

# The State of Cleantech Venture Capital 2011

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**The Money**

**The Investors**

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**Parting Thoughts**

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## Part 1: The Money

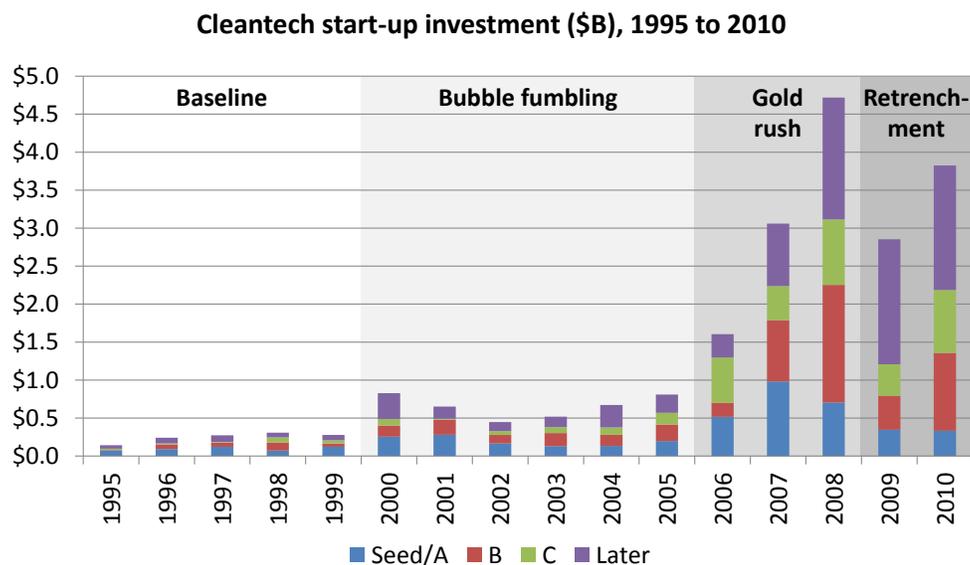
November 28, 2011

**tl;dr: Plenty of late-stage financing will be available for cleantech start-ups over the next few years, but seed/Series A money is another matter.**

There's been a pile of [negative news about cleantech start-ups](#) recently. I've heard it said more than once in the past month that venture-backed entrepreneurship clearly isn't working here, so maybe we should all pack our bags and go home. Given the human bias to extrapolate individual events into overarching trends, I figured now would be a good time to review the data so far about cleantech VC performance – and I stress *data*, not anecdote or assertion! – to see what we can learn.

This is a meaty topic, so I'm going to cover it in four posts. Today I'm going to focus on the money – how much capital has been available for cleantech start-ups so far, and what we can expect in the next few years. Two subsequent posts will address the VC investors that are supplying this cash, as well as the experiences of start-up companies that have achieved liftoff. In the final post, I'll wrap it all up with some parting thoughts.

The chart below shows cleantech start-up investment from 1995 through 2010. My data set is cobbled together from multiple sources, aiming to capture the breadth of the energy, environmental, materials, and agricultural technologies that most people refer to when they say “cleantech.” Varying definitions mean that these figures won't equal those from the [Moneytree survey](#) or the [Cleantech Group](#), but the trends should be the same. I divide this era into four periods. During each, cleantech start-up investment had a different driver:



mnordan.com | Source: Dow Jones VentureSource, Lux Research, personal communications.

- **1995 to 1999: Baseline.** This period shows us what cleantech start-up financing looks like when there's no external forcing function to influence it. The answer is \$200 million +/- \$100 million

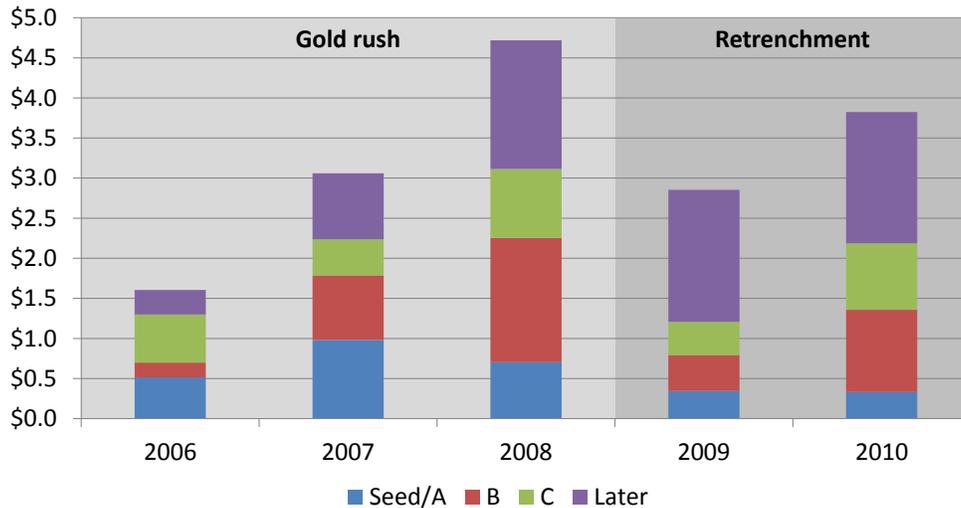
per year in 30-50 transactions annually. During this period the venture capital industry as a whole grew dramatically – from about \$7 billion invested per year to more than \$50 billion – so cleantech accounted for a shrinking percentage of the total.

- **2000 to 2005: Bubble fumbling.** The year 2000 saw the peak of the Internet bubble and a commensurate peak in total venture capital investment: An all-time record of nearly \$100 billion went into start-up companies that year, mostly of the Internet variety. But the bubble promptly burst, and VC firms that had just raised billions of fresh dollars had to find something other than dot-com start-ups to invest them in. I'd characterize what happened in the years that followed as "fumbling around for another bubble," marked by broad interest in the physical sciences instead of cleantech per se (you may recall this as the time when nanotechnology became an investment meme). Cleantech benefited considerably from the fumbling, however, and in 2005 start-up investment in the field broke \$800 million – several times greater than in the late '90s.
- **2006 to 2008: Gold rush.** Starting in 2006, cleantech became a major VC focus area, and start-up financing rose by 50%+ annually for three years. You might think this happened because all the venture capitalists went to see "An Inconvenient Truth" on the same night, but I think a different sort of herd mentality was at work: In Q4 2005, three solar companies went public, all at valuations around \$1 billion – namely Q-Cells, SunPower, and Suntech – and hundreds of VC firms hopped on the bandwagon. (You may mock the VC asset class for collectively deciding that cleantech was the next big thing, but you may also respect it for recognizing the intersection of favorable secular trends with a quarter-century of neglected tech innovation!) As a result, cleantech start-up financing skyrocketed to exceed \$4.5 billion in 2008. Note that toward the end of this period, after initial bets were placed, money began to shift away from brand-new companies: Seed/Series A financing fell by 29% from 2007 to 2008.
- **2009 to now: Retrenchment.** In September 2008, Lehman Brothers filed for bankruptcy and the stock market went into free-fall, losing 30% of its value by year-end. This spooked investors of all types, venture capitalists included, and cleantech start-up investment dropped by a third in 2009. For entrepreneurs launching new businesses, the more significant development was that Seed/Series A funding fell by half, returning to 2006 levels. 2010 brought a substantial recovery, but not a new peak, while Seed/Series A funding for new start-ups stagnated. As for 2011, the year's not over yet, but based on current figures this year will be flat or down overall with a level of Seed/Series A investment comparable to 2010.

Now let's zoom in and look at just the last five years. Three big trends come into focus:

- Financing rose sharply to a peak in 2008 and bounced around after that.
- Late-stage financing has ballooned as more companies have "graduated" to big Series D and later rounds, where they need lots of cash to build factories, hire sales forces, establish distribution channels, etc.
- Seed/Series A financing for brand-new businesses has fallen substantially.

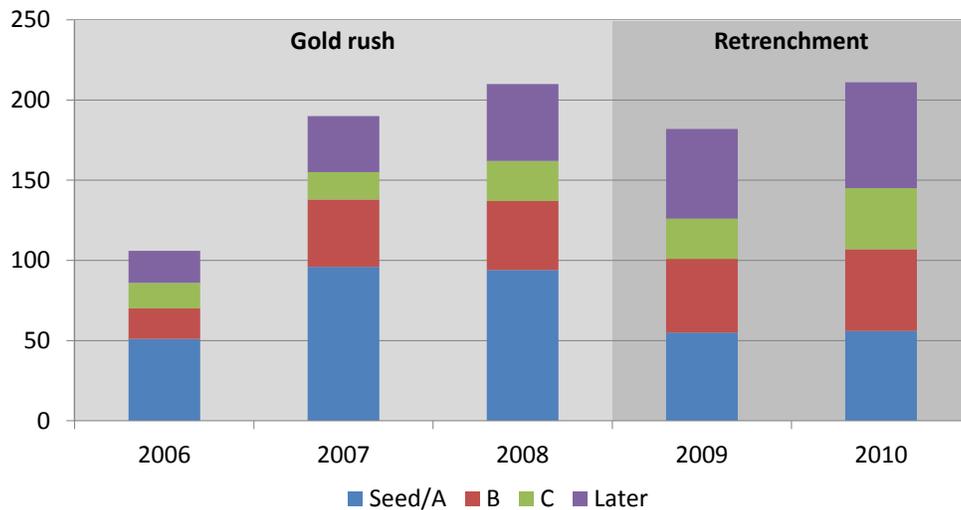
**Cleantech start-up investment (\$B), 2006 to 2010**



mnordan.com | Source: Dow Jones VentureSource, Lux Research, personal communications.

So far we've been looking at this data by *dollars invested*. We can also look at it by *rounds completed*:

**Cleantech start-up investment rounds, 2006 to 2010**



mnordan.com | Source: Dow Jones VentureSource, Lux Research, personal communications.

This evens out the visual a bit because the late-stage investments aren't weighted up by their disproportionate value. However, they still predominate: Sixty-six Series D and later rounds were raised last year, more than other stage. In contrast, the number of early-stage investment rounds has plummeted. Nearly 100 new cleantech companies per year received seed/Series A funding in 2007 and 2008, but only 50 or so did in 2009 and 2010.

All of this rear-facing stuff is fine and good, but if I'm an entrepreneur, I want to know what's going to happen *in the future*. If my cleantech business will require lots of late-stage capital down the road, what is the competition for that money going to look like?

We can answer this question by using yesterday's financing data to project tomorrow's capital requirements. We know, historically, the percentage of companies that have "graduated" from Seed/Series A to Series B, B to C, and so on. We also know the proportionate amounts of money that companies tend to raise in each round, and we can make an informed guess at how long each round of funding lasts. Equipped with these numbers, we can build a simple forecast of how much cleantech start-up financing will be required in the future. I used the assumptions below. (One big thing to note: For simplicity's sake, I've assumed that the number of new companies raising Seed/Series A financing each year – as well as the average Seed/Series A round size – will remain at 2009-2011 levels. This obviously won't happen, but it's not important to the argument I'm going to make.)

<b>"Graduation rate" assumptions</b>		<b>Follow-on round size assumptions (as multiple of Seed/A)</b>	
Transition	Rate	Round	Multiple
Seed/A to B	50%	B	2.5x
B to C	66%	C	4.0x
C to D or later	300%*	D or later	4.5x

<b>Other assumptions</b>	
Metric	Value
New Seed/A rounds/year, 2011+	55 (like 2009 and 2010)
Avg. value of Seed/A rounds, 2011+	\$7MM (like 2009 and 2010)
Average duration of all rounds	2 years

mnordan.com | \* i.e., the 1 out of 3 companies that survive to Series C have an average of 3 funding rounds thereafter

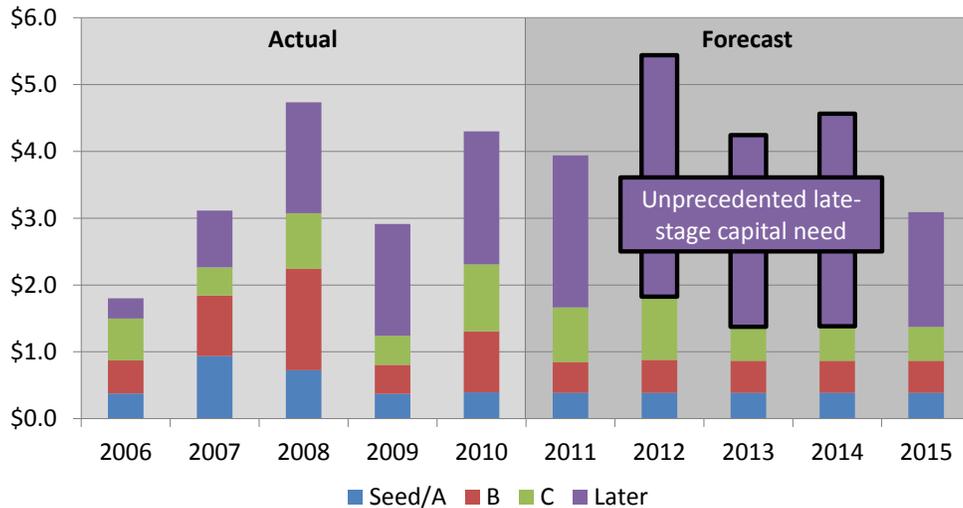
When we apply these assumptions about the future to the population of companies launched in the past, we generate a forecast.

You can see the big takeaway here: There will be a path-breaking requirement for late-stage financing in 2012-2014 as the "baby boom" of companies formed in the last five years plays out. In 2008-2010, an average of \$1.8 billion per year went into Series D and later rounds – but during 2012-2014, an average of \$3.3 billion per year will be needed. That's an extra \$1.5 billion in late-stage financing annually, or \$4.5 billion across the three years.

So will this money be available? Or will otherwise-auspicious cleantech start-ups go begging?

I'm betting that the money will be there. I posit that a number of VC and private equity pros all ran this spreadsheet a year ago, reached the same conclusion, and started raising late-stage funds. Examples include:

**Cleantech start-up investment forecast (\$B), 2006 to 2015**



mnordan.com | Forecast based on data from Dow Jones VentureSource, Lux Research, personal communications.

- VantagePoint is reportedly in the market for a [\\$1.25 billion cleantech growth fund](#).
- Silver Lake Kraftwerk, a new vehicle also raising money now, is said to have a [\\$1 billion target](#).
- BlackRock and NTR announced [a new late-stage cleantech fund](#) back in February. I'm not sure where this one stands, but if it goes forward, a fund smaller than \$1 billion would be out of character.
- Kleiner's [\\$500 million Green Growth Fund](#) – first allocated in 2008 – has apparently been re-upped, since it's now self-described as a ["\\$1 billion initiative"](#).
- Khosla's [new \\$1 billion fund](#) is half-allocated to cleantech, and I'd bet most of that portion is aimed at late-stage investment – perhaps \$300 million?
- Hudson Clean Energy's [\\$1 billion first fund](#), raised in 2009 and focused exclusively on late-stage investments, should still have some fresh capital – and in the meantime the firm appears to be raising [a second one worth \\$1.5 billion](#)

The entities above would get you near \$4.5 billion all by themselves, and the shift to later-stage allocations among all the other VC investors should be sufficient to cover any shortfall. So I think we can conclude that there will indeed be adequate late-stage financing for cleantech start-ups in the next few years – and happily so, since the need will be unprecedented.

My concern, as you might expect, is that there may be insufficient Seed/Series A capital available to fund new cleantech enterprises. The limited partners who supply VC firms with money to invest are putting [less and less capital into VC overall](#), and the share of that money that will be allocated to cleantech is unlikely to grow in the near term. If shrinking cleantech allocations get disproportionately earmarked toward late-stage investment, Seed/Series A capital will be thin on the ground. I'm self-interested in this because [our team at Venrock](#) invests early, we prefer to do so in conjunction with peers, and we already have fewer co-investors available to us now than we did two years ago.

This brings us to a different question: What would have to happen for LPs to pump more money into cleantech rather than the same or less? That depends on returns, which I'll address in the next post.

## Part 2: The Investors

November 29, 2011

**tl;dr: There's a widespread perception that cleantech venture capital must be tanking compared with VC overall. That perception is wrong.**

In yesterday's post, we looked at the amount of capital that's been invested in cleantech start-ups to date. Today, we're going to look at what that money is returning. This may seem like a topic of interest only to start-up investors, but it's important to entrepreneurs too: Without returns, the money spigot eventually gets shut off.

The conventional wisdom about cleantech venture capital goes something like this:

*"Cleantech VC must be performing much worse than VC overall. First, very few exits have occurred relative to the large amount of money invested. Second, cleantech companies are time-consuming to develop – so when exits do occur, they'll take longer. Finally, during the same time period that cleantech VC got under way, Internet VC investment yielded big wins like LinkedIn and Groupon. Doubtless, cleantech returns must look awful by comparison."*

Every part of the statement above is incorrect.

*Myth #1: Few VC-backed cleantech exits have occurred.*

**Reality:** Relative to its level of funding, cleantech has actually *overdelivered* on exits.

In order to assess this myth, we need two data sets. First, we need to know the total amount of VC financing each year as well as the share of it that went to cleantech start-ups. Second, we need some proxy for exits – again, for VC-backed companies overall and for the cleantech ones specifically. I'm going to use the gold standard of VC exits – IPOs on major stock exchanges (i.e. NYSE, Nasdaq, etc.) – because the data is both readily available and unambiguous. The two data sets appear below.

### VC financing and VC-backed IPOs, VC overall and cleantech only, 2000 to 2011

Year	VC funding, overall (\$B)	VC funding, cleantech (\$B)	VC-backed IPOs, overall	VC-backed IPOs, cleantech
2000	\$98.6	\$0.8	264	1
2001	\$37.6	\$0.7	41	-
2002	\$20.7	\$0.4	22	-
2003	\$18.8	\$0.5	29	-
2004	\$21.7	\$0.7	94	1
2005	\$22.5	\$0.8	57	1
2006	\$26.0	\$1.6	57	4
2007	\$29.9	\$3.1	86	3
2008	\$28.1	\$4.7	6	-
2009	\$18.3	\$2.9	12	1
2010	\$22.0	\$3.8	72	4
2011 YTD	\$21.2	\$2.8	45	3

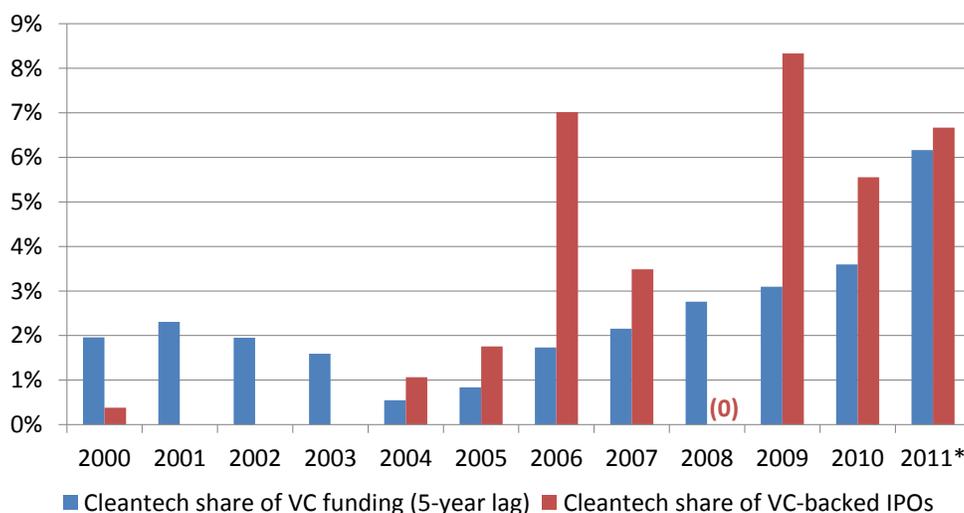
mnordan.com | Source: NVCA, Dow Jones VentureSource, SEC filings.

In any given year, we can compare cleantech’s share of VC-backed IPOs with its share of VC financing. If the former exceeded the latter, then cleantech start-ups would exhibit a better batting average than VC-backed start-ups overall.

There’s one complication: Because companies go public many years after they first get funded, we need to introduce a time lag to the financing data. This way, our “proportion of IPOs” and “proportion of financing” numbers will compare the same group of companies. Strictly speaking, the time lag should equal the average amount of time from funding to IPO, which in cleantech [happens to be 8.3 years](#). But because that interval has shortened for the most recent crop of public companies like Gevo and Kior, I’m going to use five years. (Note that this will make cleantech look worse, not better).

Here are the results:

**Cleantech share of VC funding vs. share of VC-backed IPOs, 2000 to 2011**



mnordan.com | Source: NVCA, Dow Jones VentureSource, SEC filings. \* data through Q3 2011.

Since 2004, VC-backed cleantech companies have been generally *overrepresented* in the IPO markets relative to their share of venture capital financing. This pattern has persisted in 2011, during which non-cleantech companies like LinkedIn and Groupon went public. The trend isn’t perfect – it didn’t hold true prior to 2004, it hiccupped in 2008 (when only six VC-backed companies overall went public, none cleantech-related), and it may not continue in the future (in 2012, it will require one out of ten VC-backed IPOs to hail from cleantech, versus one out of 14 so far this year). Regardless, the claim that cleantech has suffered to date from proportionately few exits is patently false.

*Myth #2: Venture-backed cleantech start-ups take longer to exit than companies in other sectors.*

**Reality:** So far, they take *less* time.

This one’s easy. As previously mentioned, the average time from founding to IPO for venture-backed cleantech start-ups is 8.3 years. For venture-backed companies overall, it’s [9.4 years](#), according to the National Venture Capital Association.

(After this gets posted, I expect a deluge of emails saying “Matthew, haven’t you [argued quite publicly](#) that cleantech innovation requires more time, not less?” I still believe this is true overall. What the present analysis shows us is that VCs have done a good job of restricting their funding to the subset of companies that fit their model.)

*Myth #3: Cleantech VC funds must be doing worse than VC overall, because they’re not exposed to ballooning valuations in the Internet and digital media sector.*

**Reality:** Cleantech-only VC funds have about the same valuation metrics as VC funds overall.

So far we’ve assessed the number of big exits that have occurred in cleantech and looked at how long they’ve taken to occur. But perhaps we just had a flash-in-the-pan of IPOs for cleantech start-ups that will never occur again. Maybe the few good companies in cleantech VC portfolios have all gone public already, and the majority left over all stink.

How could we test this? Well, VC funds are required to regularly report their interim performance – the current value of their investments compared with the amount of money paid for them – to the limited partners that provide the money to invest (mostly pension funds, foundations, and trusts). Unlike the IPO data, which shows us who crossed the finish line, these interim performance numbers show us who’s leading mid-race. If we could get at these numbers and compare the interim performance of cleantech-only VC funds with VC funds overall, we’d have a more comprehensive and predictive measure of how this cleantech venture thing is working out.

Venture capital firms don’t typically post their performance for the public. However, we have a back door to get at this data for a subset of VC funds. There are a few big pension providers out there which supply money to lots of VC funds and are also required by charter to report the interim value of each holding. One such institution is the [California Public Employees’ Retirement System](#) (CalPERS), which happens to have invested in 19 cleantech-only VC funds – those from firms like RockPort and U.S. Renewables Group that back cleantech companies exclusively. CalPERS reports its numbers with a six-month lag, meaning that the most recent data is from March 31, 2010. This is the best sample available that we can use to judge cleantech VC’s interim performance.

Let’s run through the columns:

- *Fund* is an arbitrary identifier for each cleantech-only fund that CalPERS has put money into. While I have anonymized them for this post, [CalPERS’s site](#) identifies them by name.
- *Vintage year* is when each fund started making investments. This will be important later on.
- *Size* is the amount of money that each fund has to invest. This column doesn’t come from CalPERS; it’s culled from press releases. You can use it to see whether big funds or small ones tend to do better.
- *Stage* indicates whether a fund tends to invest early or late in portfolio companies’ life cycles. This is also not CalPERS data, but rather my best guess for each fund.

## Cleantech-only VC fund interim performance as of March 31, 2011

Fund	Vintage year	Size (\$MM)	Stage	Value-to-paid in capital (net to LPs)	IRR (net to LPs)
Fund 1	2006	\$150	Diverse	1.6x	16%
Fund 2	2007	\$475	Late-stage	1.3x	11%
Fund 3	2007	\$250	Early-stage	1.2x	0%
Fund 4	2008	\$1,024	Late-stage	1.2x	9%
Fund 5	2008	\$486	Diverse	1.2x	11%
Fund 6	2008	\$435	Diverse	1.1x	10%
Fund 7	2006	\$262	Diverse	1.1x	2%
Fund 8	2007	\$90	Early-stage	1.x	0%
Fund 9	2008	\$500	Diverse	1.x	-1%
Fund 10	2008	\$123	Diverse	1.x	-2%
Fund 11	2008	\$395	Diverse	.9x	-5%
Fund 12	2010	\$150	Early-stage	.9x	-19%
Fund 13	2008	\$192	Diverse	.8x	-9%
Fund 14	2009	\$760	Late-stage	.8x	-18%
Fund 15	2006	\$284	Early-stage	.7x	-10%
Fund 16	2008	\$11	Early-stage	.7x	-29%
Fund 17	2008	\$450	Early-stage	.6x	-33%
Fund 18	2007	\$169	Diverse	.6x	-21%
Fund 19	2005	\$180	Diverse	.4x	-31%

mnordan.com | Source: CalPERS. All data as of March 31, 2011.

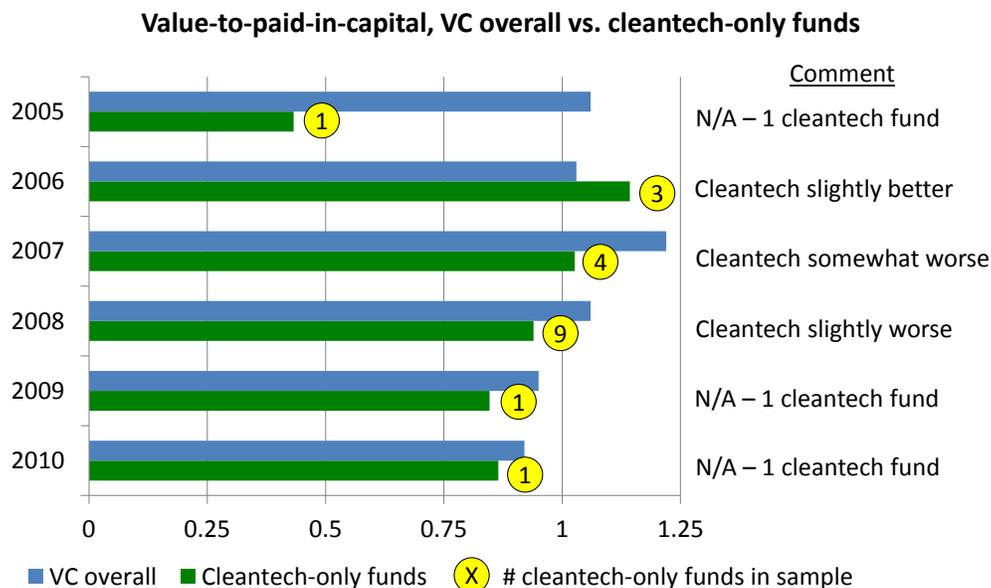
- *Value-to-paid-in-capital* is the value of each funds' investments as of March 31, 2011, divided by the amount of money initially paid for those investments. If I invested \$10 in a company two years ago and it's worth \$15 now, my value-to-paid-in-capital is 1.5x. This number is *net to LPs*, meaning that it accounts for the management fees and the share of profits that the VC fund keeps for itself.
- *IRR* is the internal rate of return of the fund – i.e., the performance expressed like an interest rate. If I invested \$10 in one company two years ago and it's worth \$15 now, my IRR is 22%. This is also reported as net to LPs.

What do we learn from this?

- As a group, these cleantech-only funds are slightly “below water” – meaning that their investments are presently worth slightly less than what was paid for them. On a fund-weighted basis, the average value-to-paid-in-capital ratio is 0.95x.
- Eight out of 19 of the funds, or about 40%, are “above water.”
- The best fund is at 1.6x value-to-paid-in-capital while the worst is at 0.4x.

This might seem really bad at first glance, but remember that the average fund in this group is only four years old. Venture funds typically run for 10 years, and they almost always exhibit a “J-curve” of performance – meaning that they are under water for their first several years (when some portfolio companies die and go to zero, but the others haven't appreciated much in value), and they only get above water in the back half. With that in mind, we ask: Is cleantech doing better or worse than VC overall?

As it happens, we can get the data to make this comparison. The [National Venture Capital Association](#) publishes the same kind of data that we have above from CalPERS, except that they do it for [the entire landscape of venture capital funds](#). By comparing our cleantech-only fund performance data from CalPERS with our all-of-VC data from the NVCA, we can determine how the interim performance of cleantech-only funds stacks up to VC overall. When we do this, we should only compare funds of the same vintage year, to account for the amount of time that the funds have been running and to rule out year-to-year disruptors like the 2008 financial collapse. The results look like this:



mnordan.com | Source: NVCA (VC overall), CalPERS (cleantech-only). All data as of March 31, 2011, except VC overall in 2009 and 2010 as of December 31, 2010, due to changes in NVCA reporting.

As you can see, we can't learn much for the vintage years 2005, 2009, and 2010, because in each we're comparing all of VC to just one cleantech-only fund. But from 2006 through 2008, we have a decent basis for comparison. And you know what? In each case, cleantech is a little better or a little worse than VC overall. Across the entire time period, the cleantech-only funds have a fund-weighted value-to-paid-in-capital ratio of .95x, whereas VC overall is at 1.07x. Given that both values are within ten percentage points of flat – and, moreover, that we are talking about funds that are at most five years old – this is not a large difference.

Further, we're unfairly handicapping cleantech in this analysis. Why? We're comparing the entire VC universe with *cleantech-only funds*. We've omitted the cleantech practices of generalist funds like Kleiner Perkins, DFJ, and Khosla Ventures, because there's no place where we can get data on their cleantech performance carved out from everything else. This impacts our analysis because some of cleantech's biggest VC-backed IPOs have been supported solely by these generalists – for example Kior, which had Khosla as its lone VC and delivered a \$1 billion+ return that only shows up in the "VC overall" side of our comparison.

With this in mind, we can conclude that cleantech VC performance is roughly equal to the VC asset class overall (so far). Reasonable people can argue about whether the whole venture capital shebang is doing well or poorly, but can't claim that the cleantech bit is bombing.

This analysis has, by necessity, been very investor-centric. What does life look like if you're a CEO inside one of these cleantech portfolio companies? We'll tackle that in tomorrow's post.

### Part 3: The Companies

November 30, 2011

**tl;dr: Half of successful VC-backed cleantech start-ups stumble along the way. Entrepreneurs who raise big financing rounds at sky-high valuations can end up shooting themselves in the foot.**

Most cleantech start-ups require a lot of capital. The average VC-backed company that goes public in this sector [raises about \\$120 million](#) through five rounds of financing along the way.

Every time a CEO seeks new investment, she walks a tightrope. On one hand, she wants to raise capital at a high valuation to minimize dilution. On the other hand, she doesn't want the valuation to be *too* high, because if the company loses steam it risks a "down round" ahead – i.e., raising the next round of capital at a lower share price than before.

Down rounds dilute the ownership of common shareholders (the founders and employees) quite substantially unless they're explicitly protected. This is because of anti-dilution provisions designed to protect the existing investors, who hold preferred shares; these terms are part of nearly every institutional financing and are [too complex to discuss here](#). Down rounds can dilute those investors as well, but as long as they can pony up their share of the incoming cash, they can maintain their level of ownership. Common shareholders don't have this luxury.

Conventional wisdom holds that CEOs should strive for the highest possible share price every time they raise money, because their number one job is to prevent dilution, and down rounds are rare events that only happen in mediocre companies.

A while back, I decided to test whether this actually holds true in cleantech. It's particularly germane in this sector because of the large amounts of money that must be raised and the many rounds of financing required to reach the finish line.

To perform this analysis, we need time-series data on the share prices of privately-held, VC-backed cleantech start-ups. "But Matthew," you protest, "private companies rarely publicize their valuations, and they certainly make sure to keep down rounds a secret!" In nearly every case, you're right, but there's one instance in which companies are legally required to publish a historical record of their private share prices: When they file to go public. In a happy coincidence, we can presume that companies angling for an IPO have also had some measure of business success. So by examining the SEC filings of public and aspiring-to-be-public cleantech start-ups, we can determine whether successful companies always raise money at ever-higher prices, or whether they tend to stumble along the way.

From trawls through SEC filings, I've been able to identify 24 such VC-backed cleantech companies for which private share price histories can be reconstructed – 15 that have gone public since 2000, and nine more that have filed an outstanding S-1. (A handful of additional companies didn't make the cut because they went public on a foreign exchange with different reporting requirements, they raised only one round of private financing, or they had a really complicated history that I couldn't untangle.) Here they are:

### Sample: 24 VC-backed cleantech start-ups with 2000 or later IPO or outstanding S-1

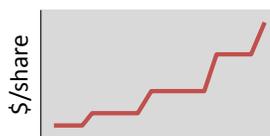
Company	Type	Category	Company	Type	Category
Evergreen Solar	IPO	Solar	Gevo	IPO	Biofuels/chemicals
Color Kinetics	IPO	Lighting	Solazyme	IPO	Biofuels/chemicals
Metabolix	IPO	Biochemicals	Kior	IPO	Biofuels
First Solar	IPO	Solar	Brightsource	S-1	Solar
Comverge	IPO	Demand response	Myriant	S-1	Biochemicals
EnerNOC	IPO	Demand response	Ceres	S-1	Biofuel feedstocks
Yingli	IPO	Solar	Enphase	S-1	Microinverters
A123Systems	IPO	Energy storage	Aspen Aerogels	S-1	Adv. materials
Codexis	IPO	Biochemicals	Luca Techs.	S-1	Coal gasification
Tesla	IPO	Electric vehicles	Silver Spring	S-1	Smart meters
Amyris	IPO	Biofuels/chemicals	Genomatica	S-1	Biochemicals
SemiLEDs	IPO	Lighting	Mascoma	S-1	Biofuels

mnordan.com | Source: SEC filings.

You can chart the share price trajectory of each of these companies on a line chart. The x-axis of the chart is time in months, and the y-axis is share price. Each inflection point on the chart represents a fundraising round (Series A, Series B, etc.) at which capital was raised. The lines between the inflection points represent the intervals of time between fundraising events. For the companies that have filed an S-1 but not yet gone public, the last point on the chart represents the share price at the most recent private financing. For the public companies, the last point is the share price at the IPO.

Looking across these 24 companies, three patterns emerge:

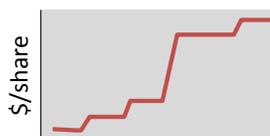
#### Three share price trajectories for VC-backed cleantech start-ups



Time

##### 1) Build

- Consistent upticks at each round
- VC hindsight: Get in early, defend position
- **Entrepreneur: Good**



Time

##### 2) Pop

- One round stands out as a particularly big increase
- VC hindsight: Time it and get in before the pop
- **Entrepreneur: Great! The big \$ diluted me less!**



Time

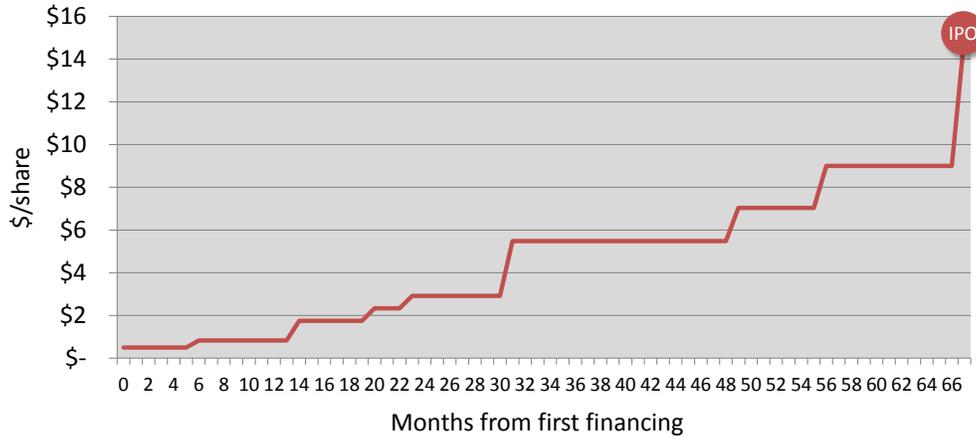
##### 3) Stumble

- Big down round(s) (>10%) somewhere on the way
- VC hindsight: Buy on the dips, avoid falling daggers
- **Entrepreneur: Very bad**

mnordan.com | Source: SEC filings.

The first pattern is the **build**, where a company raises successive rounds of financing at steadily higher prices with no single round standing out. This is a good situation for the entrepreneur because it minimizes dilution. A venture investor with 20/20 hindsight would want to play this scenario by investing early and having sufficient follow-on capital to maintain the position, because the earliest investors tend to make the highest returns (both on a cash-on-cash basis and an IRR basis). Biofuels/chemicals company Gevo is a good example of a build:

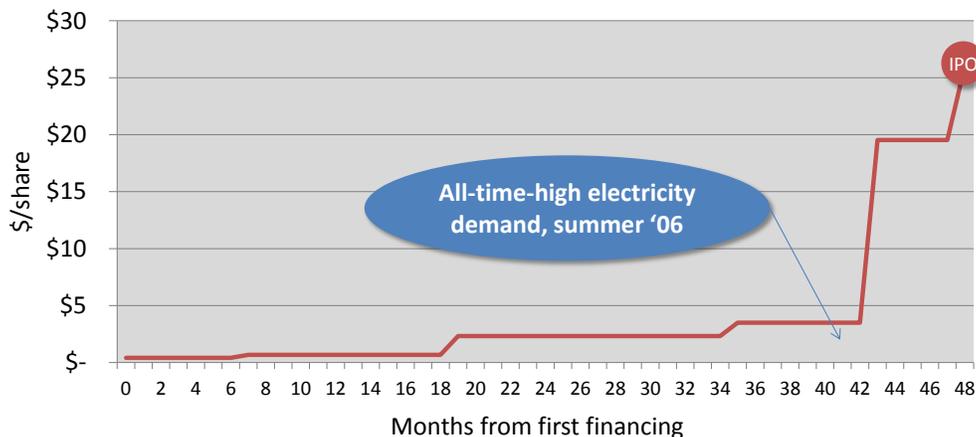
Share price history: Gevo – “build” case study



mnordan.com | Source: SEC filings.

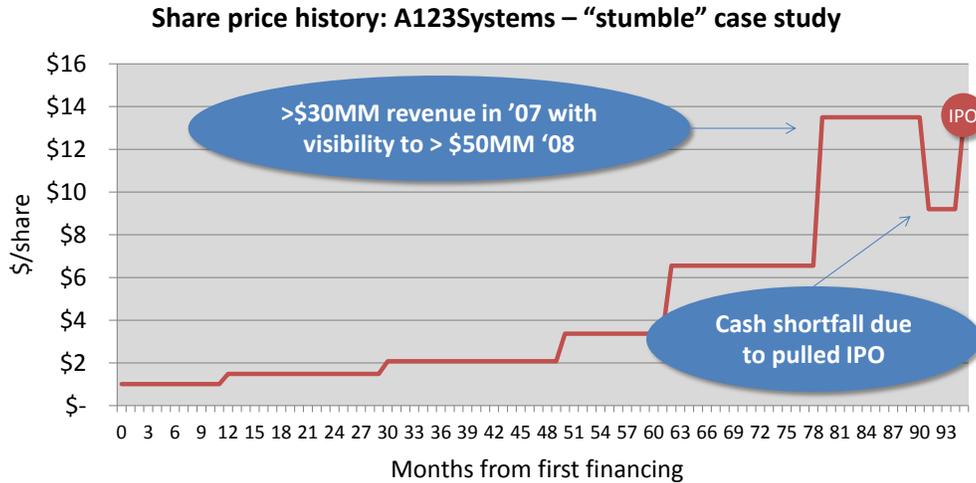
The second pattern is the **pop**. In this case, a company raises capital at a modest uptick each time, except for one round where some extraordinary event sends the share price soaring. Entrepreneurs love this situation – particularly if the pop comes late, because it mitigates dilution right when big money is required! A venture investor, in hindsight, would want to get in just before the pop. Demand response pioneer EnerNOC is a great example: Its share price spiked 5.5x from its Series B-1 round to its Series C round, owing (as far as I can tell) to a really hot 2006 summer that broke demand response records.

Share price history: EnerNOC – “pop” case study



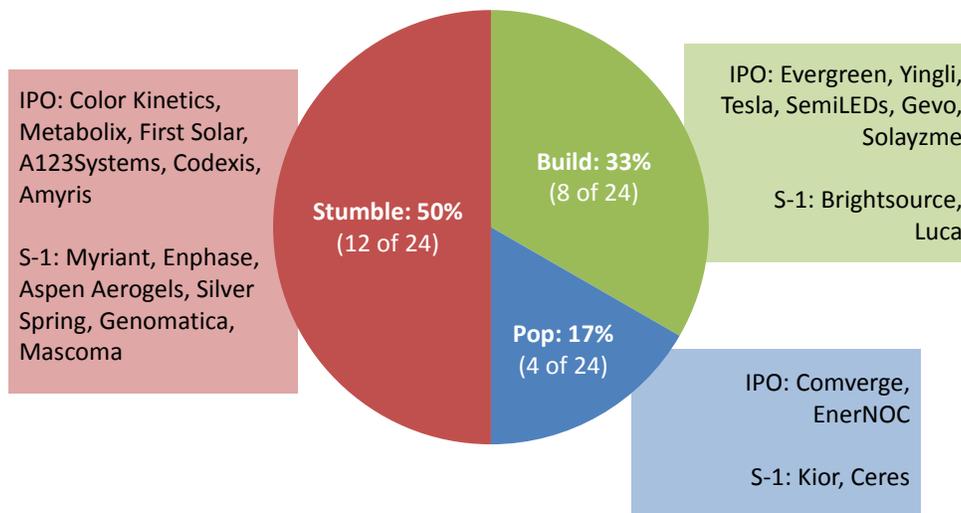
mnordan.com | Source: SEC filings.

The third pattern is the **stumble**. This is the position that no start-up CEO wants to be in, where something goes wrong – unexpected technology hurdle? cancelled deal? management shakeup? – and new financing gets raised at a lower price than before. Theoretically a venture investor with perfect judgment would recognize the dip as a buying opportunity, but in times like these it’s exceedingly difficult to discern a hiccup from free-fall. A123Systems is a good case study: The company attracted more than \$100 million at a big uptick in May 2008 in anticipation of an IPO, but had to raise another \$100 million at a lower price the next year when the IPO got delayed.



So, of these 24 companies, how often did each pattern occur?

**Summary: Share price trajectories for VC-backed cleantech start-ups**



- Builds happened a third of the time.
- Pops occurred one-sixth of the time.
- **Half of the companies stumbled.** This is the *most common* pattern. And these are the *successful* companies that ultimately filed to go public; just imagine the others!

The conclusion for cleantech entrepreneurs: Watch what you wish for – you just might get it.

Every time you raise financing there will be a chorus of voices in the boardroom encouraging you to raise the biggest round possible at the highest valuation. Sometimes this will indeed be the right decision, and if you're certain that it is, you should shoot for the stars. But often – according to this data, at least half the time – it won't be. Should you get over your ski tips in valuation, you'll set yourself and your team up for disproportionate dilution in the future, where your only defense is the mercy of your board. These are the cases where it's in your personal self-interest to raise the appropriate amount of money at a sustainable valuation from people that you trust – not the largest amount of money at the highest possible price from whoever's willing to pay it.

Remember, the share price that really matters is the one at the very end.

Tune in tomorrow for some parting thoughts.

## Part 4: Parting Thoughts

December 01, 2011

**tl;dr: We're in the early innings of a long ball game.**

This week we've analyzed the state of cleantech venture capital and used data to discern myth from reality. In summary, we've found that:

- There will be sufficient late-stage capital in the next few years to feed the '06-'08 "baby boom" of cleantech start-ups, but there may be a corresponding dearth of Seed/Series A money.
- Contrary to conventional wisdom, cleantech VC is not sucking wind compared with VC overall. The two are performing about the same on an interim basis and cleantech investment has actually overdelivered on IPOs.
- Half of *successful* cleantech start-ups stumble on the way to the finish line, enduring a down round that disproportionately hurts founders and employees. Entrepreneurs should approach fundraising with a long-term orientation and be wary of sky-high valuations.

A few parting thoughts as I muse on these points:

- **It's still really early.** Cleantech venture capital investment only became substantial in 2006, and the average VC-backed start-up takes eight years from founding to exit. That means the real fruits of this labor are yet to come. If there is ever to be a cleantech IPO boom, one would expect it to start in the middle of this decade.
- **Limited partners should reassess early-stage cleantech.** More and more cleantech venture capital is earmarked for late-stage growth equity deals. As a result, these investment rounds are likely to engender price competition that depresses returns. In contrast, Seed/Series A cleantech financing looks to be cyclically underserved, and the enhanced return profile that accompanies scarcer capital could help offset early-stage technology risk. If I were at an LP institution right now, I'd be looking for the sharpest early-stage cleantech investment team that can zig while most investors zag.
- **New company founders should weigh alternatives to VC.** While CEOs at late-stage firms will have adequate financing options in the next few years, new cleantech founders will find themselves fiercely competing for capital. Think of it this way: Since 2009, about 50 cleantech ventures per year receive Seed/Series A funding. Do you want to place all your bets on being one of the fifty? There are plenty of other underexploited options for cleantech entrepreneurs – including grants from agencies like ARPA-E during initial technology development (case study: [FastCAP Systems](#)), funding from a large corporation in exchange for a preferred license or other IP rights (case study: [Liquid Metal Battery Corporation](#) with [Total](#)), and early sale to a corporation with an executive job in the bargain (case study: [Zensi](#) with [Belkin](#)).
- **The optimal investment vehicle remains to be figured out.** I pointed out in the second post that VC firms have, so far, mostly restricted their funding to companies that fit in the venture "box" – i.e., \$10-30 million invested over the life of a technology company, all in equity, for an outcome in five to 10 years. By definition, this excludes big-payoff categories with mondo capital

requirements (like nuclear fusion), fields that have acceptable capital needs but stretch the timeframe (like advanced materials), adjacent investment opportunities in cleantech value chains (like land deals for biofuel feedstocks), and financing the deployments of technologies versus the technologies themselves (an odd one, since more value tends to get created downstream). All of these omissions leave money on the table. A number of VC firms – [mine included](#) – are blazing a trail by shaving these square pegs for the venture model’s round hole, and flexible alternative investors like family offices, superangels, and corporations have a window of opportunity exploit. Despite this, I can’t shake the suspicion that a truly purpose-built cleantech investment vehicle lies in the future, not the present.

Thus ends our whirlwind tour of cleantech venture capital. Studying a fuzzy topic like this keeps a person humble, because most of the predictions you make are likely to be wrong! Please don’t hesitate to contact me with your own, especially if they differ.