



Clean Energy and Economic Prosperity: *America's 21st Century Innovation Imperative*

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Presentation Agenda

1. The case for clean energy innovation
2. Clean energy innovation challenges
3. Policy implications

Innovation: A definition

The transformation of an idea into a marketable product or service, a new or improved manufacturing or distribution process, or a new method of providing a social service.

Our Nation's Dependence on Innovation

- Capacity to innovate is vital to the future of U. S. competitiveness / economic security
- Responding to this challenge requires that we recognize that the international economic playing field has forever shifted
- Since other nations will continue to have the competitive advantage of lower wages, the U. S. must grow its innovative capacity to maintain/increase its standard of living

Universities and Small Businesses - Key Engines of Innovation

- 8 percent of all university startups go public, in comparison to a "going public rate" of only 0.07 percent for other U.S. enterprises - a 114x difference
 - Over 400 university startups are created nationally each year based on federally funded R&D, which included Google, Netscape, Genentech, Lycos, Sun Microsystems, Silicon Graphics, and Cisco Systems
 - 68% of university startups created between 1980 to 2000 remained in business in 2001, while regular startups experienced a 90% failure rate during that same time period
- The SBIR-STTR program is critical to the nation's innovation ecosystem and future prosperity!**





Clean Energy Innovation

– Our National Imperative

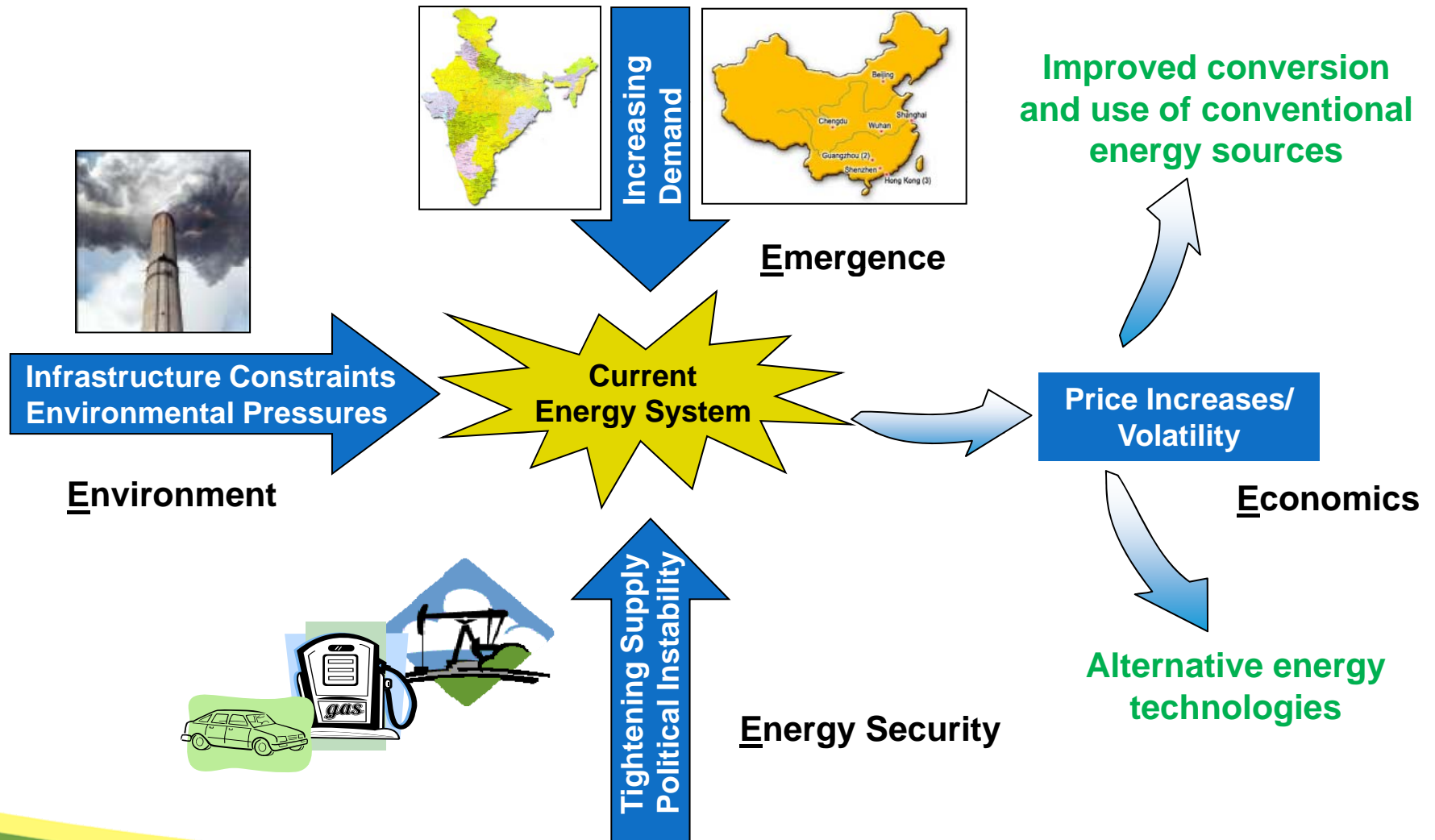
“**Energy and innovation**, healthcare, and education – these are the pillars of the new foundation we have to build. “

“In no area will innovation be more important than in the development of new ways to produce, use, and save energy.”

-- President Barack Obama, August 5, 2009

Why Energy Innovation?

The 4E's of Energy



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Key Technology Challenges

Implementing Renewable Gigawatts at Scale



BARRIERS

- . Cost
- . Reliability
- . Infrastructure
- . Dispatchability

Displacement of Petroleum-Based Fuels



BARRIERS

- . Cost
- . Life cycle sustainability
- . Fuels infrastructure
- . Demand and utilization

Reducing Energy Demand of Buildings, Vehicles, and Industry



BARRIERS

- . Coordinated implementation
- . Valuing efficiency
- . Cost
- . Performance and reliability

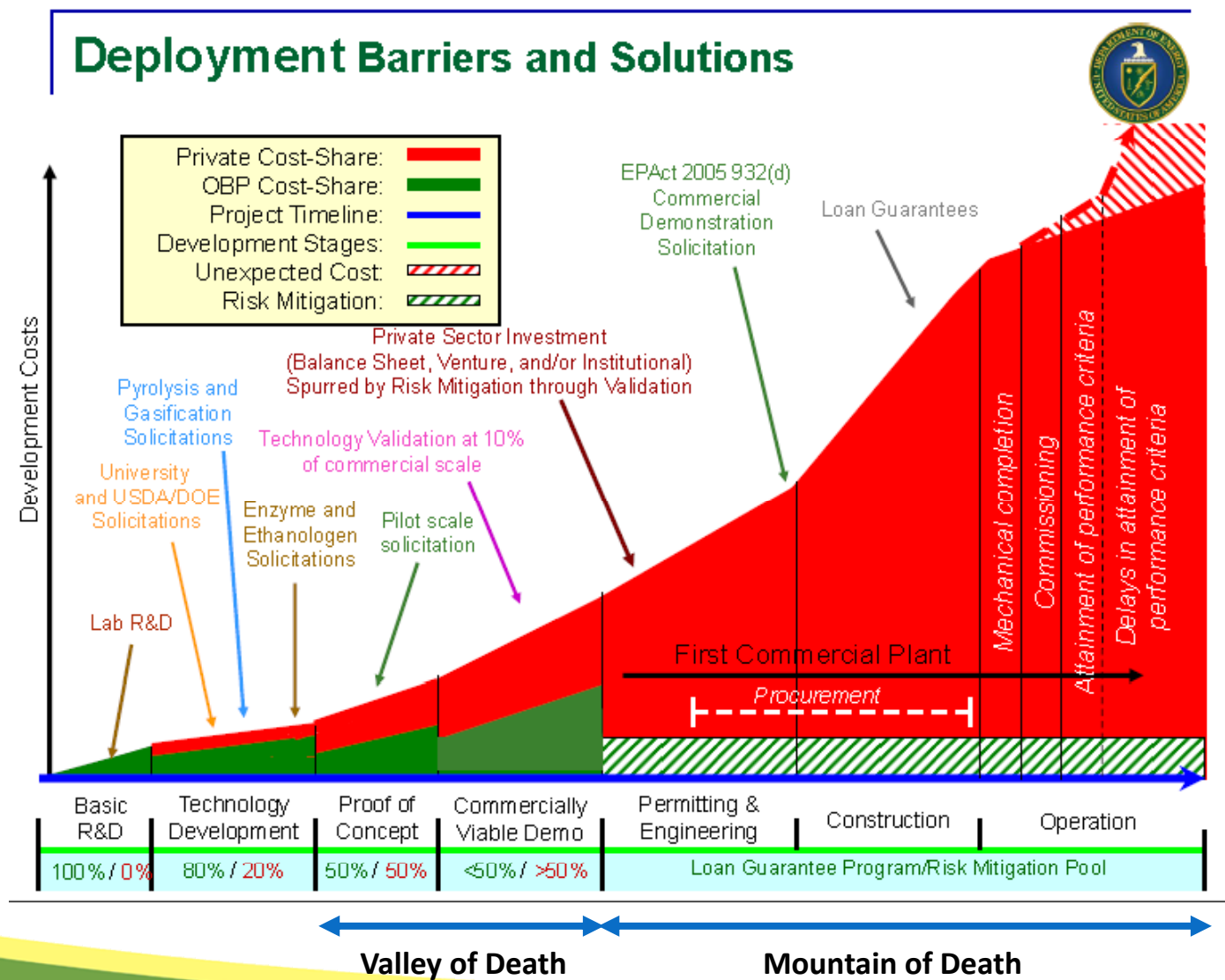
Clean Energy Commercialization Challenges

- Capital requirements
 - Predominantly, big asset-based businesses
 - Both a “Valley of Death” and a “Mountain of Death” to overcome
- Commodity pricing risks
- Policy/regulatory overhang
- Long lead times from lab to market fruition

➤ **High Risk – High Reward Potential**

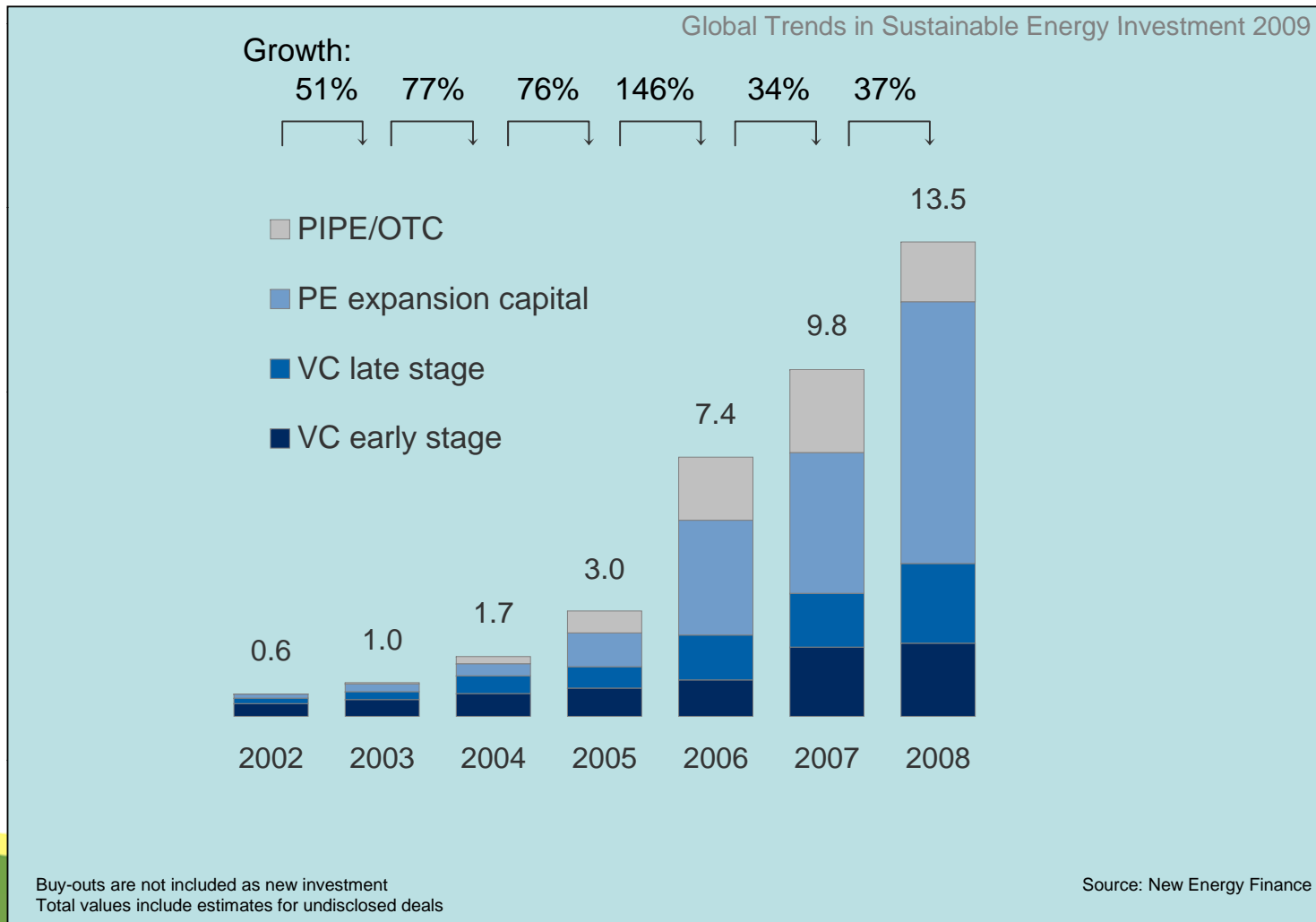
The "Death Valleys" of Energy Technology Commercialization

(Example: Biorefinery)



The “Valley of Death” ... as prevalent as ever

Although the U.S. is among the most robust Angel and Venture market in the world, the proportion of funding going into seed rounds is declining



“Mountain of Death” ... U. S. is falling behind

Although the U.S. is among the most robust Angel and Venture market in the world, clean energy asset finance remains stalled

Global asset finance summary

Q3 2009 (\$bn)

Type of investment	Amount	No. of deals
Total new build asset financing	\$19.2bn	143
Refinancing	\$2.0bn	11
Acquisition	\$5.2bn	23
Total refinancing & acquisitions	\$7.3bn	34
Total asset financing	\$26.5bn	177

Region	Amount	No. of deals
North America	\$1.3bn	10
South America	\$3.1bn	28
EU Europe	\$8.8bn	51
Non-EU Europe	\$0.3bn	3
Middle East & Africa	\$0.6bn	10
China	\$4.4bn	29
India	\$0.1bn	7
Rest of ASOC	\$0.6bn	5
Total new build asset financing	\$19.2bn	143

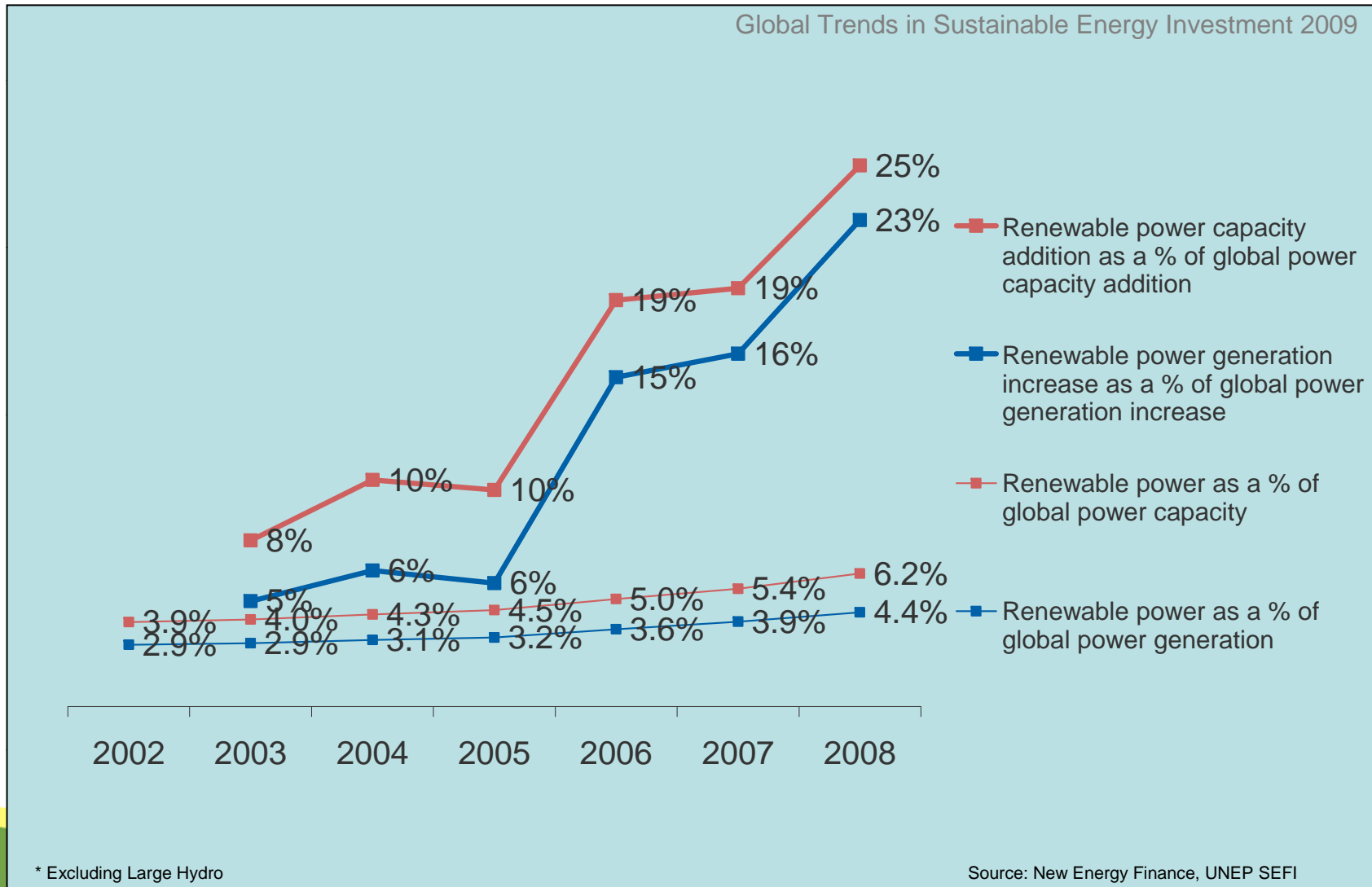
Sector	Amount	No. of deals
Wind	\$11.9bn	57
Solar	\$3.8bn	39
Biomass	\$1.3bn	14
Biofuels	\$0.7bn	6
Small Hydro	\$1.2bn	22
Geothermal	\$0.3bn	2
Marine	\$0.1bn	3
Total new build asset financing	\$19.2bn	143

Note: Total values include estimates for undisclosed deals.

Source: New Energy Finance

Challenges aside, Clean Energy is making significant inroads into worldwide electric power supply

Renewable Power Generation* and Capacity as a proportion of global power, 2002-2008, % share



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U. S. Policy Challenges

- Resting on the “prosperity recipe” of the good old days is no longer sufficient
 - Education (esp. Science and Technology)
 - Entrepreneurial culture
 - Existence of large multi-national corporations
 - Availability of early-stage capital
 - Large, unencumbered domestic market
 - Deep and flexible labor market
 - **These once-unique foundations are being duplicated across the world**
- With only a few exceptions (e.g. SBIR-STTR, NIST-ATP), U.S. innovation funding has not been focused on the technology commercialization challenges
 - Instead, focused on research challenges and national security missions

Successful Public-Private Partnerships: Some Examples

- 1798 – U.S. grant for production of muskets and interchangeable parts, to Ely Whitney, who founded first machine-tool industry
- 1842 – Samuel Morse received an award to demonstrate feasibility of the telegraph
- 1919 – RCA is founded on U. S. Navy initiative with commercial and military rationale
- 1969-1990's – U. S. investments in forerunners of the internet
- Today – U. S. investment in genomics, biomedical, and **clean energy**

Adapted from Marc Stanley, NIST, 2005



U. S. Policy Challenges: Looking Ahead with Optimism

- U.S. Department of Commerce, Office of Innovation and Entrepreneurship*
- White House Innovation Policy Outline**
 - Investments in the building blocks of innovation (fundamental research, education, infrastructure)
 - Promotion of competitive markets that spur entrepreneurship (promote exports, support open capital markets)
 - Investments to catalyze breakthroughs in national priorities such as healthcare, IT, and **clean energy**
- ARRA (stimulus) provides unprecedented federal commitment to Clean Energy innovation - \$150 Billion over 10 years

*Commerce Secretary Gary Locke announcement, September 24, 2009

** A strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs”, White House, NEC, OSTP, September, 2009

NIREC's Role in Driving Innovation

- 501(c)(3) nonprofit public-private partnership
- Mission is to transform of clean energy ideas into sustainable enterprises
- Focused on renewable energy, energy conservation and energy efficiency
- We do this through:
 1. Funding pre-commercialization development activities
 2. Entrepreneur-in-Residence (EiR) Program
 3. Strengthening and leveraging the region's Innovation Ecosystem



NIREC Project Investment Overview

- NIREC provides cash awards of up to \$100,000 for the development of clean energy technologies
 - Plus an additional \$50,000 in pre-commercialization services
- Awarded competitively through a stringent review process by NIREC's Technology Commercialization Advisory Board
- Call for proposals are announced twice per year (Spring and Fall)
- Funds are currently intended for technology validation, technical proof of concept, and business planning activities
- Participation in the EIR Program to develop well grounded and compelling Commercialization Roadmaps and Business Packages – enable project/company to reach next funding milestone



ANNOUNCING the opening of NIREC's Nov, 2009 Request for Proposals

Funding budgets up to \$150,000 for technology development
and pre-commercialization activities

Statement of Intent due: January 18, 2010

Proposal Due: February 8, 2010

Information available today at NIREC's booth (#217) or stop by
NIREC's vendor presentation (next slide)



For more information ...

“Accelerating Your Innovation to Market:
Leveraging NIREC’s Investment”

NIREC Director of Operations, Li Han Chan

Pavilion E

1:30 pm today

