

Box 1 Defining cleantech

Everyone seems to have their own definition of a cleantech firm—much like they did for biotech early on. But Ernst & Young defines it as “a diverse range of innovative products and services that optimize the use of natural resources or reduce the negative environmental impact of their use while creating value by lowering costs, improving efficiency, or providing superior performance.” It also breaks it down into these subsections: alternative fuels (biofuels, natural gas); energy/electricity generation (gasification, tidal/wave, hydrogen, geothermal, solar, wind, hydro); energy storage (batteries, fuel cells, flywheels); energy efficiency (energy efficiency products, power and efficiency management services, industrial products); water (treatment processes, conservation and monitoring); environment (air, recycling, waste) and industry focused products and services (agriculture, construction, transportation, materials, consumer products).

are on pace to shatter the record highs in VC investment set last year.

Tracy Lefteroff, global managing partner of the VC practice at Price waterhouse woopers reads the numbers slightly differently. It's not that VCs were formerly enamored with grain ethanol or biodiesel and have changed their tune; it's more that they were looking for other ways to produce fuel and have found it in cellulosic ethanol, algae and biomass. “I don't think that VCs ever thought that grain-developed biofuels was the ultimate answer here,” he says.

The overlap in the science behind cleantech firms and the biotech industry (with biofuels sometimes straddling that line) means that VC funds formerly investing exclusively in biotech are now branching into the energy segment. Oxford Bioscience Partners, in Boston, has invested in only biotech since 1986, but the company realized its insight into biotech was useful elsewhere. “We decided that what we knew best was biology and chemistry,” says Mike Pavia, an entrepreneur-in-residence at Oxford. “And we

thought, ‘Are there any [other] areas where we can use our expertise?’”

Oxford's next fund is expected to focus up to 20% on cleantech and biofuels. The company's first move into the biofuels space was last year with an investment into Golden, Colorado-based Luca Technologies, a company manipulating microorganisms to metabolize hydrocarbon molecules in coal and oil in the absence of oxygen to produce methane. With these little methane factories—which they call ‘geobioreactors’—Luca hopes to produce energy from what is otherwise a nonusable hydrocarbon source.

Pavia has held positions in several drug development firms, most recently at Millennium, in Cambridge, Massachusetts, where he was chief technology officer when the hype around genomics and biotech was at its peak. He finds striking parallels with the present craze for cleantech ventures. In some ways, he says, cleantech now “feels like biotech did in the early 80s.”

Brady Huggett *New York*

IN brief

Europe imports GM soy

The European Commission has authorized imports of Bayer CropScience's genetically modified (GM) soybean, an approval that will help ease a shortage of animal feed (*Nat. Biotechnol.* **25**, 1065–1066, 2007) and bolster commercial ties with major GM crop-growing countries such as the US, Canada and Argentina. The A2704-12 soybean produced by the Mannheim, Germany-based company, engineered to resist Liberty, a glufosinate herbicide, is the first soybean approval in ten years. The decision announced in September is only a partial victory for the biotech industry, as it does not mark a change of heart about GM crops on the part of the European government but rather is a default approval. EU law allows for ‘rubber stamp’ approvals when countries cannot agree on an application; this one for A2704-12 follows inconclusive talks among EU farm ministers in May. “We are delighted whenever the EU system approves one of our member's products,” says Willy deGreef, secretary general of EuropaBio. “It is clear that, with a shortfall of 30 to 40 million tonnes a year, the EU needs to import very large amounts of soybean. However, why do we need this incentive from the agricultural sector when these soybeans, and other GM products in the pipeline, have already had a positive opinion from European food safety authorities?” Europe's feed and livestock manufacturing industries are keen to see more GM soy imports approved as they rely on soy products as a high-quality protein source. In September, EU ministers clashed over authorizing imports of Monsanto's second-generation GM product MON 89799 resistant to Roundup Ready herbicides for use in feed. —Susan Aldridge

East Africa pushes GM law

Kenya and Uganda are close to passing legislation to regulate biotech use. Research into genetically modified (GM) crops is already underway in both countries, but commercialization requires this law. William Ruto, Kenya's Minister for Agriculture, at the First All-Africa Congress on Biotechnology Congress in Nairobi, confirmed that Kenya was close to enacting it. The legislation would address biosafety concerns and encourage other East African nations to quickly come on board. Adopting an enabling policy would mark a significant shift in a continent long paralyzed by anti-GM activities. Only South Africa and Burkina Faso have commercial plantings of GM crops; fewer than a dozen nations have reported field trials of GM crops whereas 20 are engaged in research and development of GM crops. Some 27 African countries have ratified the Cartagena Protocol on Biosafety, part of a United Nations convention, which lays down the rules under which GM crops and other organisms can be transferred from one country to another. But only 24 have the capacity and institutions to conduct research and development into agricultural biotech. The director of the Kenya Agricultural Research Institute, Ephraim Mukisira, says, “a GM law will help create a vibrant biotech sector and consolidate Kenya as a regional powerhouse in science and technology. Clarity for investors and researchers will speed up existing research and products in the pipeline.” —Daniel Kamanga

Table 1 Breakdown of cleantech VC investment by sector

Cleantech category	2005 (\$ million)	2006 (\$ million)	2007 (\$ million)	2008 (3Q) (\$ million)
Solar	312.9	673	1,760	2,696.7
C-Si photovoltaics	50	370.2	629.5	350.1
Concentrated photovoltaics	12.4	45	128.1	71.1
Concentrated solar thermal	—	3	96.1	644.7
Solar service providers	89.6	62.6	401.9	312.4
Thin films	160.9	192.3	504.4	1,318.4
Biofuels	151	991.5	675.4	711.7
Algae biodiesel	13.4	6.8	34.4	179.3
Biodiesel	71.5	297.6	272.6	123.5
Biogas	4.1	3	72.9	4.6
Biomass	13.6	83.6	55.6	94
Cellulosic ethanol	12.5	105.2	97.9	289.8
Grain ethanol	35.9	495.1	142.1	20.6
Geothermal	9.8	10.9	124	30.3
Hydro/marine	14.4	72.1	82.1	68.4
Other renewable energy	99.6	311.6	327.4	231.1
Wind	99.7	559.7	307.4	439.2
Total	687.4	2,618.8	3,276.4	4,177.5

Source: Cleantech Group