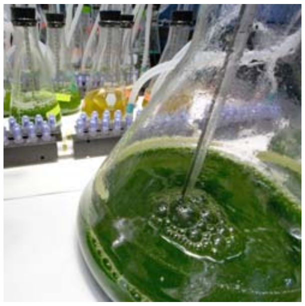
Profits and professors
by Alexis Madrigal - 4.4.08


Solix Biofuels uses a Colorado State lab to test its algae-based formulas.

Fifteen years ago, Bryan Wilson was a young Colorado State professor looking for some space for his new lab. There wasn't anywhere for him on campus, so he headed out into the community surrounding the university to find a good spot for his work. He came across the long-abandoned Old Fort Collins Power Plant, first built in 1936. He did what any aspiring scientist would do upon encountering an 30,000-square-foot industrial space with no bathrooms: He asked the city if he could have it—and they said yes.

"But the university wasn't eager to take on this huge white elephant; they said, 'You can do this, but you have to make it a freestanding enterprise,'" Wilson says, and so the Engines and Energy Conversion Laboratory (EECL) was born.

Today, EECL has come to serve as a technology incubator, providing know-how, testing infrastructure, and workspace to fledgling companies. Already three startups have spun out of its doors, and Colorado State is now launching an ambitious new program headed by Wilson: the 100-faculty-strong Clean Energy Supercluster. The program, following two others in the health sciences, could supplant older models of technology transfer, and speed much-demanded scientific advances into the market.

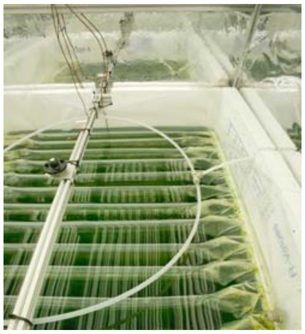
Though it generates $2 million a year in contract research revenue, EECL also receives funding from Colorado State University. The arrangement also set the table for an unusual public-private partnership that could be a model for how to commercialize clean technology developed in American universities.

Perhaps the most recycled "green" material is the phrase "breakthrough technology." Almost everyone involved with cleantech seems to believe a sustainable future will only be achieved through developing new ways of serving markets with new products. Many point to the network of American universities as just the infrastructure necessary to research such a future, but moving innovations out of the lab and into the marketplace presents enormous challenges.

In 1980, Congress passed the Bayh-Dole Act, which aimed to help federal research hit the commercial market, in part through improved technology transfer activities at universities. By creating a uniform policy that allowed small businesses and nonprofit organizations (such as universities) to own the intellectual property rights of inventions driven by federal funding, the legislation offered universities the opportunity to more easily monetize the outcome of research. While the legislation did help strengthen technology transfer departments at universities, few programs show a high rate of return on their invested research funds.

It's not just that it's hard to find scientific research that can scale with significant economic and environmental impacts; many scientists don't even use such business-driven categories to think about their work.

"Eighty-five percent of the graduating PhDs in the country in science and engineering go into industry, but they are being taught by the remaining 15 percent," says Andy Hagardon, a University of California at Davis (UC Davis) professor who runs the university's Green Technology Entrepreneurship Academy.



Hagardon says students don't know how to answer the question, "What happens to an idea after it's lost its publishability but long before it gets to the market?" The key transition from post-publication to commercial markets is supposed to be managed by the technology transfer departments that exist at most universities.

In the classic model, scientists

Growing bags produce algae for Solix Biofuels' EECL-based research on commercial-scale fuel production.

disclose to the university work they think is marketable, at which point tech transfer professionals take over to assess the research's market potential. In general, they're looking for two things. "We want to know, No. 1, is it useful; and what's the size of the market?" says Patrick Shelby, a technology manager at the University of Washington. "The other aspect of it is patentability where you're really talking about three things: Is it novel, is it unique, and is it non-obvious?"

If the research fits the criteria, patent protections are filed immediately and, as Wilson somewhat derisively puts it, "You wave the patent around, someone bids on it, and they go out and make a zillion dollars, and the university gets rich, too." The money from licensing the patent is usually split about equally between the inventor, the inventor's department and the university in general.

The model does generate revenue for universities, but its success has been limited nearly exclusively to the life sciences. The University of California's roughly $3billion in public funding yielded $110million from licensing its patents to industry in fiscal year 2006. Almost all of the top 25revenue generating patents came from the life sciences, including the top five, which generated nearly 46 percent of total revenue.

Physical-science patents, like those most useful in cleantech, have experienced little success getting out of universities and into the hands of entrepreneurs. That's one major reason many technology transfer offices are trying to move beyond the traditional model.

In particular, technology managers are trying to get involved earlier in the research process to help scientists design their experiments for the greatest public impact, either via standard licensing or new routes, like using an open-source model. "From the beginning, how can we help them think about it what takes to get something out?" says Chuck Williams of the University of Oregon's Technology Transfer Department.

Even more fundamental changes to commercializing research could be called for— especially around greentech, a field in which many say there is a critical time window for reducing the environmental impacts of the world's industries.

Not all professors are looking for patentable innovations; that's not what drives the tenure system at most schools. Certain places, Stanford and MIT among them, have long had an entrepreneurial culture, but that's not generally the case. Lab scientists also might not be aware of new applications for their research, or know what markets exist for the products that come out of their science.

That's where Hagardon and Wilson's programs come in. In different ways, both are trying to teach scientists how to extend their reach into the business realm so they can shape what happens to their research and how it's commercialized. The UC Davis Green Technology Entrepreneurship Academy gives would-be entrepreneurs a one-week crash course in how to develop and pitch their science as a product to venture capitalists. It draws scientists from all over the country, particularly those from so-called "fly-over states," where researchers are much less likely to be familiar with the VC world.

Hagardon says teaching scientists business skills was particularly important in the energy realm, where new technologies face an uphill battle against entrenched power companies. "Solutions in the sustainable space are almost by definition attempting to knock off established systems," says Hagardon. "Ethanol is a great example. It was sort of hijacked by investors, when the science itself and a lot of scientists said that, much like hydrogen, this was not a good energy equation. Part of our mantra is: Make sure that the scientists themselves have a strong voice in the process."

To keep that voice, though, scientists have to remain part of the process from the science through product development and all the way to the creation of the business.

Hagardon says many scientists have valuable experience doing exactly the things they need to run their own companies. "You'd be amazed at how many things are similar," he notes. Scientists who lead research labs, in particular, have work lives similar to what Hagardon calls "the worst time in the entrepreneurial cycle." Lead scientists are constantly on the look-out for ways to market their research—to bring in money, get research published and produce results that will continue to bring in funding.

But not all researchers are interested in becoming, as Wilson puts it, scientist-CEOs. Some are content to do lab science, without having to delve into company financials and profit models. For that reason, they aren't likely to see their science as patentable. That's one area where

Wilson's supercluster concept could be transformative.

Wilson's team plans to go out into research labs, evaluating the commercial prospects of not just discoveries that researchers have filed, but also other works scientists in the cluster have been conducting. While the scientists won't necessarily have to get involved, the supercluster team wants to help scientists see the path to market for their science, enabling them to design their experiments with applications in mind. Toward that end, Wilson's group will hand out about 10seed grants worth $30,000 a piece, with a focus on interdisciplinary work.

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