimensional R&D approach may not be the most secure way of protecting technology or operations. Given the many steps from plant or animal to the pump, protecting one's research and operations at many levels can provide a more solid IP position. Iogen Corporation of Ottawa, Ontario, has done this by filing for patents for enhanced expression of proteins in genetically modified (GM) fungi, GM microbes for better production of certain enzymes, upstream pre-treatment processes for feedstocks and downstream methods of processing lignocellulosic feedstock to produce ethanol.

To be sure, companies holding core technologies in the production of biofuels can solidify their position by reinforcing their core patents by patenting complementary technologies. Building a strong patent portfolio can be accomplished by internal R&D but also by acquiring patents from other entities such as Universities and firms wishing to divest themselves of a given business unit.

Companies with patented technology in neighbouring industries may also want a piece of the pie. PerkinElmer, a leader in analytical tools and a prolific patent filer, claims to have plans to move into the biofuel business, which has experienced quality control issues at times.<sup>3</sup> Agricultural giants like Cargill and Archer Daniels Midland have also taken notice and are developing their IP portfolios accordingly. And, of course, traditional players in the petroleum industry will need to evolve by moving toward renewable fuels and patent penetration is a potential tactic for IP-savvy firms. Such companies may expand into the biofuel field with beachhead patents based on adjacent, practical technologies.

Whatever the business posturing in the biofuel business, if cellulosic ethanol production can be perfected or algae can be harnessed to its potential, the patents on such technology may as well be alchemic as far as turning R&D into profits.

### **Canadian biofuel - conclusions**

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<sup>3</sup> Ebert, Jessica « A 60 Year Service » Chemistry World, September 2007, Vol. 4 No. 5, p. 64-67.

Canadian companies should be aware of the power and pitfalls of patenting. Biofuel R&D is in full bloom and significant patent activity is being observed in Canada as well as in foreign jurisdictions such as Europe and the United States.

In Canada, R&D and patenting efforts should be especially geared to native biomass to solidify Canadian ownership and expertise with regard to Canadian resources.

Wider-reaching, core technologies developed in Canada should be patented in jurisdictions where the biofuel will be produced or sold, rather than limiting protection to North America.

Collaboration with foreign owners of key, complementary technologies could also accelerate Canadian proficiency and establish future international relationships.

Patents are a key component to the modern-day economic machinery, especially in technology-keen industries. Companies in the biofuel industry should assess their intellectual property strategy as the science and economics of biofuels continue to motor along.

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