

Cleantech and Venture Capital

A Whirlwind Romance or Just Dating?

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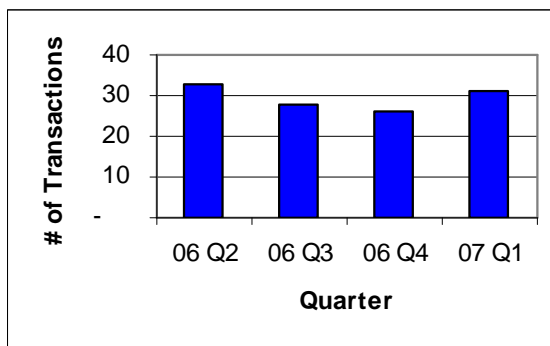
The Topline Strategy Group

The recent spate of news reports on the surge in Cleantech investing probably conjures images of the dotcom boom, with Cleantech entrepreneurs driving up and down Sand Hill Road and Route 128 pitching their plans to venture capitalists eager to finance the next big thing. While there is no question that Cleantech is hot and that venture capitalists are paying a lot of attention to the space, Topline Strategy's analysis shows that rather than rushing headlong into Cleantech, the mainstream venture capital community is taking an active but measured interest in the space.

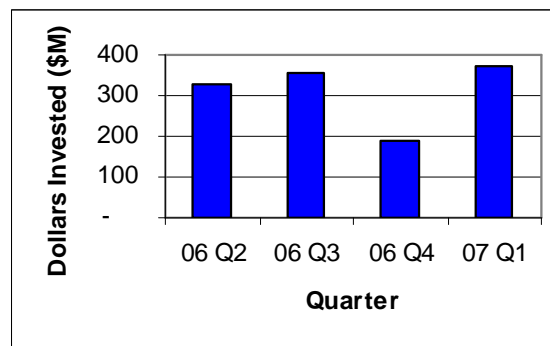
One of the first major issues about Cleantech investing is just figuring out exactly how much venture capital has been invested in the market. While the Cleantech Venture Network reported that \$2.9 billion was invested in North America in 2006, Ernst and Young reported a far lower figure for U.S. venture investment (which makes up most of the North American total) – just \$883 million. Topline Strategy's own analysis of the 12 month period from Q2 2006 to Q1 2007 (a slightly different period) places the number at \$1.3 billion. While that is a lot of money, from the venture capital perspective the sector is still in its infancy and has not reached the inflection point. Both the total dollars invested and number of venture transactions have remained relatively flat quarter over quarter, and as a whole the sector still represents just a fraction of all venture capital – 4.9% of all deployed capital and 3.7% of all transactions.

Venture Investing in Cleantech Has Remained Relatively Steady Quarter over Quarter since Q2 2006

Number of Venture Transactions by Quarter



Total Venture \$ Invested by Quarter



Furthermore, a deeper analysis of exactly who is investing in Cleantech reveals that, with a couple of notable exceptions, the mainstream venture community (defined as the firms that focus on the High Tech and Life Sciences sectors that make up 84% of all VC investment) has not been the primary investors in Cleantech. Of the 16 venture firms that have invested in 3 or more Cleantech companies during the Q2 2006 to Q1 2007 period, only 7 are among the Top 100 High Tech and Life Science venture capital firms¹. The primary investors tend to be niche companies who have been specializing in energy and Cleantech investing for quite a while.

¹ As measured by number of total investment rounds in High Tech and Life Science companies during the period. DFJ Element considered as a separate entity from Draper Fisher Jurvetson.

**Few of the Venture Firms Investing Heavily in Cleantech Are among the
Top 100 High Tech and Life Science VCs**

(Venture firms investing in 3 or more Cleantech companies - Q2 2006 to Q1 2007)

<i>Firm</i>	<i># of Cleantech Investments (# of Companies)</i>	<i>Rank in Top 100 of High Tech & Life Science VCs</i>
DFJ Element	8	-
Nth Power	7	-
Rockport Capital Partners	7	-
Draper Fisher Jurvetson	6	3
Khosla Ventures	6	T94
Chrysalix Energy	5	-
Braemar Energy Ventures	7	-
NGEN Partners	4	-
Technology Partners	4	-
VantagePoint Venture Partners	4	T84
Advanced Technology Ventures	3	T43
Advantage Capital Partners	3	T58
Atlas Venture, Ltd.	3	T20
Contango Capital Management	3	-
Kleiner Perkins Caufield & Byers	3	8
New Jersey Technology Council	3	-

Instead, it appears that the mainstream venture community is currently in “learning mode,” where only three of the Top 25 High Tech and Life Science VCs have made three or more investments. Eight more have made one or two investments in Cleantech companies, perhaps as a way to explore the market – a rational approach given the sector’s complexity. As this report will show, Cleantech is an incredibly broad umbrella that encompasses a wide range of markets and technologies with unique strategies and funding requirements. Ultimately, given the scope of the challenge of building a sustainable future, we fully expect that the mainstream venture community will become major players in the sector. However, it will take time for them to learn the market and build the capabilities they need to serve the needs of potential portfolio companies.

Eleven of the Top 25 High Tech and Life Science VCs Invested in at Least One Cleantech Company between April 2006 and March 2007

(Firms ranked by number of total venture rounds in High Tech and Life Science Companies)

<i>Rank</i>	<i>Investor</i>	<i>High Tech & Life Science Rounds</i>	<i>Cleantech Companies</i>
1	New Enterprise Associates	69	2
2	Intel Capital	63	-
T3	Draper Fisher Jurvetson	56	6
T3	U.S. Venture Partners	56	-
5	Polaris Venture Partners	50	-
6	Sequoia Capital	48	2
7	Venrock Associates	47	-
8	Kleiner Perkins Caufield & Byers	45	3
9	Canaan Partners	44	1
10	Menlo Ventures	40	-
11	ARCH Venture Partners	39	-
T12	Alta Partners	37	-
T12	Morgenthaler Ventures	37	2
14	Foundation Capital	36	2
T15	Accel Partners	35	-
T15	Oak Investment Partners	35	2
17	InterWest Partners	34	-
T18	Austin Ventures, L.P.	33	1
T18	Sutter Hill Ventures	33	-
T20	Atlas Venture, Ltd.	31	3
T20	ComVentures	31	-
T20	Greylock Partners	31	-
T20	Redpoint Ventures	31	1
T20	Sanderling Ventures	31	-
25	Versant Ventures	30	-

Factor 1: There is a Lot to Learn about Cleantech

Our favorite definition of Cleantech Venture Capital is the one offered by Eric Young of Canaan Partners, one of the few Sand Hill Road VCs with a long history in Cleantech, having invested in Transphase Systems in 1991, "In our view, Cleantech is any technology that enhances the use of natural resources. As venture capitalists, we look for new solutions, usually technology based, that are so compelling that customers are convinced to change how they do things today and take a chance on a small, unproven company. We see Cleantech venture capital where these two definitions meet."

The breadth of this definition is reflected in the breadth of companies receiving Cleantech investments. As the following breakdown shows, while Cleantech investing is currently dominated by Biofuels and Solar, it cuts across a wide swath of the economy covering water, real estate, and essentially every aspect of energy. Even within a given sector, Cleantech covers a lot of

ground. For example, just within Solar, investment categories span from solar cell production to cell packaging to solar farm operation to solar utilities to panel marketing and distribution.

If coming up to speed on the breadth of industries touched by Cleantech isn't enough, Cleantech poses two more knowledge challenges for investors – technology and geography. “In high tech and life sciences, investors typically have technology-based expertise. They know software or semiconductors or biotech and invest in those technologies across industries. It is the opposite in Cleantech where investors need industry-based expertise. They need to understand an industry like energy and how that industry approaches innovation, which can be confounding. They also need to understand that it takes a range of technologies to address the industry's pressing issues. That means investing in an advanced materials company one day, a software company the next, and an engineered products company the day after that,” says Tucker Twitmyer, Managing Partner at Pennsylvania-based EnerTech Capital, an energy-focused venture fund that has a substantial Cleantech portfolio.

One of the offshoots of the technical breadth of Cleantech is that it suggests that clustering, having a tight knit community of entrepreneurs and investors in a small geographic area, may be less available in this sector than it has been in other venture sectors. “The basis for clustering is that there is a critical, local mass of interchangeable technicians, engineers and entrepreneurs. In Cleantech, these skills differ widely from one opportunity to the next. It isn't obvious, except maybe for some small clusters around fuel cells or battery technology, that there will be transferability from one venture to the next. The CTO of a silicon-based solar company has almost nothing in common with his counterpart in a down-hole oil and gas company. The last time they probably took a class together was in high school,” says Twitmyer. As the chart below shows, our data suggests that Cleantech companies receiving funding were somewhat less geographically concentrated than high tech and life sciences companies. However, it is still too early to tell whether this represents a long term trend. If clustering turns out to be less important in Cleantech, the high tech and life science venture firms concentrated in clusters like Silicon Valley and Boston will need to further expand their geographic reach to compete in this new sector.

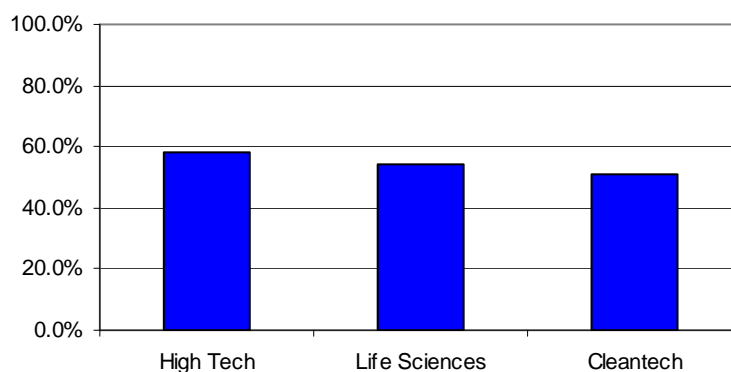
Cleantech Covers a Wide Variety of Technologies and Industries

(Venture capital invested by category – Q2 2006 to Q1 2007)

<i>Category</i>	<i># of Companies Receiving Investment</i>	<i>Amount of Capital Invested (\$)</i>
Biofuels	17	432,777,300
Solar	15	233,894,700
Energy Management	8	94,035,200
Energy Storage	8	77,673,200
Environmentally-friendly Chem/Mat.	7	38,955,400
Green Buildings	7	15,400,000
Fuel Cells	6	58,275,000
Water	5	37,950,200
Wind	3	49,600,000
Clean Coal	2	88,000,000
Pollution Control	2	19,150,000
Power Generation Equipment	2	13,799,000
Waste Management	2	12,179,800
Electric Cars	1	40,000,000
Finance	1	18,204,000
Food	1	10,999,900
Fuel Management	1	8,000,000
Geothermal	1	4,100,000
Conservation	1	Not Available
Not Available	3	3,908,000

Cleantech Demonstrating Somewhat Less Geographic Concentration than High Tech and Life Sciences

(Share of Companies Receiving Funding Located in the Top 3 Venture Markets – Silicon Valley, New England, and Southern California – April 2006 to March 2007)



Factor 2: Cleantech has Unique Funding Requirements

In addition to building the knowledge base to successfully invest in Cleantech, venture firms will also need to adapt to the unique financing aspects of Cleantech. Unlike technology companies, where doubling capacity may mean simply adding a few low-cost servers, or life sciences companies, which require a lot of capital but primarily for R&D, many Cleantech companies require very large investments in fixed assets such as plants and equipment. For example, Great Point Energy, a company that is commercializing a process for converting coal into natural gas and building its own production facilities, raised \$45,000,000 in venture capital from April 2006 to March 2007. However, that is just a small down payment on the billion dollars or more required to build a full scale production facility. As a result, Cleantech presents an interesting juxtaposition between two separate financial industries – venture capital and project finance. This juxtaposition plays out in two different ways.

1. Access to Project Finance as a Core Competency for Venture Firms

In addition to needing venture capital to fund their core businesses, many Cleantech companies also need access to large amounts of project financing – capital, often hundreds of millions or billions of dollars, designated to finance a specific capital project. Unlike venture firms who specialize in high risk, high reward situations, project finance companies look for safe, proven investments that earn returns “in the high single digits or low double digits,” says Mark Culpepper, VP of Strategic Marketing at SunEdison. SunEdison is a full service Solar Energy Service Provider that works with national retailers, government agencies, and utilities. As the following example shows, having expertise in project finance and relationships with project finance providers will be an important core competency for venture firms in the Cleantech world. SunEdison took venture funding in Q2 of 2006 to support the growth of its core business, but the company also uses large amounts of project financing to fund the development of its solar plants. From a venture standpoint, what was interesting was their choice of a lead venture investor, Goldman Sachs. “PV systems have been in place for many years and can reliably produce electricity and financial returns. One of our major innovations was to recognize that solar power was an excellent candidate for project finance. Historically, project finance focused on big investments like industrial scale power plants. We saw that investors could earn predictable returns from smaller scale solar projects as well. Goldman, our lead venture investor, worked closely with us on arranging our initial project

financing. Their expertise and reputation in project finance helped convince project finance investors that PV technology and our model for solar energy services works," says Culpepper.

2. Financing the First Plant

The second aspect of the juxtaposition of project financing and venture occurs when it is time to finance the first plant or other major capital investment for a new technology. Unlike other capital intensive categories such as biotech, where there are clear gates such as completing phases of clinical trials to judge progress, the milestones to judge the success of a new Cleantech technology are far murkier. As a result, investors have far less certainty about the outcome of a Cleantech venture at the point when major amounts of capital need to be committed. In fact, it often isn't clear that a new technology will work until after a full scale production plant is built and the money is spent. Debt financing is typically not available for projects involving unproven technologies. That means that these ventures need to find a huge amount of equity.

But are traditional venture investors currently ready to make those kinds of investments? "Clean energy businesses that require building a plant are a real challenge for traditional venture investors," says David Miller, who recently received his PhD from MIT in Technology Management and Policy and invests in clean energy technology start ups. "There is a really narrow window between when they are proven enough in the lab to attract venture money and when they reach the point where they need so much money to build a plant that they no longer fit the traditional venture model." Over the coming months, it will be interesting to see how the venture firms adapt to the needs of the Cleantech market."

Average Amount Invested per Round is Comparable to the Capital Intensive Life Science Sector

(All venture investment rounds of \$500K or more – April 2006 to March 2007)

Sector	Average \$/Transaction	% of Average
Lifesci	12,289,836	136%
Cleantech	12,225,987	135%
Other	9,483,080	105%
High Tech	7,718,713	85%
Average - All Sectors	9,035,015	100%

Many Cleantech Companies Require Large Amounts of Equity

(Top 10 Cleantech companies – Total venture capital raised Apr 06 Mar 07)

Company	Amount Raised	Business
Cilion, Inc.	209,350,000	Ethanol
Imperium Renewables	113,000,000	Biodiesel
Nanosolar, Inc.	75,999,600	Thin Film Solar
UPC Wind Management	44,000,000	Wind Farm Operator
Tesla Motors, Inc.	40,000,000	Electric Cars
CoalTek, Inc.	38,000,000	Clean Coal
Mascoma Corporation	35,000,200	Cellulose Ethanol
Miasole, Inc.	35,000,100	Thin Film Solar
A123 Systems, Inc.	34,312,300	Hybrid Car Batteries
SolFocus, Inc.	32,000,000	Solar Concentrators

Factors 3 and Beyond

In addition to industry knowledge and unique financing requirements, there are still plenty of other important differences between Cleantech and other types of venture investments.

Unit Costs

Unlike most high tech and biotech products, many Cleantech products are relatively low margin capital goods whose cost structure is based on good old-fashioned economies of scale.

Eric Young of Canaan Partners, based on his experience as an investor in Capstone Turbine Corporation, commented, “One thing Capstone taught me was how important it is to ramp up unit sales to drive down unit cost. This added dimension makes strategic planning that much harder. At one point, we were looking at over 50 different markets to find ones that were compelling enough to drive adoption and big enough to drive down unit costs.”

Regulation

While regulation plays an important component in setting the ground rules in life sciences and telecom, it literally makes markets in Cleantech. Without subsidies, markets like solar power and ethanol would not exist. “The risk of relying on the government to make your business possible is just enormous,” says Rob Erlichman, President of Sunlight Electric, a solar integrator located in Northern California. “The legislative and regulatory processes are fundamentally unpredictable. Just look at the history of solar power. It boomed in the 1970s but nearly disappeared in the 1980s after President Reagan let the Carter era solar tax breaks expire.”

Conclusion

For investors, Cleantech presents a challenge – new industries, new technologies, new geographies, new financing models, new strategic dynamics, new regulatory concerns and more. While we are highly confident that Cleantech will become as important to the venture community as High Tech and Life Sciences, we expect to see a gradual increase in funding, not a bubble, as investors move up the learning curve.

Methodology

To produce this study, Topline Strategy analyzed over 3,200 U.S. venture transactions, representing \$25.1 billion in invested capital, completed during the 12 month period from April 2006 to March 2007. The transaction data was sourced from the National Venture Capital Association’s quarterly MoneyTree report. According to MoneyTree, the data set covers over 94% of all venture transactions and 93% of all capital deployed in the U.S. during that period.

To identify Cleantech transactions, Topline Strategy reviewed the profile of each company receiving funding and assigned it to a sector – High Tech, Life Sciences, Cleantech or Other. Each Cleantech company was then further classified by category (Solar, Biofuels, etc). Any such analysis requires making judgment calls. For example, we elected not to include Infinite Power Solutions, a company that produces thin film batteries for electronics applications, as a Cleantech company since the primary value proposition for its products appears to be enabling manufacturers to develop new battery powered applications in devices like credit cards, not conserving power. We did elect to include Cilion, an ethanol company that raised \$209 million dollars in Q3 of 2006. While the company is clearly a Cleantech venture, there was some question whether the funding represented venture capital, project finance or some hybrid of the

two. In all, we included seven companies that raised a total of \$262 million where there were some questions about whether to consider them venture capital or project finance transactions.

As stated above, our calculation of \$1.3 billion in U.S. Cleantech venture capital fell between the two figures of \$883 million reported by Ernst & Young and \$2.9 billion reported by the Cleantech Venture Network. Based on our analysis, the difference between our figures and those of Ernst & Young are likely the result of different reporting periods (12 months ending 3/31/07 vs. 12/31/06) and Topline's use of a somewhat broader definition of Cleantech than Ernst & Young and choice to include the companies that they may have deemed to be project finance. The Ernst & Young report is based on source data provided by Dow Jones, which tends to be very similar to the source data produced by MoneyTree. Despite significant research, we were unable to fully explain the gap between the Cleantech Venture Network figure of \$2.9 billion for North America and our figure of \$1.3 billion for the U.S. While the reporting period and North America vs. U.S. certainly explain some of the difference, our primary hypotheses are that their figures include 1) companies that we deemed to fall outside of Cleantech, 2) transactions that do not fall into the typical definition of venture capital, and 3) non-high tech and life science investors who do not report their transactions to MoneyTree. In any event, all of these hypotheses would tend to reinforce the conclusions of this paper since they point to the mainstream venture community financing an even smaller portion of Cleantech than we have calculated.

About The Topline Strategy Group

The Topline Strategy Group is a strategy consulting and business development firm dedicated to helping emerging high tech and Cleantech businesses accelerate growth. Topline consultants possess strategy expertise gained at top strategy consulting firms and operating experience acquired through launching and growing numerous successful technology companies. The Topline Strategy Group employs proven methodologies to help companies grow at each stage of their lifecycles—from launching successful new products and accelerating sales of current products, to building comprehensive corporate growth plans. Topline clients have identified and captured tens of millions of dollars in additional revenue and generated hundreds of millions of dollars in market capitalization.

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