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# From Research to Innovation: The Power of an Energy Innovation/Entrepreneurship Ecosystem

Visit by Russian Delegation

Massachusetts Institute of Technology

Cambridge, Massachusetts

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William K. Aulet, Senior Lecturer  
and Managing Director

MIT Entrepreneurship Center  
Chairman, MIT Clean Energy Prize

One Amherst Street, Room E40-196  
phone: +1-617-253-8653  
e-mail: [aulet@mit.edu](mailto:aulet@mit.edu)

Cambridge, MA 02142-1352 USA  
fax: +1-617-253-8633  
<http://entrepreneurship.mit.edu>

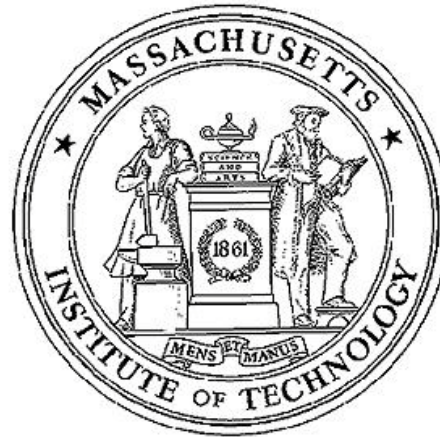
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# Innovation/Entrepreneurship at MIT

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- Results of Kauffman Foundation/MIT Study (2009)
- 25,800 currently active companies formed
- 3.3 million employees
- \$2 trillion in annual revenues
- If considered as a standalone economy, these spinoffs would be the 11-17<sup>th</sup> largest in world
- Amazing laboratory to study innovation

# Invention at MIT

## TLO Statistics for Fiscal Year 2008

Total Number of Invention Disclosures	522
Number of U.S. Patents Filed (including provisionals, follow-ons, etc.)	282
Number of U.S. Patents Issued	122
Number of Licenses Granted (not including trademarks and end-use software)	68
Number of Trademark Licenses Granted	19
Number of Software End-Use Licenses Granted	15
Number of Options Granted (not including options as part of research agreements)	30
Number of Companies Started venture capitalized and/or with minimum of \$50K of other funding)	20

Cash Income	\$89.1 M
Royalties	\$65.9 M
Patent Reimbursement	\$8.2 M
Equity Cash-In	\$ 4.0 M
Expenditure on Patents	\$16.3 M

# Innovation

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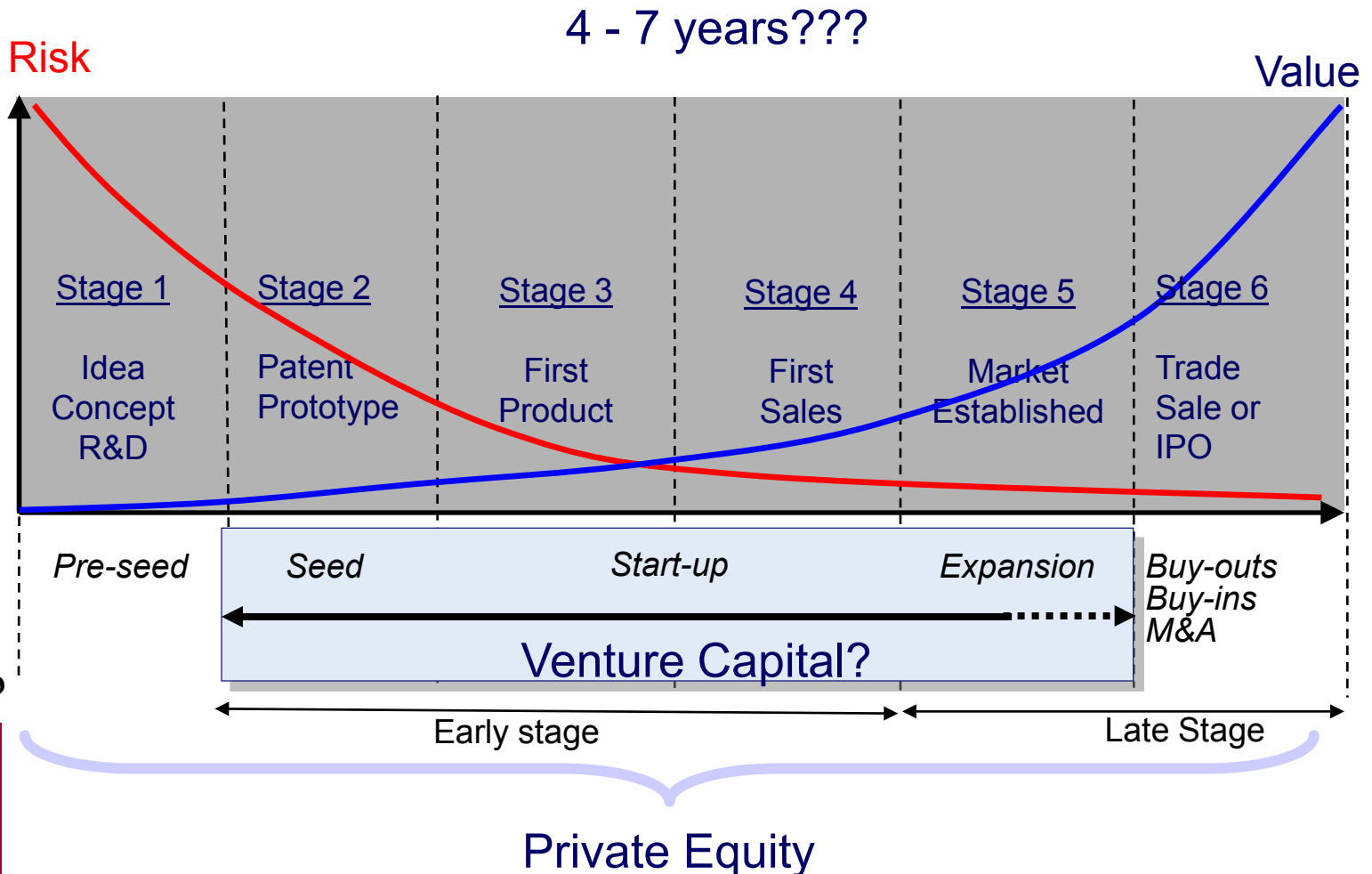
- Innovation = Invention + Commercialization

# Innovation Engine Driving US Economy

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- Innovation Engine = Power of Entrepreneurship + VC
- The Power of Entrepreneurship comes from:
  - Focus
  - Willingness to take risk
  - Fast clock speed
  - High financial & personal incentives
- “Venture Capital (VC)” is a catalyst for creating, nurturing, and growing new ventures
- “Venture Capitalists” contribute:
  - Funding
  - Strategy assistance
  - Powerful networks including access to key customers
  - Professional experienced management oversight

# Life Cycle of a New Venture

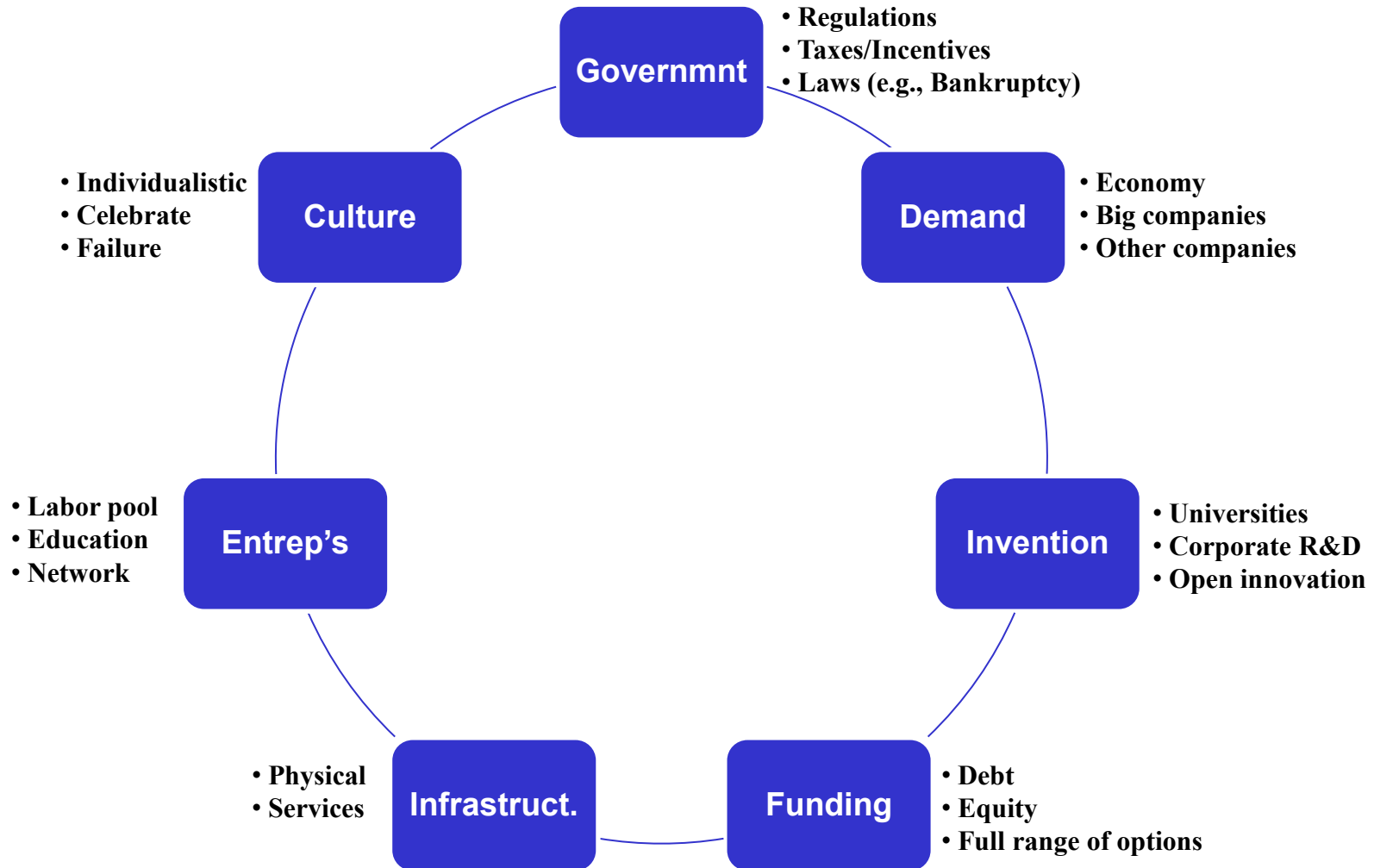


# Experience Base

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- US - MIT
- Saudi Arabia
- Denmark
- Pakistan
- Canada – Quebec Region
- United Arab Emirates
- Russia
- Scotland
- Spain
- Italy – Friuli Region
- England
- Netherlands
- US – Silicon Valley
- US – South Region
- Finland

# Systems View: Innovation Ecosystem



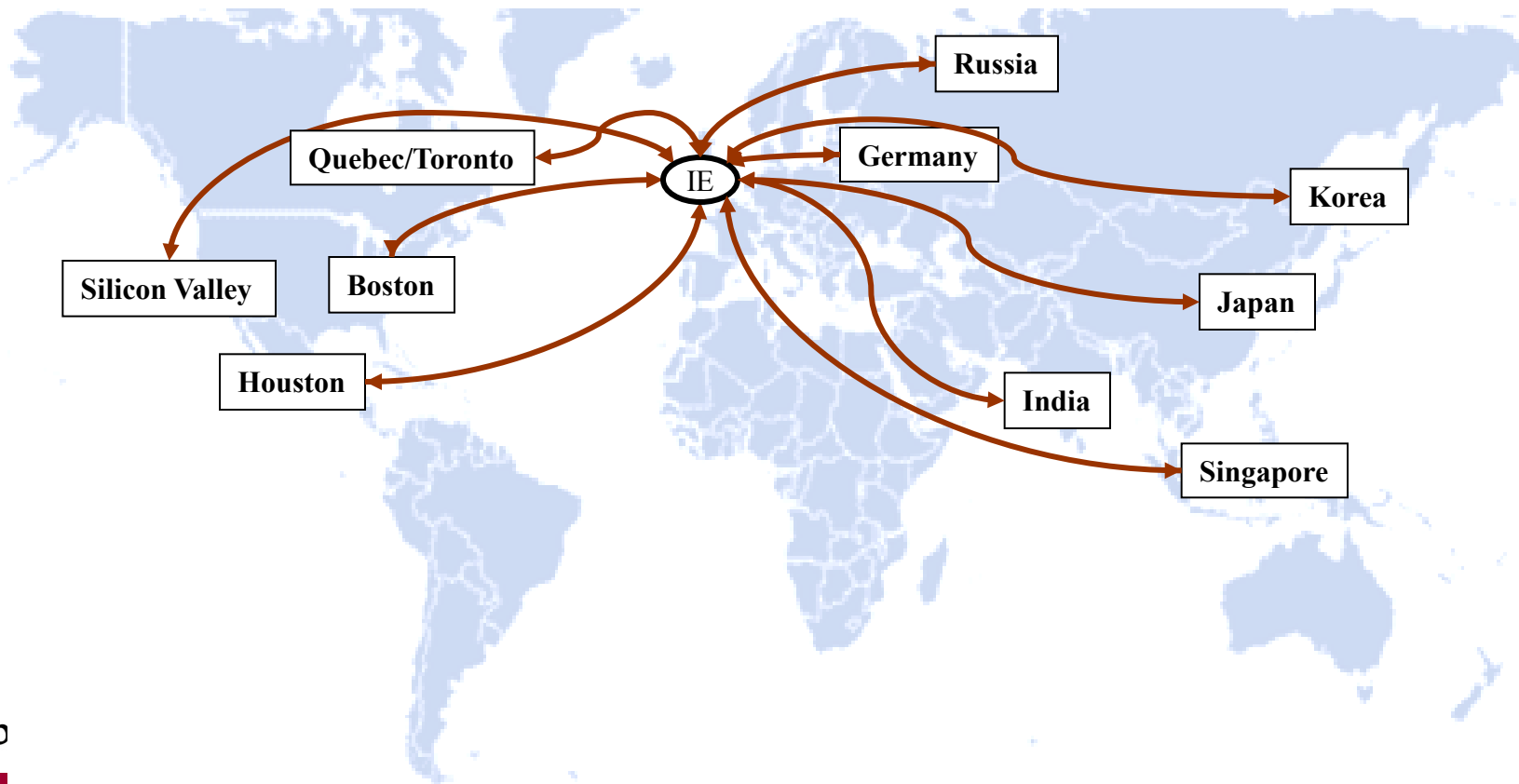
# Some Elements Have More Leverage Than Others...

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Based on Our Experience and confirmed in the Monitor Group Entrepreneurial Benchmarking Study ([www.monitor.com](http://www.monitor.com)), the elements with the most leverage are:

- 1a. Culture
- 1b. Entrepreneurial Ambition and Skill
3. Government Taxes/Incentives
4. Access to Early Capital (not VC)
5. Access to Invention

# Synergies in WW Innovation Ecosystem



- Locations will vary by industry and above are examples to illustrate point

# General Principles for Success

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- **Educate**
- **Network**
- **Celebrate**

# Historical Innovation in Energy Sector

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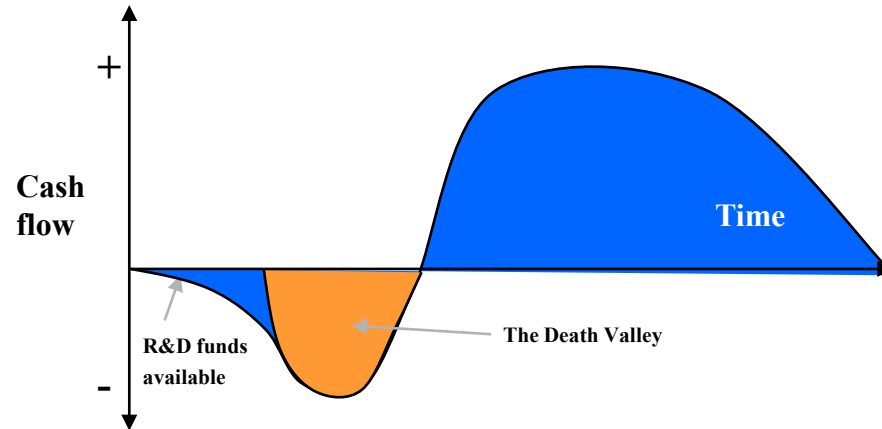
- Structural Considerations
  - Cyclic nature
  - Low priced commodity
  - High capital intensity → conservative gatekeepers
  - Scope and scale issues
  - Regulatory overhead
- Resultant Environment
  - Unattractive
  - Shortage of high quality capital & entrepreneurs
  - Relatively very unimpressive results

# Poor Track Record

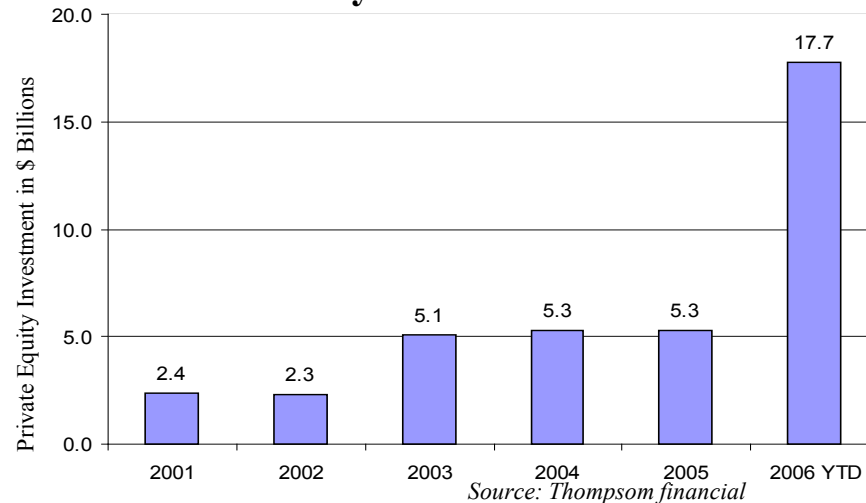
<b>GTL (40)</b>	<b>Multiphase metering (20)</b>	<b>Expandable casing (10)</b>
<b>Subsea processing (30)</b>	<b>Sub-sea trees (20)</b>	<b>Dual gradient drilling (10)</b>
<b>Horiz drilling (25)</b>	<b>MWD (17 yrs)</b>	<b>Slag Cement (10)</b>
<b>3D Seismic (20)</b>	<b>FPSO (15)</b>	<b>DH separation (10)</b>
<b>Seismic while drilling (20)</b>	<b>Smart wells (15)</b>	<b>Visualization (3)</b>
<b>4D Seismic (20)</b>	<b>Slimhole drilling (15)</b>	

# About to Change?

## Stranded in Funding “Death Valley”

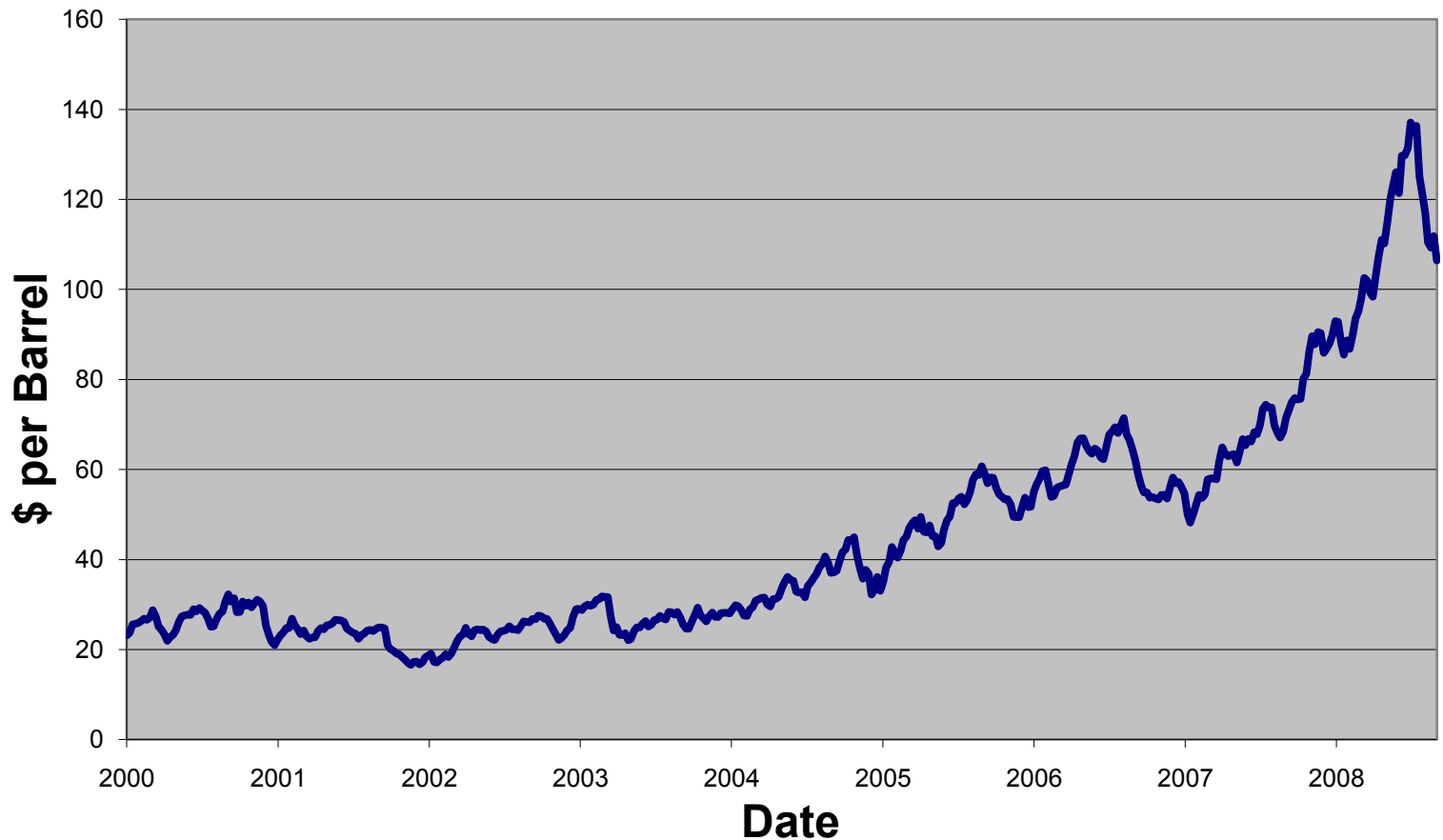


## Industry at Inflection Point



# Economics + Climate + National Security

## World Oil Prices



Source: <http://tonto.eia.doe.gov/dnav/pet/hist/wtotworldw.htm>

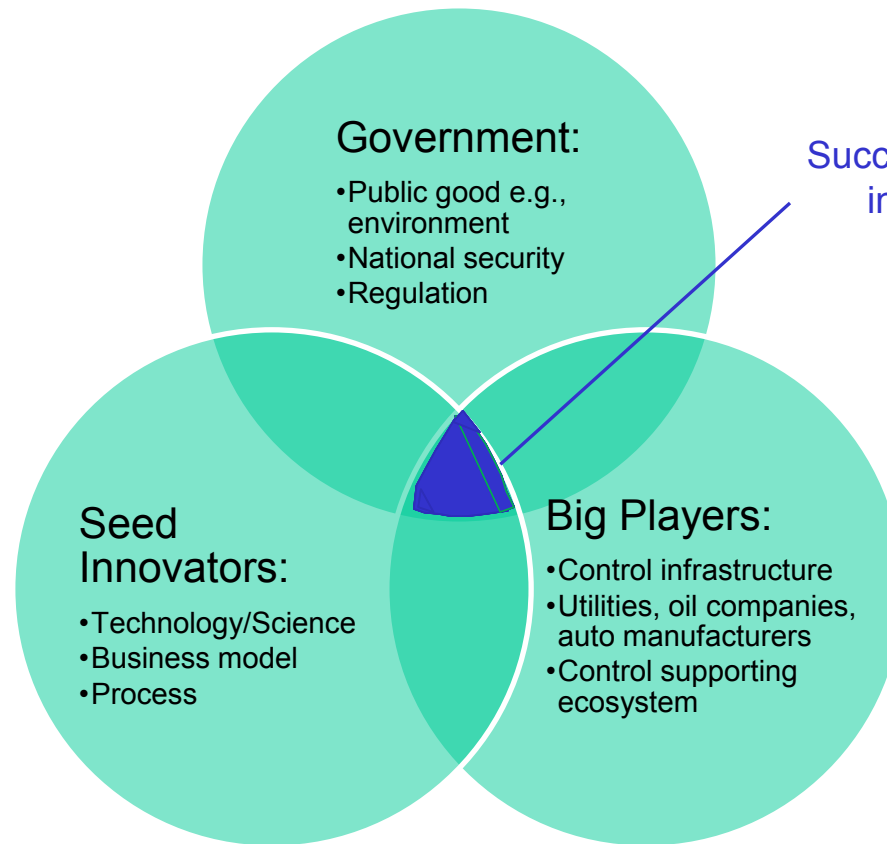
# Not so Fast ...

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“The Energy Industry is a multi-trillion dollar per year, highly capitalized, commodity business, with exquisite supply chains, providing essential services at all levels of society. This leads to a system with considerable inertia, aversion to risk, extensive regulation and complex politics”

-- Ernie Moniz, MIT Prof of Physics & Director of MIT Energy Initiative  
September 4, 2008

# Energy Innovation & Entrepreneurship



Successful strategies require incorporating all three components

Examples of successes (Macro):

- Solar power in Germany
- Bio-Ethanol in Brazil
- Wind power in China

Examples of successes (Micro):

- Evergreen Solar
- A123
- EnerNOC/SunEdison

# Groupings of Innovations

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- Categories of innovations:
  - Incremental or sustaining
  - Disruptive
  - General
- Types of innovations
  - Technical
  - Process
  - Business model
  - Positioning/perception
  - Other

# Future of Energy Innovation

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- Inflow of Money is Very Helpful
- Choke Point Becomes Entrepreneur Resource
- New Generation of Renaissance Energy Entrepreneurs/Innovators
  - Interdisciplinary
  - Policy and politically savvy
  - Effective in working with large companies
  - Comfortable with incremental and/or disruptive innovations
  - Seeking mix of technology, process, business model & other innovation
- Collaborative Teams

# MIT Game Plan

## Educate

- Energy Ventures
- Highly Selective Program
- Mix of Engineering/Science, Business & Policy

## Celebrate

- MIT Clean Energy Prize
- National Student Competition
- 113 Entries from 40 Colleges & Universities

## Network

- MIT Energy Club
- MIT VC Conference, MIT Private Equity Conference, NECEC
- Active Placement Services

## Educate

- Financing Energy Projects
- iTeams
- New Enterprise

## History

The MIT Clean Energy Prize, established in 2007, is the premier student business plan competition in the energy space in the U.S. and was created to accelerate the pace of innovation in the energy area, specifically with regard to clean energy and reducing our dependence on foreign oil

## Focus:

- U.S. university students bringing new ideas and technologies in the clean energy space and turning them into successful businesses
- Providing support to educational institutions that do not have MIT's ecosystem, network and platform

*Biomass*

*Energy Efficiency & Infrastructure*

*Clean Hydrocarbons*

*Renewables*

*Transportation*



# Examples



Food Waste to Fertilizer



**Green Gopher**

*Digging For Energy Savings  
In Your Backyard*



*The Wind Logistics Group*



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# Upcoming

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- May 3<sup>th</sup> at Boston Sheraton Hotel 3-4:30 PM – Showcase with 25 Finalists
- May 3<sup>th</sup> Category Finalists Announced
- May 11<sup>th</sup> Finals at Wong Auditorium
- [www.mitcep.org](http://www.mitcep.org)

# Case Study: Clean Energy Entrepreneurship

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January 4, 2010

Shawn Lesser: A few months ago, I ranked the best U.S. states for cleantech, as well as the top 10 cleantech countries (see [The top 10 U.S. states for cleantech in 2009](#) and [The top 10 cleantech countries of 2009](#)). In my latest rankings, I sought to identify the 10 U.S. academic institutions best suited to take advantage of this trend.

Here are the top 10 cleantech universities in 2010:

1. Massachusetts Institute of Technology MIT is a true cleantech spinoff machine. The Cambridge, Mass.-based institution is also home to the MIT Clean Energy Prize, the premier student clean energy innovation and venture creation competition in the country. The annual \$200,000 prize is awarded to the top student energy venture in the country. In 2009, 113 teams entered from 40 universities around the country. MIT Clean Energy Prize has helped launch several energy ventures, including FloDesign, FastCap Systems, Levant Power, Husk Insulation, and Covalent Solar. Another reason for the top ranking has been the establishment of the MIT Energy Initiative in September 2006, as an institute-wide initiative designed to help transform the global energy system to meet the needs of the future and to help build a bridge to that future by improving today's energy systems. Notable cleantech spinouts include: [A123 Systems](#), FastCap Systems, Levant Power, Trophos Energy, [Promethean Power](#), [1366 Technologies](#), Sun Catalytix, and [Agrivida](#).

# Mind Set in this Process

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*The willingness to fail*

*gives us*

*the ability to succeed.*

# Best Renewable Fuel

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***“Do you know what my favorite renewable fuel is?”***

***An ecosystem for innovation. “***

-- Thomas Friedman, Time Magazine, September 15, 2008