

Venture Capital Investment Drivers in Recycling

CT Governor's Recycling Working Group

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The logo for Enhanced Capital is displayed within a dark grey rectangular box. The word "Enhanced" is written in a red serif font, and the word "Capital" is written in a white serif font, positioned to the right of "Enhanced".

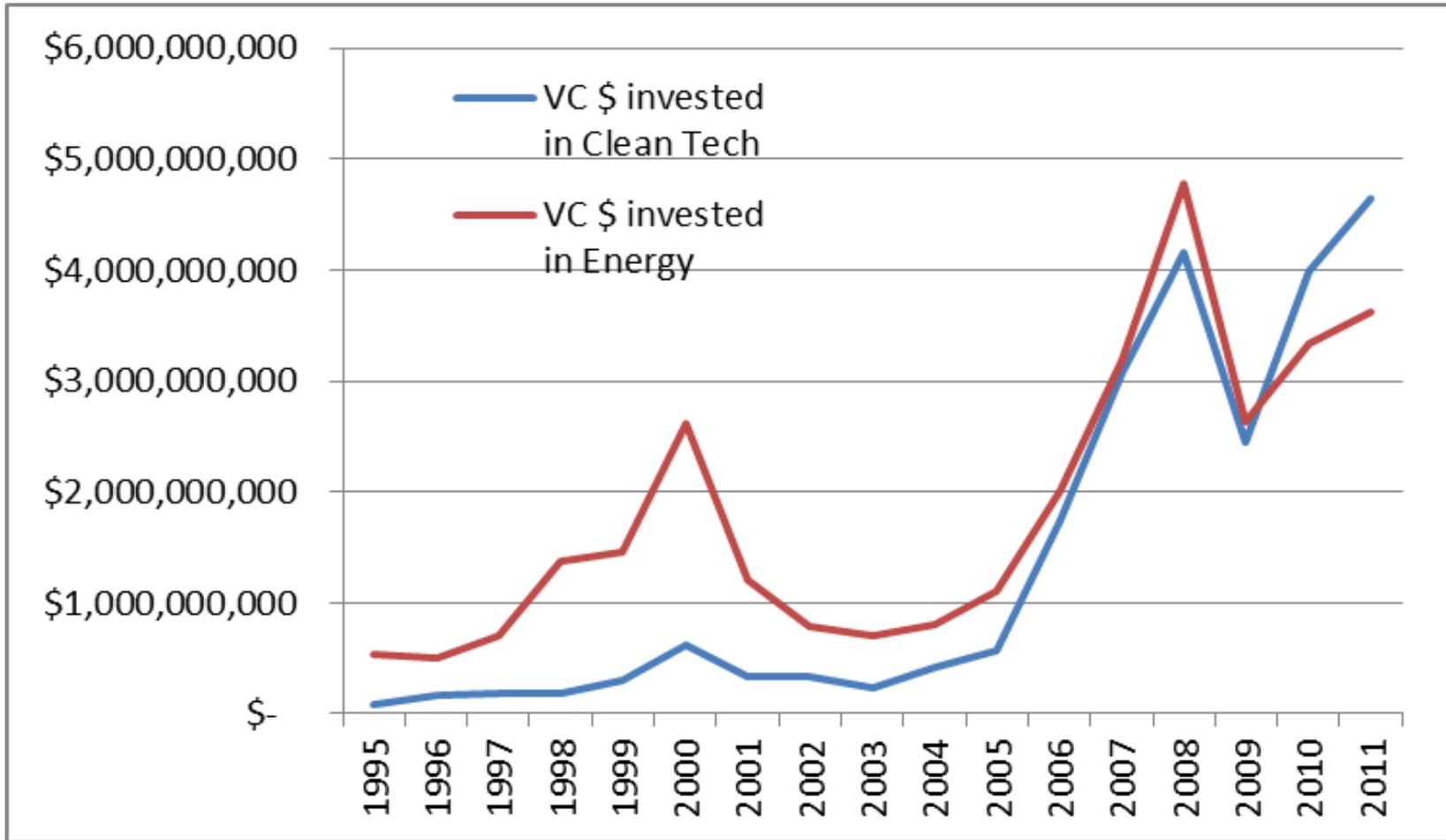
Enhanced Capital

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Recycling in Venture Capital Context

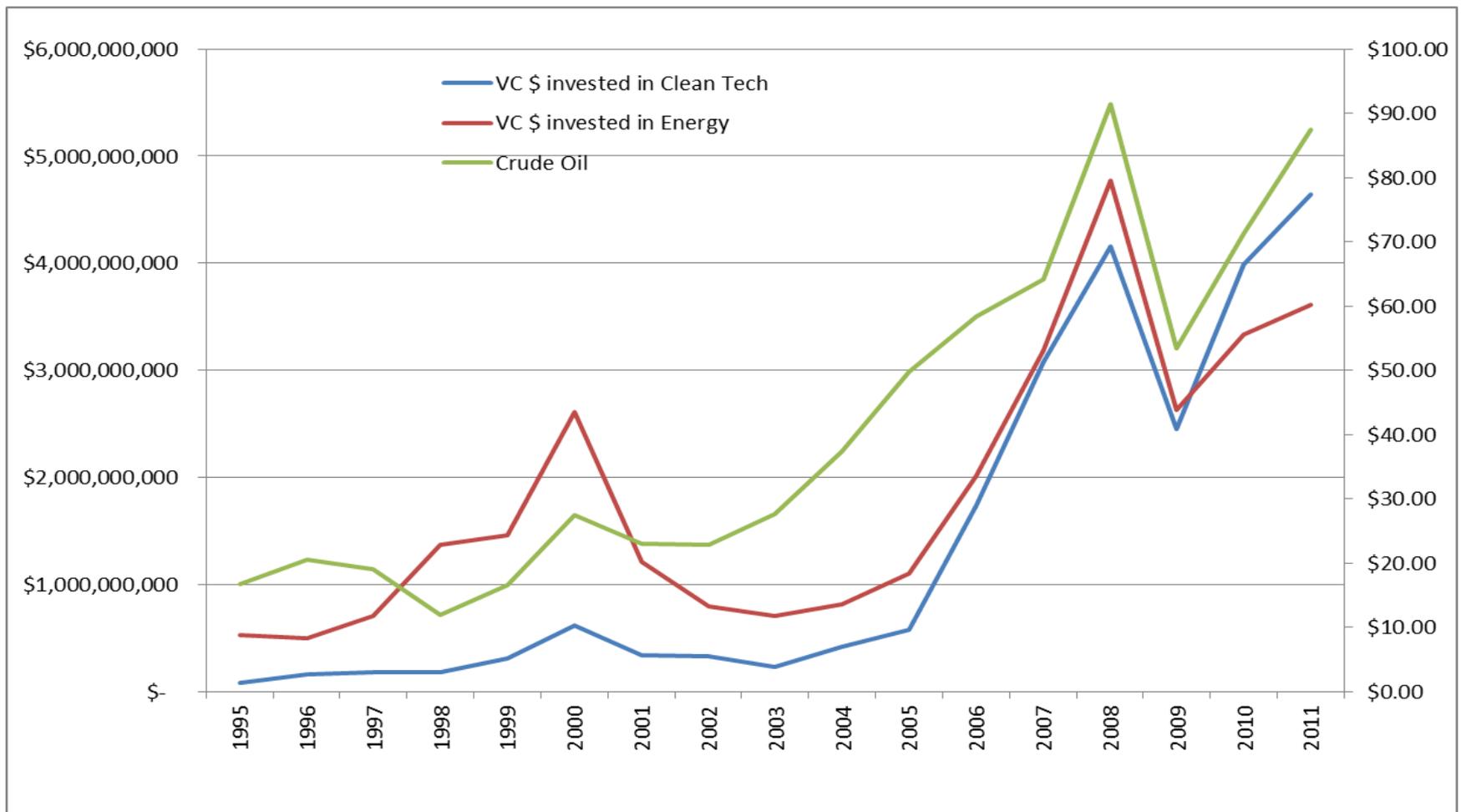
- Use Clean Tech as a Proxy Sector
- Data from PWC Money Tree
- Focus on Solid Waste

Clean Tech Tracks Energy Investing



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Clean Tech & Energy Track Crude Oil



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CleanTech Energy 15x Under Invested

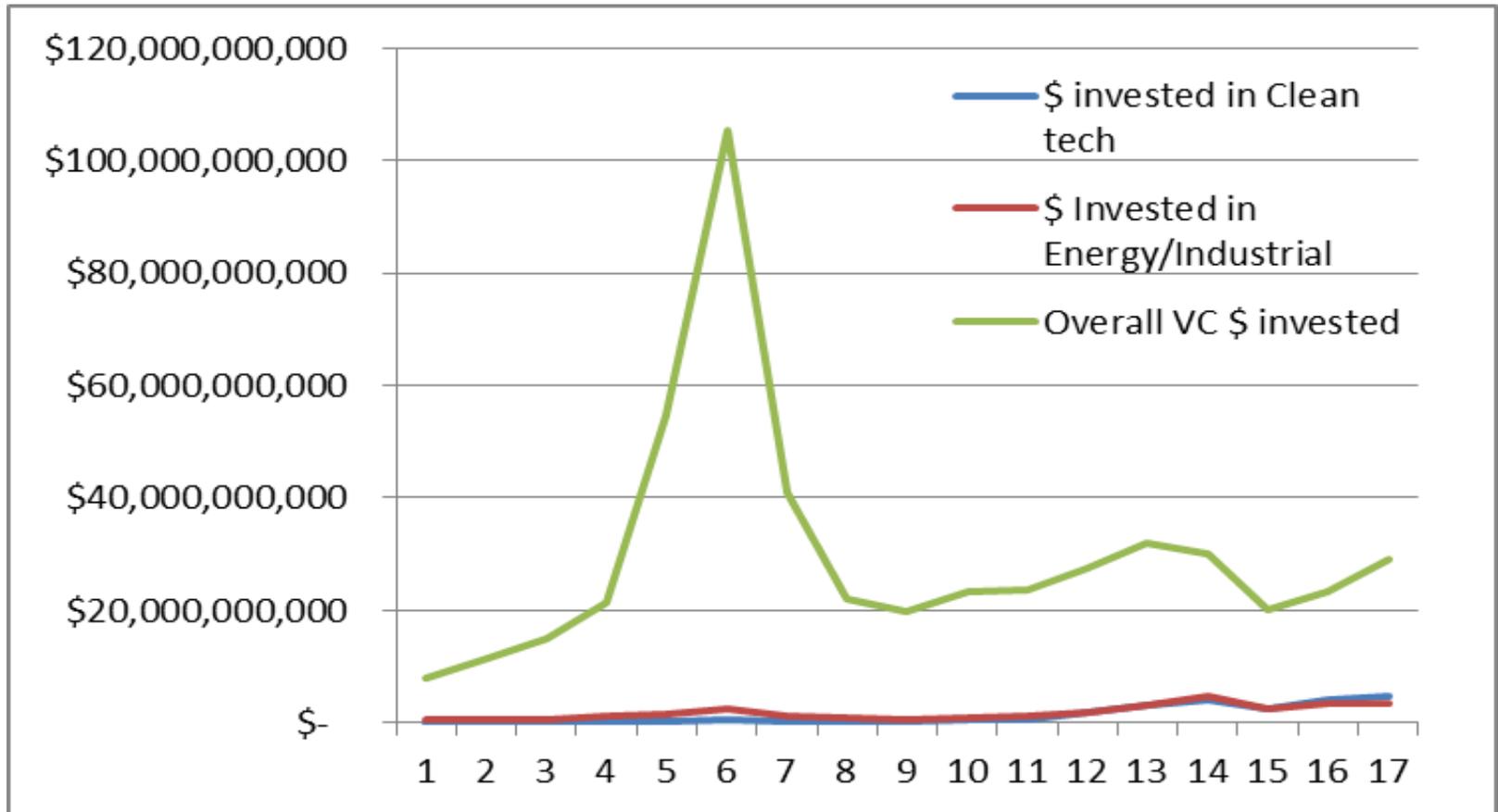
- Relative to underlying industry size, the venture capital industry has underinvested in energy/cleantech (by approximately 15x)

	Five Year VC Funding \$B	Industry Size \$B	Funding as a Percentage of Industry Size
Energy/CleanTec	10.5	1545	0.68%
Telecom/IT	57.8	551	10.49%
Ratio: Energy as a Percent of IT	18.2%	280.4%	6.5%

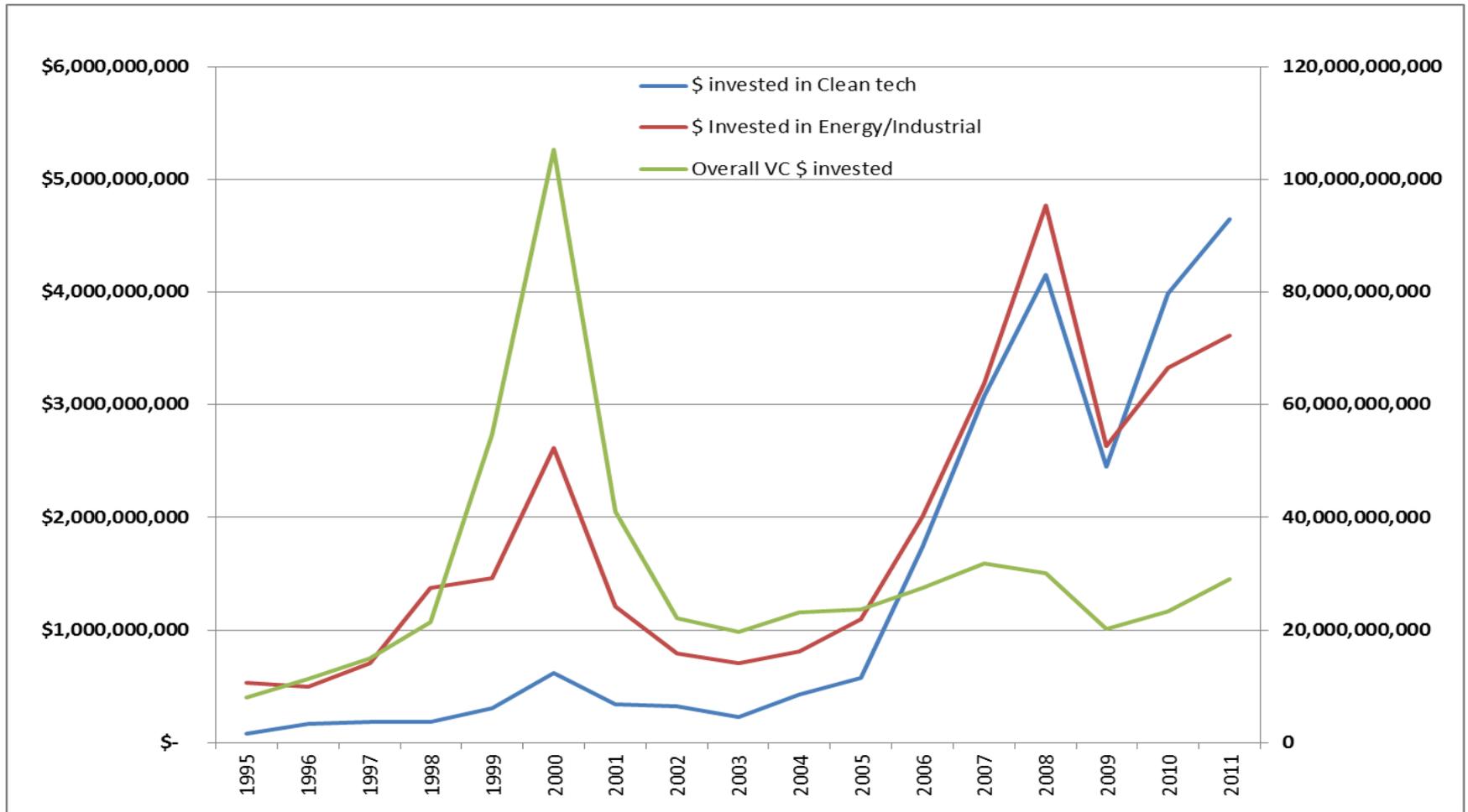
Source: Signal Lake Ventures

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Small \$ compared with VC \$

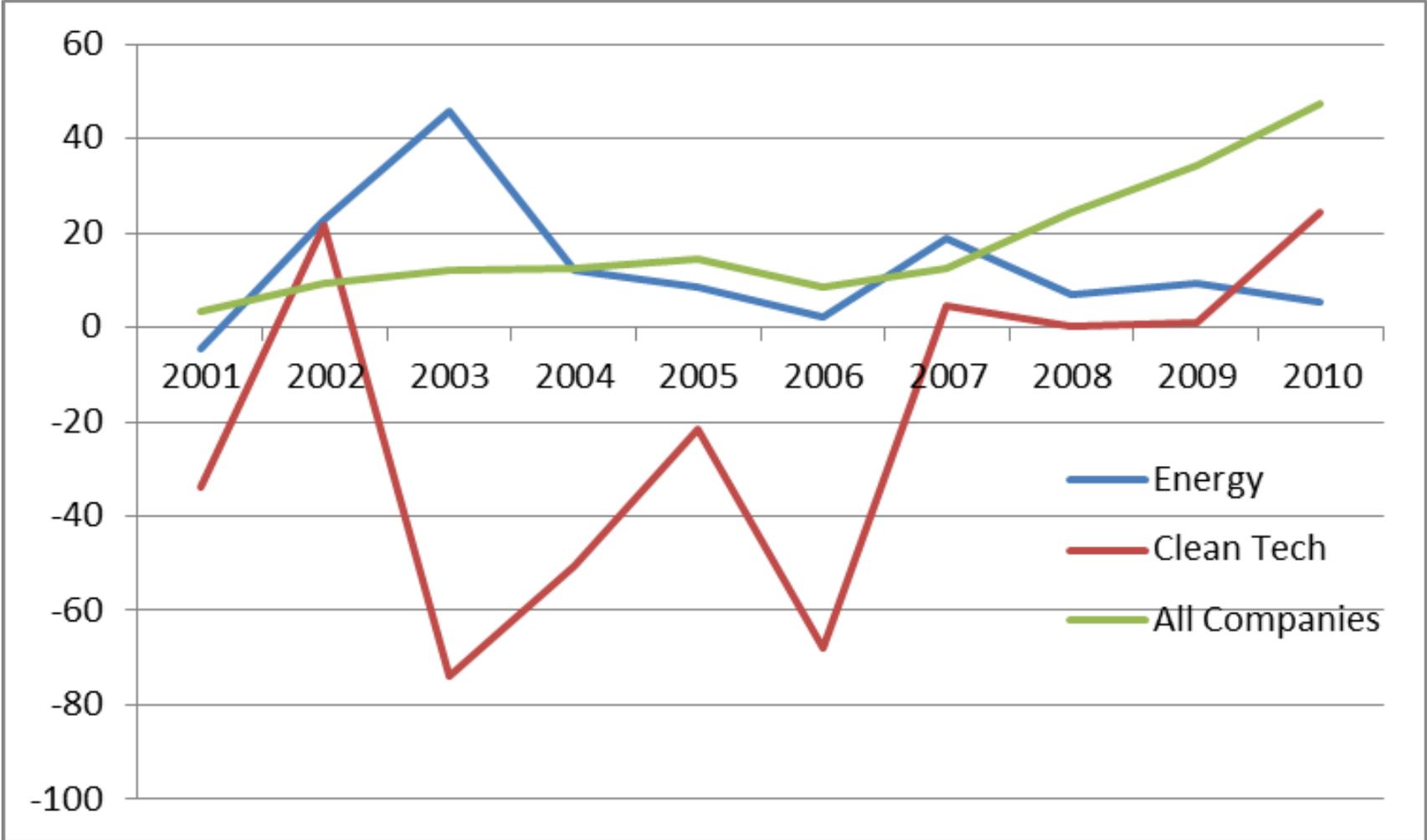


Minor Correlation with VC \$



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Low, Irregular Returns for Clean Tech



Clean tech: Innovation Challenged

- Clean Tech Innovation has limited upside
- Potential customers must be aggregated
- Capital requirements are high
- Implementation \$ and incentives are volatile
- Venture Capital Model fails for clean tech
- Public Sector support required

Implementation Opportunities

- From Liddy's Data Base:
 - Biomass – 35 Companies
 - Municipal Solid Waste – 6 Companies
 - Post Industrial processes for Waste – 12 Companies – Industry Specific
 - Hazardous – 6 Companies
 - Niches like tires – 12 Companies

Prioritization

- Investor: Highest ROI
- Public Sector:
 - Job creation or
 - Lowest environmental cost
 - Lowest Cost to user
- Biggest Impact with Lowest Barrier to Entry

BioMass: 60% of Municipal Waste

- We are following 25 different biomass technologies operating with pilot plants in the U. S.
- Biggest challenge is amassing reliable supply of materials.
- Low technology risk

Biowaste

From an Environmental Problem to an Energy Solution

Biowaste (USA)

<u>Municipal sewer waste</u>	16,000 plants -7 million tons
<u>Industrial waste treatment</u>	23,000 plants
<u>Food processing waste</u>	30+ million tons/year
<u>Livestock and Poultry</u>	millions of tons/year
<u>Crop residues</u>	500 million tons/year

Energy Potential

7.6	Terawatts*
0.5	Terawatts*
10+	Terawatts**
1.4	Terawatts*
3.5	Terawatts*#

World Energy Production

(2006 in Terawatts)

Oil	5.7
Gas	3.6
Coal	4.3
Hydro	1.0
Nuclear	0.9
Solar,wind,other	0.2
Total	15.8

*Berkeley National Laboratory report 2005

#Just bagasse from sugar cane

** PMC Biotec estimate

Harvest Power: Organics Recycler

- Over \$200M invested - Largest VC's
- TEAM
- Technology works
- Growth Constraint: Large supply contracts
- What if CT committed all organics to them?
- What if we added green boxes to blue boxes?
 - Jobs, power, reduced trucking,
 - Start in the cities

PMC Biotec

- Eliminate sludge –
 - Sewage treatment
 - Organics Anaerobic Digesters
- Optimize Methane
- Biggest Customer - KOREA
- www.pmcbiotec.com

Extract High Value Post consumer

- ReCommunity-
- Single stream systems increase participation
- Incentives to reduce by pay per bag systems
- Must have reliable supply and reduce travel costs.

Hazardous Expensive Problems

- Hazardous Waste - Eco Manufacturing – Cambridge MA
- Aggregate Tires for energy recovery – Canadian Carbon Converters - Greenwich
- C&D aggregate and separate and gasify – SG Blocks – Ash recycling
- Waste plastic film – APC Recycling - Killingworth
- Yellow and brown grease – Greenleaf Biofuels – New Haven
- Electronics Recycling – You Renew – New Haven
- Challenge to Growth: Reliable supply

Enough Regulatory Incentives?

- Enable Zero waste from industry
- Give Zero waste systems easier zoning
- What if we had anaerobic digesters behind every grocery store and school cafeteria?
 - <http://www.ecomagination.com/lettuce-power-up-turning-food-waste-to-energy>
- What if we combined those with fuel cells to stabilize the grid? — UTC Power, Fuel Cell Energy, Watt Fuel Cell, Proton, Trenergi, Axiome, Sustainable Tech, Ballard, Infinity
- Make recycling cheaper than landfilling.

Who Gets the Funding?

- Private Sector Funds are available for implementation
- Ability to do well structured projects
 - » Large can be achieved by dispersed but duplicated
- Use proven technology
- Project developers who derisk
 - » Supply contracts in place – Put or pay
 - » Put up 40% equity
 - » Get long term off-take agreements

Connecticut Opportunities

- Leverage the local waste streams
 - Use of waste – biofuels
 - Combine proven technologies
 - Become a paradigm
- Build on local experts for deployment.
 - Efficiency companies for consumers
 - Sewage treatment for municipalities
 - Cheaper recycling for industry and utilities

Public Sector Mandates

- Public Sector:
 - Pool procurement for large scale projects
 - Provide long term contracts for projects
 - Expedite permits with fees related to Cash Flow.
 - Allow easier monetization of tax benefits
 - Stabilize and standardize incentives

Entrepreneurs Mandates

- Create Financeable Projects:
 - Deploy proven technologies
 - Get long term supply and off-take contracts
 - DERISK projects prior to funding.
- Green Products:
 - Focus on extreme cost benefits not green benefits
 - Sell to large customers not consumers
 - Have strong IP

Finance Mandates

- Support large and small scale projects
 - combine/standardize projects
- Monetize tax credits as equity
- Be willing to take scale up risk on technology

Summary

- Market drivers trump incentives
- Public sector as best customer
- Combine regional incentives and demand
- Standardize and Simplify

Thank you

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Resource Links

- www.pwcmoneytree.com
- www.nvca.org
- www.cvg.org
- www.enhancedcapital.com