

Managing Technology Convergence and Protecting Innovation: Intellectual Property for Cleantech Ventures – Biomass and Beyond

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While intellectual property is always an important component to the success of any technology-based company, it is arguably especially important for “cleantech” ventures directed to energy and/or environmentally-related technologies. Cleantech is a broad field with several narrow subsectors - the technologies embraced run the gamut from older technologies already in the public domain and now being recycled, to cutting-edge research coming out of academic and industry labs. Some of the innovations involve fundamental technology breakthroughs that may warrant broad protection. In other cases, however, an incremental and seemingly narrow improvement in an already crowded area of development may provide an important enabling solution having significant commercial value.

Cleantech Common Themes

Keen observers of the biomass/cleantech space note various attributes that appear to be common themes for many cleantech ventures. First, cleantech typically requires a significant interdisciplinary knowledge of scientific and engineering principles, including chemistry, materials science, mechanical and electrical engineering, biology and biotech, environmental sciences, and/or IT and CS. Second, cleantech endeavors often require a longer time frame to get to market, in some instances greater than 10 years, requiring persistence, patience, and long-range business strategies. Third, there may be limited possible routes to market, such as an existing hierarchy which controls some infrastructure, forcing cleantech companies to sensitively consider how their innovations “plug in to” the bigger picture. In addition, cleantech is often capital intensive, involving a bigger financial scope and scale than other tech sectors, and can be significantly affected by government regulations and public perception.

Considering technologies related to the conversion of biomass into transportation fuels as a specific example is illustrative of how these themes can play out. Innovation required to bring such technologies to commercial fruition can span and integrate a wide range of technology specialties. Examples include horticulture, plant biology, forestry, genetics, microbiology, fermentation, gasification/pyrolysis, catalysis, chemical purification, pipelining/transportation, combustion/engine design. Many of the solutions being proposed, such as cellulosic ethanol, algal biodiesel and thermochemical conversion of biomass to hydrogen or liquid transportation fuels, have yet to be proven to be practical or economical at scale and are likely to require large capital outlays over long time frames to reach an endpoint of substantial market penetration and revenue generation. Moreover, each proposed biomass-based transportation fuel solution ultimately has to deal with the formidable hurdle of integrating itself into the existing gasoline/fossil diesel distribution/vehicle requirements infrastructure or of inventing – or compelling others to invent – a new transportation infrastructure.

IP Tools for Cleantech

Patents. Many factors may affect the procurement, effectiveness and usefulness of patent protection in the cleantech space, including the role of patents in a given cleantech business strategy. Are patent filings useful to the business primarily to instill investor confidence or to bar market entry in one or more jurisdictions? Is marketplace exclusivity and a strong defensive position important? Is the IP expected to provide leverage for licensing and partnering opportunities? These and other answers help structure a successful patent protection strategy.

Agreements. For many cleantech



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endeavors, there is an expanded role for technology partnerships, consultants, and advisors in a variety of fields, and thus a greater attentiveness to the protection of proprietary information through carefully crafted agreements often is warranted. Similarly, trade secrets may provide additional or alternative protection for some innovative solutions involving improvements to and/or combinations of existing technologies or relating to aspects of commercial implementation that provide commercial advantage but for which copying by competitors may be difficult to determine.

Trademarks. These also have an important role to play as energy policy tends to be an emotionally charged issue, and the impact of branding on public perception can significantly affect market value.

Developing a Strong IP Strategy

For cleantech companies, it is important to note that investors consider strong IP to be important both for first-to-market companies (to exclude entry of competitors) as well as those that follow (to protect a key value-added proposition for later market entry or licensing/acquisition leverage).

Those involved in developing a cleantech IP strategy need understand all of the technology dimensions involved. For example, appreciable protection may be available not only for the resulting combination of technologies that leads to a particular innovative solution, but additionally for one or more of the respective technology pieces, and/or how the respective technology pieces fit together. As noted above, technology convergence also warrants an increased sensitivity to issues such as ownership and protection of proprietary information in agreements.

In academic and corporate research settings, different areas of research that historically may have had no apparent connection to each other, or to energy and the environment, may suddenly find themselves significantly relevant in combination. Just one example is the synergy between diverse areas such as microbe biology and high-efficiency low-power electronics for certain fuel cell-based biomass to electrical power

generation applications.

Where/how innovations will be adopted or “plugged in” to an existing infrastructure is another area for consideration. IP directed to integration with an existing production/delivery/ distribution infrastructure (IP on “the plug”) may in some cases transcend protection of the core technologies associated with a given cleantech innovation and be of key importance. For example in the biomass space, IP directed to improving the logistics and economics of biomass harvest and delivery to conversion facilities or IP directed to facilitating the integration of biomass-derived fuel or energy into existing distribution or end user infrastructure may ultimately be of greater value than IP covering specific biomass conversion technologies.

Incremental or narrow innovations can be commercially very valuable in the cleantech space, and IP protection should not be ruled out if a broad scope of protection appears to be unavailable. When it comes to energy-related challenges, innovators often need to simultaneously consider supply/demand issues, environmental impact, and national security interests, and provide solutions that positively impact price, reliability and scalability. Even in crowded areas of development, incremental innovations, however seemingly trivial, that achieve any one or more of these things and provide a lynch-pin type of enabling solution are likely to be extremely valuable.

Similarly, patent protection should not be discounted or dismissed for cleantech ventures with a long time frame to market and/or a long technology lifespan. Strategic patent application filing approaches may be available in some jurisdictions to potentially increase patent enforcement life, for example, until the effort reaches a certain state of “maturity” or potential commercial viability. Another possibility for extending the overall life of a cleantech patent portfolio is to file one or more initial applications relating to core aspects of the technology, and then stagger over time subsequent patent filings to incremental improvements/changes.

Given the global applicability of

cleantech innovation, strategic international IP protection may be of significant importance. Protecting innovation globally typically takes into consideration those jurisdictions in which significant market opportunities are present or anticipated, as well as jurisdictions in which potential competitive activity may be likely. For biomass ventures, an additional sensitivity to international regulations, government subsidy and taxation policy, prevailing and projected economics of existing fossil fuel based alternatives, access to and price of required biomass raw materials, prevailing energy/fuel distribution and end user infrastructure, and jurisdiction-specific enforcement issues relating to energy and the environment is warranted.

As noted above, the impact of branding on public perception can significantly affect market value, and cleantech endeavors may face particular challenges given the limited branding vernacular available (“green,” “clean,” “eco,” “earth,” “bio” etc.) In the long run, it may be more beneficial to consider alternatives to the more obvious green-branding choices while at the same time being mindful of the heightened sensitivity of public perception to energy and environmental issues.

Conclusion

While there is no one-size-fits-all approach when it comes to biomass/cleantech IP, there are nonetheless some general attributes of many cleantech efforts that should be considered when assessing possible IP strategies. We have identified what we believe to be the most salient of these attributes and explored how they should inform an approach to IP protection.

To summarize some of our key recommendations:

- Appreciate the importance of understanding all technology dimensions involved; technology convergence creates potential for enhanced IP protection.
- In academic and corporate research settings, technology convergence contributing to many cleantech solutions may provide rich possibilities for invention mining and creative bundling for commercial

exploitation.

- IP directed to integration with existing production/delivery/distribution infrastructure (IP on “the plug”) can in some cases transcend core technologies and be of key importance.
- Legacy technology does not mean unprotectable technology.
- Incremental/narrow innovations can be commercially very valuable; don’t rule out protection if broad scope appears to be unavailable.

- For biomass and other cleantech ventures characterized by a long time to market and long technology lifespan, increase patent enforcement life via strategic filing approaches.
- International IP protection considerations for cleantech should include sensitivity to the dynamics of local economic conditions and international policies (e.g., regulations, incentives) as well as jurisdiction-specific enforcement issues.
- Consider elevated importance of

public perception on branding, but beware of “green gridlock” when considering trademark protection.

While some of the identified cleantech attributes may have a greater significance than others for a given venture, being mindful of the variety of issues germane to many energy and/or environmentally-related ventures will invariably be helpful toward building a sensible model for protecting cleantech innovations.