Lecture 15

New Venture Trends

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Trends

- New trends
  - Life Sciences
  - Clean Energy

Life Science Ventures

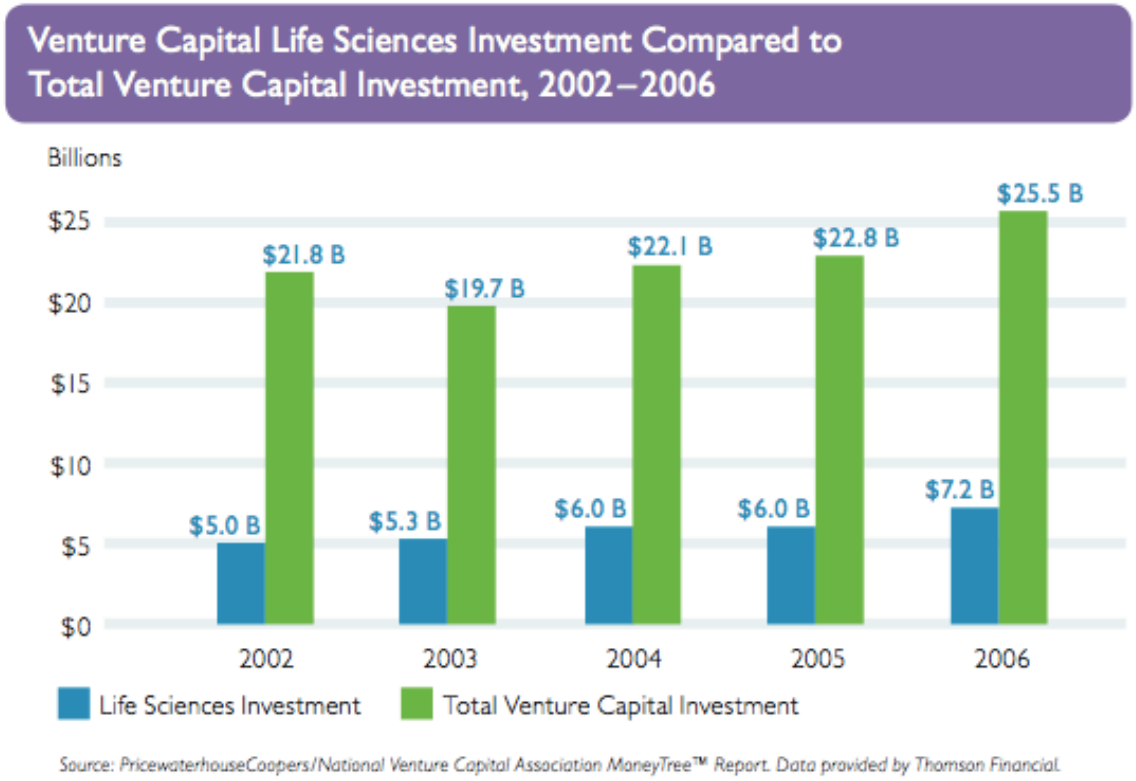
Life Sciences Sector

- Venture Capitalists Are Committed to Growing the Life Sciences Sector
- Since 2002, over $29 billion in venture capital investment has flowed into the life sciences sector. This investment pace is steadily growing. In 2006 alone, venture capital investment totaled $7.2 billion in emerging life sciences companies, representing 28 percent of all venture capital investment.
- Experts agree that virtually the entire biotechnology industry and most of the significant breakthroughs in the medical devices industry would not exist without the support of the venture capital industry.
- Employment at venture capital backed life sciences companies comprised 54 percent of total life sciences employment and 60 percent of total life sciences revenue in 2006.
- Venture financed life sciences companies supported 493,800 jobs and generated $132 billion in revenue in 2006.
- There have been more than 100 venture backed initial public offerings (IPOs) in the life sciences sector since 2002.

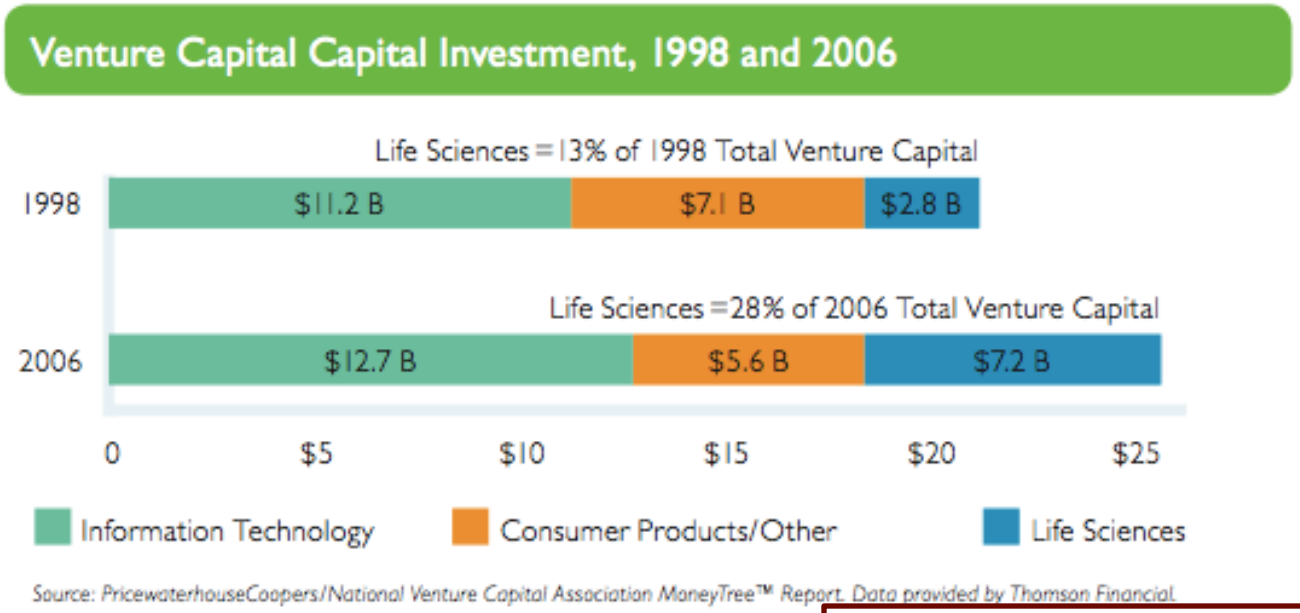
Life Science Companies

- Impact of Discoveries by Venture Capital Backed Life Sciences Companies
- u Saves millions of lives u Improves medical procedures u Reduces health care costs
- u Provides overall economic benefits to the U.S. economy

Life Sciences Investment



Venture Capital Investment



The venture capital community invested $7.2 billion in life sciences companies in 2006, up from $2.8 billion in 1998. Over the last 8 years, venture capital investment in life sciences jumped from 13 percent to 28 percent of total venture capital investment.

For the last 20 years, the venture capital community has enabled many of the most promising life sciences companies to conduct groundbreaking scientific research, while simultaneously building viable businesses that bring these innovative products to the marketplace and contribute to the U.S. economy.

Investment in biotechnology

- In particular, venture capitalists have invested heavily in biotechnology and the medical devices and equipment sector.
- In the biotechnology sector, more than 420 deals received venture capital financing, totaling $4.5 billion in 2006, compared to $3.2 billion in 2002 and $1.6 billion in 1998.
- Additionally, the venture capital industry invested $2.7 billion in some 300 deals in the medical devices and equipment sector in 2006, compared to $1.8 billion in 2002.
- The amount of venture capital invested in the medical devices and equipment sector alone increased by nearly 60 percent between 2004 and 2006.

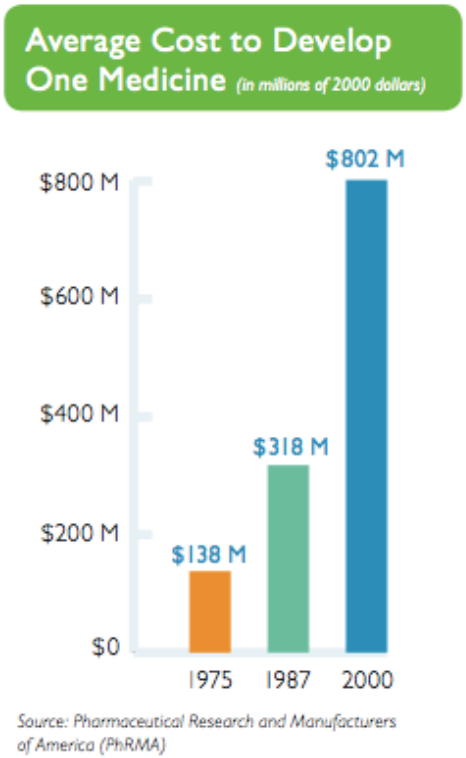
Venture investment in life sciences

- Venture investment in life sciences companies is extremely beneficial to the U.S. economy.
- Employment at venture capital financed life sciences companies reached almost 494,000 workers in 2006, up from nearly 381,000 in 2003, representing 54 percent of total life sciences employment in 2006, according to the latest data from Global Insight, the economic research firm.
- The importance of venture capital investment in the biotechnology sector is underscored by the fact that 40 percent of total biotechnology industry employment in 2006 was tied to companies that got their start with venture capital. In the medical devices and equipment industry, venture financed companies represented 83 percent of total industry employment in 2006.
- The dynamism of venture capital backed life sciences companies, particularly venture financed biotechnology companies, is reflected in the employment growth rates. Venture backed biotechnology companies increased their employment base by 9.2 percent between 2003 and 2006, significantly outpacing the 4.3 percent total compound annual employment growth for the entire biotechnology industry.

Pharmaceutical and life sciences corporations

- The venture capital industry looks to fund only those companies that provide truly fundamental innovation. As a result of such high criteria, many of these venture backed discoveries are so revolutionary that they disrupt markets and industry segments.
- In fact, many large pharmaceutical and life sciences corporations consider young, venture backed companies to be their de facto research R&D pipelines.
- For this reason, venture backed companies often are acquired for their disruptive technologies by these larger organizations.
- From 2002 to 2006, close to 200 venture backed life sciences companies were acquired for their innovations.

Average cost to develop one medicine



Regulatory Hurdles to Building a Successful Life Sciences Company

- Food And Drug Administration (FDA) Approval
- United States Patent and Trademark Office (USPTO)
- Centers for Medicare and Medicaid Services (CMS) Payment
- Sarbanes-Oxley Compliance

Venture backed Life Sciences Employment

Venture Backed Life Sciences Employment, 2003 and 2006

	2003 Venture Capital Backed Life Sciences Employment	2006 Venture Capital Backed Life Sciences Employment	2006 Total Life Sciences Employment	2006 Venture Capital Backed Share of Total Life Sciences Employment
Biotechnology	190,600	247,900	627,600	40%
Medical Devices and Equipment	190,200	245,900	294,900	83%
Life Sciences Total	380,800	493,800	922,500	54%

Source: Global Insight

Medical Startups

Revolutionary Innovations of Venture Backed Medical Startups

Disease	Innovative Treatment Examples
Heart Disease	Angioplasty, Aortic Aneurysm Stent Grafts, Atherectomy, Minimally Invasive Bypass, Electro-Ablation, Implantable Defibrillators, Integrilin, and ReoPro
Cancer	Doppler Ultrasound, Minimally Invasive Biopsy, Prostate-specific Antigen (PSA), MRI, Avastin, Erbuitux, Gliadel, Herceptin, Rituxan, and Velcade
Stroke	MRI and Tissue Plasminogen Activator (TPA)
Respiratory Disease	FluMist and Ventilators
Diabetes	Glucose Self-Monitoring Devices and Recombinant Human Insulin
Spinal Injuries	Kyphoplasty, Artificial Spinal Discs, and Spinal Fusion Cages

Medical Technology

Medical Technology Revolutionizes Breast Biopsies

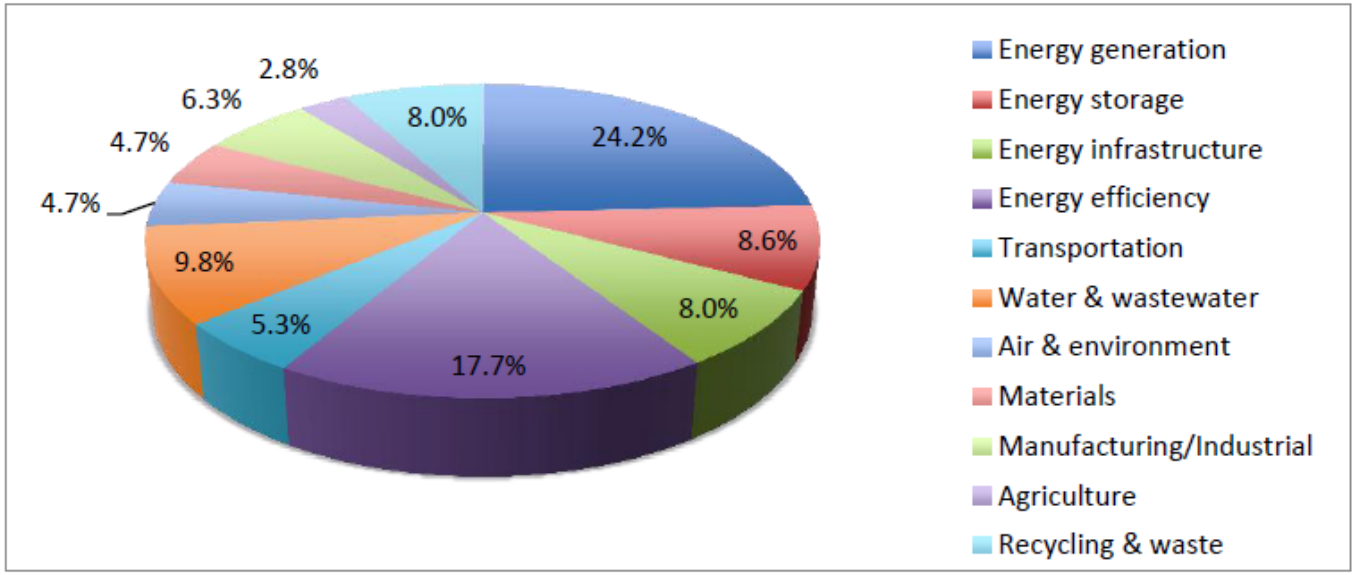
	Open Surgical Biopsy	Minimally Invasive Biopsy Procedure
Incision Size	1.5-2"	0.12-0.2"
Procedure Time	2-4 hours	30-60 minutes
Recovery Time	Several hours	Immediate
Scarring	Substantial	Minimal
Cost	$1,169-$1,360	$517-$855

Source: AdvaMed

Clean-Tech Ventures

Areas of Clean-Tech

Figure 61. Areas of Clean Tech for Planned Investments



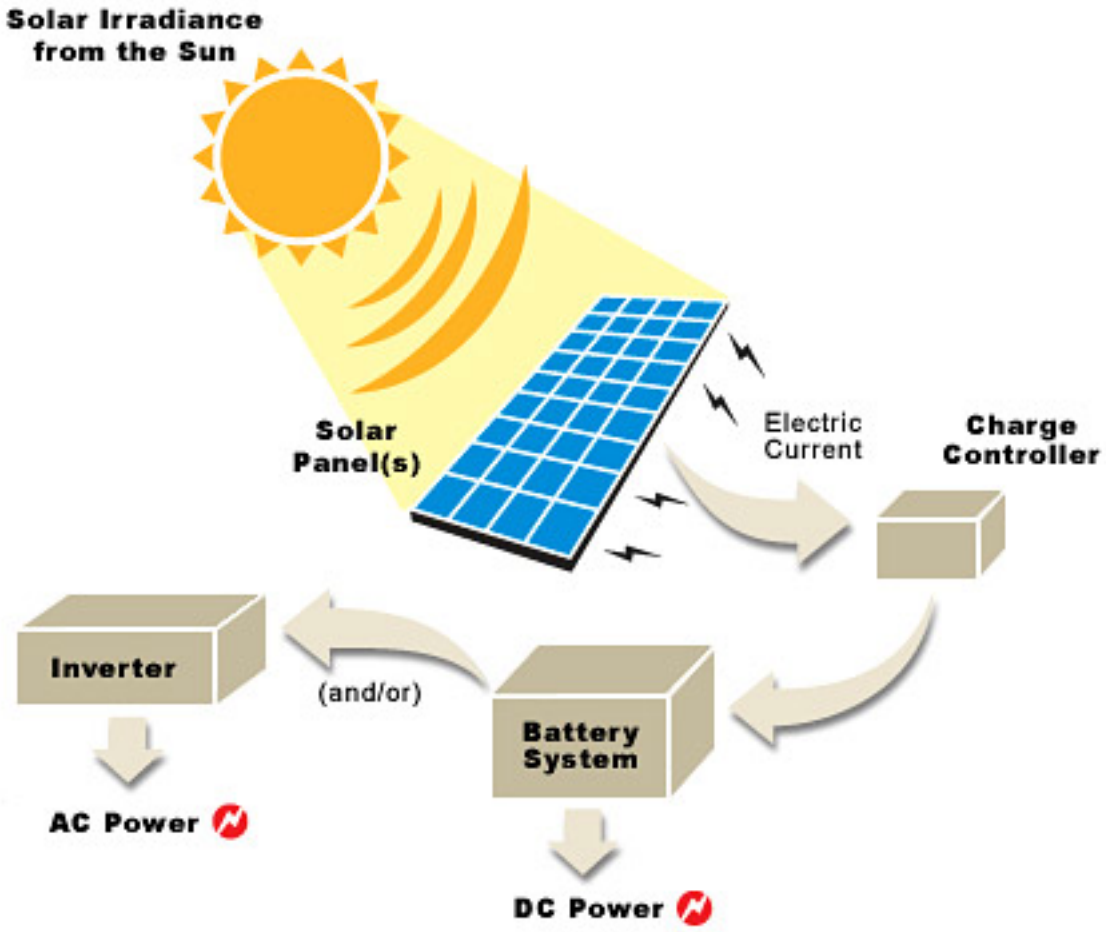
Demand or Supply side

- Conventional wisdom says that capital-efficient, entrepreneur- friendly opportunities would be found on the "demand side" of the energy space.
  - energy consumption management,
  - energy-efficient products and
  - demand response management.
- Entrepreneur-friendly opportunities in "supply side" territory also available.

Solar Energy

- Solar has been the dominant category for venture capital in-vesting in Energy for several years, with a primary focus on new materials and manufacturing. As the deployment of solar gains ever-increasing scale, we see a new set of opportunities emerging around underserved parts of the solar ecosystem.

Solar Energy



Inverter

- The inverter is an interesting part of the system for several reasons.
- It's the most despised part of the chain, accounting for the majority of failures in the field and stubbornly resisting cost reduction due to its Edison-era architecture.
- As cell prices drop, the inverter's share of system cost rises, making it an increasingly important area of economic focus and an increasingly attractive target for reinvention by entrepreneurs.

Value Added Services

- Value-added capabilities such as monitoring, optimization, control and storage that can significantly enhance the business case for solar, and accelerate its adoption in additional markets.

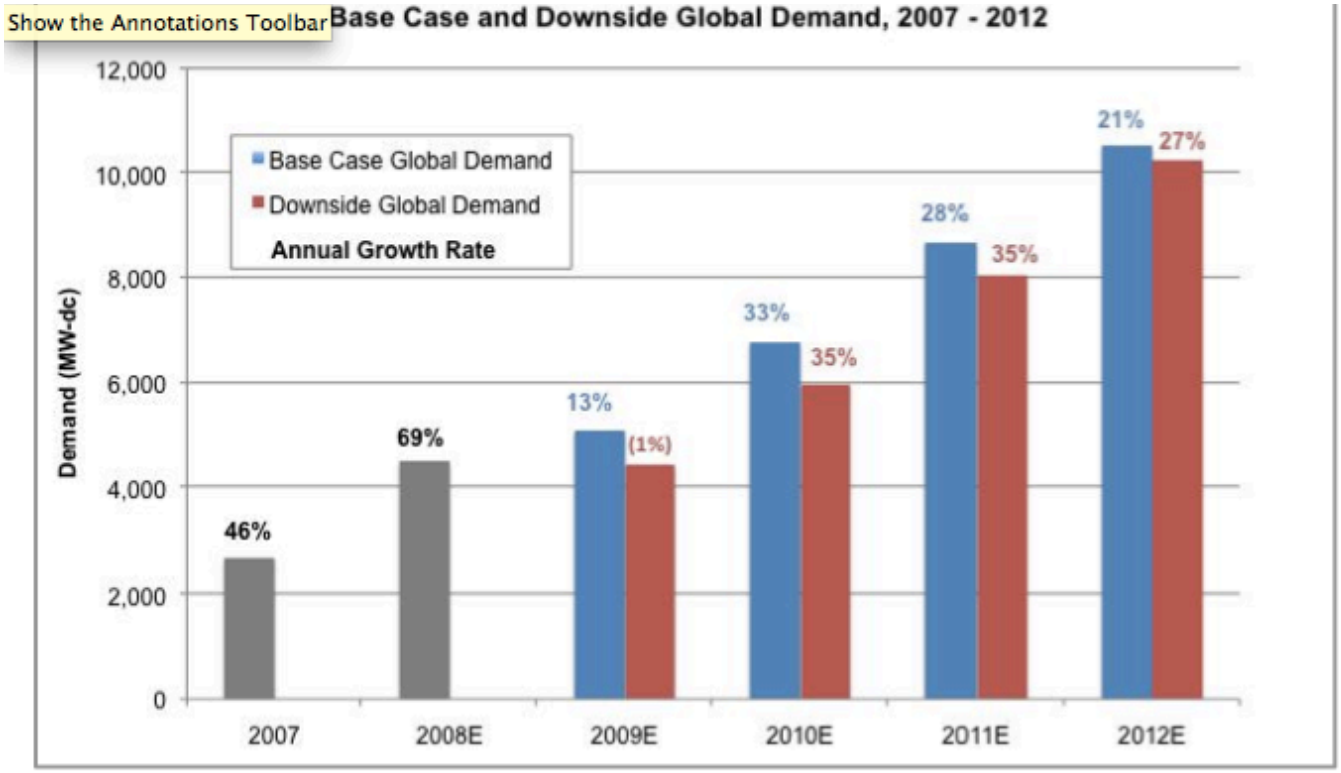
Green energy

- **As the consumer's "green" consciousness is raised, opportunities are created to serve this emerging media and commerce segment. The Internet will be a driving force.**
- Many consumers are taking an ever greater interest in their energy consumption.
- This interest is driving them to seek out more energy-efficient products (e.g. the Prius), better understand their own energy usage, and compare their "green-ness" to others.

Control

- Actual control of the key electric devices in their home.
  - How to effectively engage the consumer in the topic of energy consumption is a central question in all of these efforts, since the technical apparatus of fine-grained control is a moot point if the consumer isn't paying attention.
  - Another strategic question involves the utility – specifically, whether to go to market with and through the utility, or to go after the consumer directly.
  - While the former promises a powerful channel, the utility sales cycle is long.
  - The utility also has its own complex business model and motivations which may or may not be well-aligned with those of a startup focused on consumer energy management.
  - Going direct, meanwhile, poses the classic online customer acquisition challenge but holds out the potential for creating a valuable new consumer Internet brand.

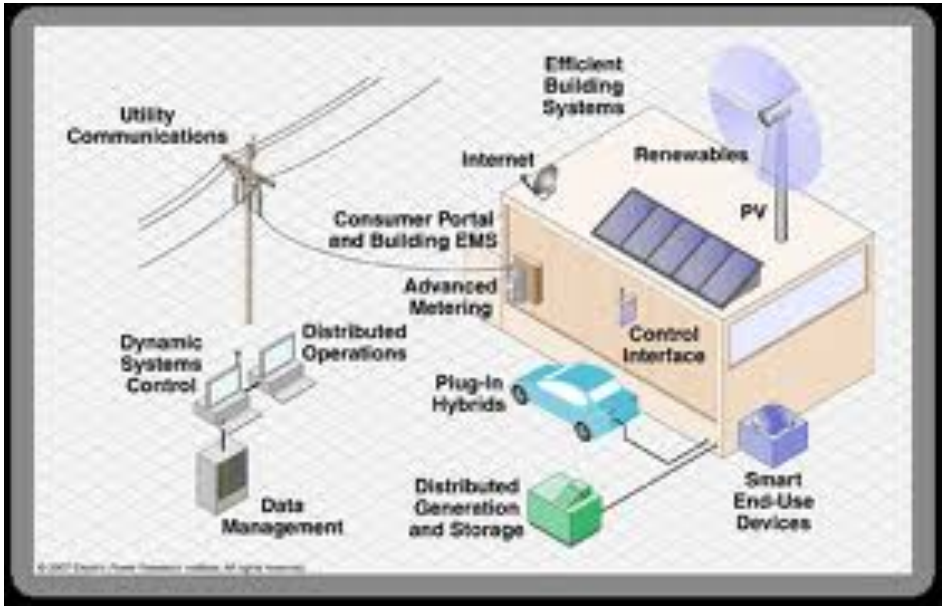
Demand



Graph provided by Greentech Media and Prometheus Institute

Smart Grid

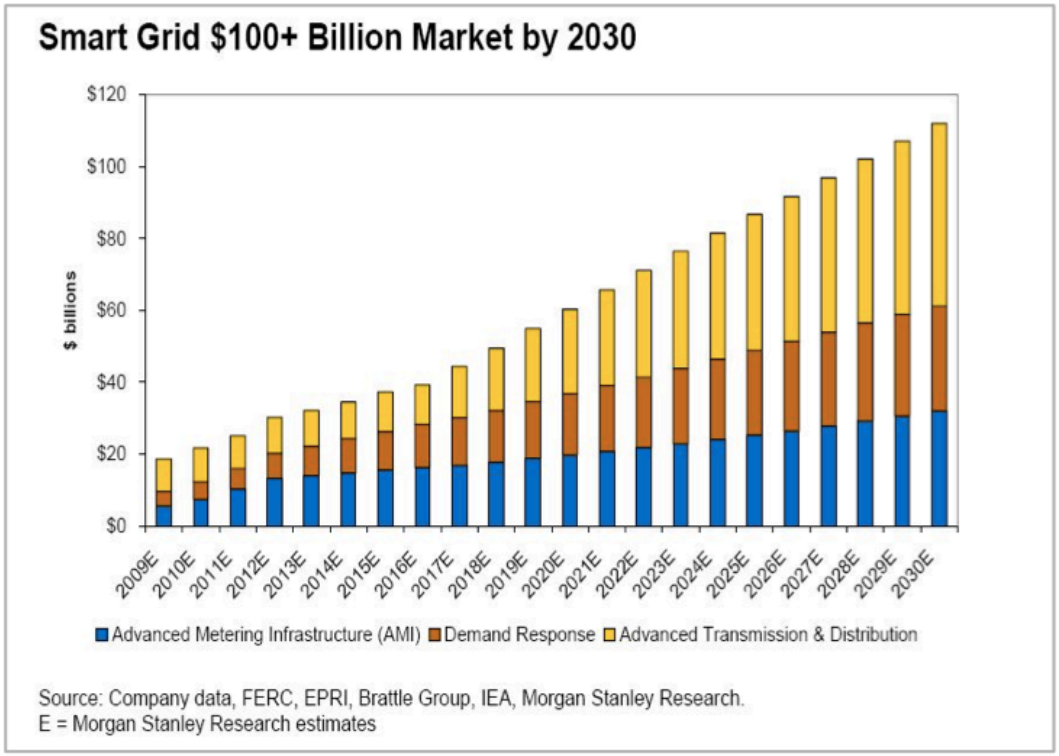
- **The electricity distribution network is emerging as the next great opportunity in communications. It carries with it many of the same promises and challenges of prior waves in net- working.**



Electric grid

- There are many new forces being applied to the electric grid that are pushing it to its limits.
- When most of the grid was conceived and built, no homes or businesses had central air conditioning, which is now its most significant load.
- And new loads previously unimagined (computers, 60"+ plasma TVs, even plug-in hybrid cars) are becoming staples of the American household.
- Peak load has been increasing faster than off- peak, creating an unbalanced, inefficient system made worse by the fact that there is virtually no energy storage on the grid.
- Until the very recent recession and drop in electricity demand (the first since WWII), supply has not been able to keep up, capacity margins have been down, and interest by government, regulators and utilities in deploying new technologies to solve the problem has increased.

Smart Grid



Graph provided by Morgan Stanley Research

AMR & AMI

- Auto- mated meter reading (AMR) to save utilities the expense of manual meter reads has turned into an elaborate vision of a complex, two-way information and communication network overlaid onto the electric grid.
- And the vision extends beyond the meter, into homes and businesses, with the ultimate goal of giving the utility more granular visibility and control of demand - something which today is completely outside their control, except for highly manual interactions with a group of their largest customers.
- Much of the venture investment to date in this space has focused on the networking infrastructure to enable the smart grid (aka AMI – Advanced Meter Initiative).

Software platforms

- There are opportunities of interest in the software platforms that will be integral to this new infrastructure, and the applications that can be built on top of them.

- A new generation of infrastructure software will be required to fulfill these visions. The situation is again analogous to the impact of the IP revolution on the telecommunications industry, which for a while opened the door to new software architectures before consolidation eventually took hold.

- New entrants seeking to develop such products will need to contend with integration with legacy back-office and operations systems, and competition from the software incumbents who have already begun to fill the gaps in their smart grid product portfolios.

Smart Grid Market

- The Smart Grid market is very large – every "device" connected to the grid is a candidate for a technology upgrade, and every individual, home, and business are customers for new energy hardware, software, and services. We expect this to be fertile ground for investment for many years to come.

Energy Storage

- **Energy storage has the potential to "change the game" in how electricity is generated, distributed and consumed. While this potential has gone unrealized for decades, there is reason for optimism behind a new generation of aspirants.**

Energy & Social

- Internet- based consumer plays, capitalizing on the opportunity to engage the consumer, build a community, discern purchasing intent, and so forth – all around green themes and market segments.

Energy Data Cloud

- An application which is an authoritative repository, to which other applications must interface.
- Such a system would be the natural underpinning of a future "Energy Data Cloud", home to the customer's energy-related data, operational applications and analytics.
- Such a cloud would also be the obvious point of integration between the enterprise and the other systems of the Grid, facilitating relationships with energy service aggregators, energy markets and market-facing intermediaries, grid system operators and even utilities.
- Vendors that can garner footprint via rock-solid business cases will win the opportunity to contend for the Energy Data Cloud title.

Getting Engaged

- **Except for a few die-hard energy geeks, the general population is not all that interested in slicing and dicing their kWh's consumed. Which explains why efforts focused on ever-more-granular presentation of raw data haven't taken off.**
- A new tack must be taken to gain consumer mindshare, and we think social media will be a large part of the equation.

Utilities

- **The utility offers scale, but can be a challenging partner for entrepreneurial innovators.**
- The utility casts such a long shadow in the energy world, they stand apart as the most obvious and attractive partner for Smart Grid ventures seeking large-scale distribution.
- However, working in harmony with the utility is typically not easy for fast-moving startups.
- Utilities have their own unique business models, policy goals, political considerations, regulatory obligations, operational priorities and cultural context.
- Most of these are foreign to free-wheeling entrepreneurs transplanted from other industries. Any startup seeking to leverage the scale benefits of the utility must learn to work effectively in this strange world.

The Consumer Energy Platform

- **Once the consumer is engaged, there is the opportunity to take further steps in relationship and demand management.**
- With the consumer finally paying attention, avenues are opened to a richer set of interactions and transactions.
- One such avenue lies in the field of active control, which would involve equipping the most engaged elements of the population with Grid- connected devices (such as communicating thermostats or "smart plugs") and enrolling them in consumer-friendly demand response programs.

The Role of the Aggregator

- **Energy market structure and operational factors combine to create opportunities for technology-enabled, market- savvy intermediaries.**
- An aggregator/service provider model, in which they gain control of a large collection of loads and assets, and monetize them in the energy markets in some optimized fashion.
- This model has already been put to work in its simplest form by the Demand Response aggregators, who no doubt will have ambition to elevate the sophistication of their offerings, increasing levels of automation, uplifting monetization potential and expanding the base of assets and loads they can target.
  - Variations in terms of target market (C & I? Consumers?) and also target MW's (EV's? Storage? Building systems?).
  - Some aspirants will no doubt integrate all the way to outright asset ownership, a more capital-intensive version of the same basic economic play.

VC investment

Top Venture Capital Clean Technology Sectors in 2009		
Technology Sector	**Amount Invested**	**% of total**
Solar	$1.2 billion	21%
Transportation (including electric vehicles, advanced batteries, fuel cells)	$1.1 billion	20%
Energy Efficiency	$1.0 billion	18%
Biofuels	$554 million	10%
Smart Grid	$414 million	7%
Water	$117 million	2%

Source: Cleantech Group (cleantech.com)

Clean Technology VC Investment

Historical Clean Technology VC Investment By Year – North America, Europe & Israel, China, India	
2002	$908,269,409 (164 deals)
2003	$1,259,665,762 (301 deals)
2004	$1,321,871,203 (333 deals)
2005	$1,994,122,434 (381 deals)
2006	$4,519,108,949 (409 deals)
2007	$6,053,192,844 (488 deals)
2008	$8,465,483,542 (567 deals)
2009 preliminary (final to increase)	$5,640,928,988 (557 deals)

Source: Cleantech Group (cleantech.com)

Five Largest Clean Technology Rounds

Five Largest Clean Technology Rounds in 2009		
Company	**Description**	**Amount Raised**
Solyndra (USA)	Thin-film solar (CIGS)	$198 million
A123 Systems (USA)	Advanced batteries	$100 million
Landis+Gyr (Switzerland)	Smart meters	$100 million
Silver Spring Networks (USA)	Smart grid	$100 million
V-Vehicle (USA)	Car maker	$100 million

Source: Cleantech Group (cleantech.com)

References

- Entrepreneurial Energy by P. Wagner, et. al. Accel
- Entrepreneurial Energy 2.0 by P. Wagner, Accel
- http://cleantech.com/about/pressreleases/20090106.cfm