Bridging the Valley of Death

Addressing the scarcity of seed and scale-up capital for next generation clean energy technologies.




Clean Energy States Alliance call, 18 December 2009

new energy finance

About this study

- *Clean Energy Group (CEG) and New Energy Finance (NEF) were commissioned by the Annenberg Foundation to assess current gaps in clean energy financing, and solicit recommendations to address them.*
- *Between June-August 2009, CEG and NEF conducted interviews with 60 sector thought leaders in 10 countries.*
- *Participants included venture capitalists, project developers, attorneys, insurers, private equity players, commercial bankers and others.*
- *A summary of proposed responses is presented here in draft form and has been circulated to survey participants for further comment.*

The Valley of Death

Two valleys of death, not one

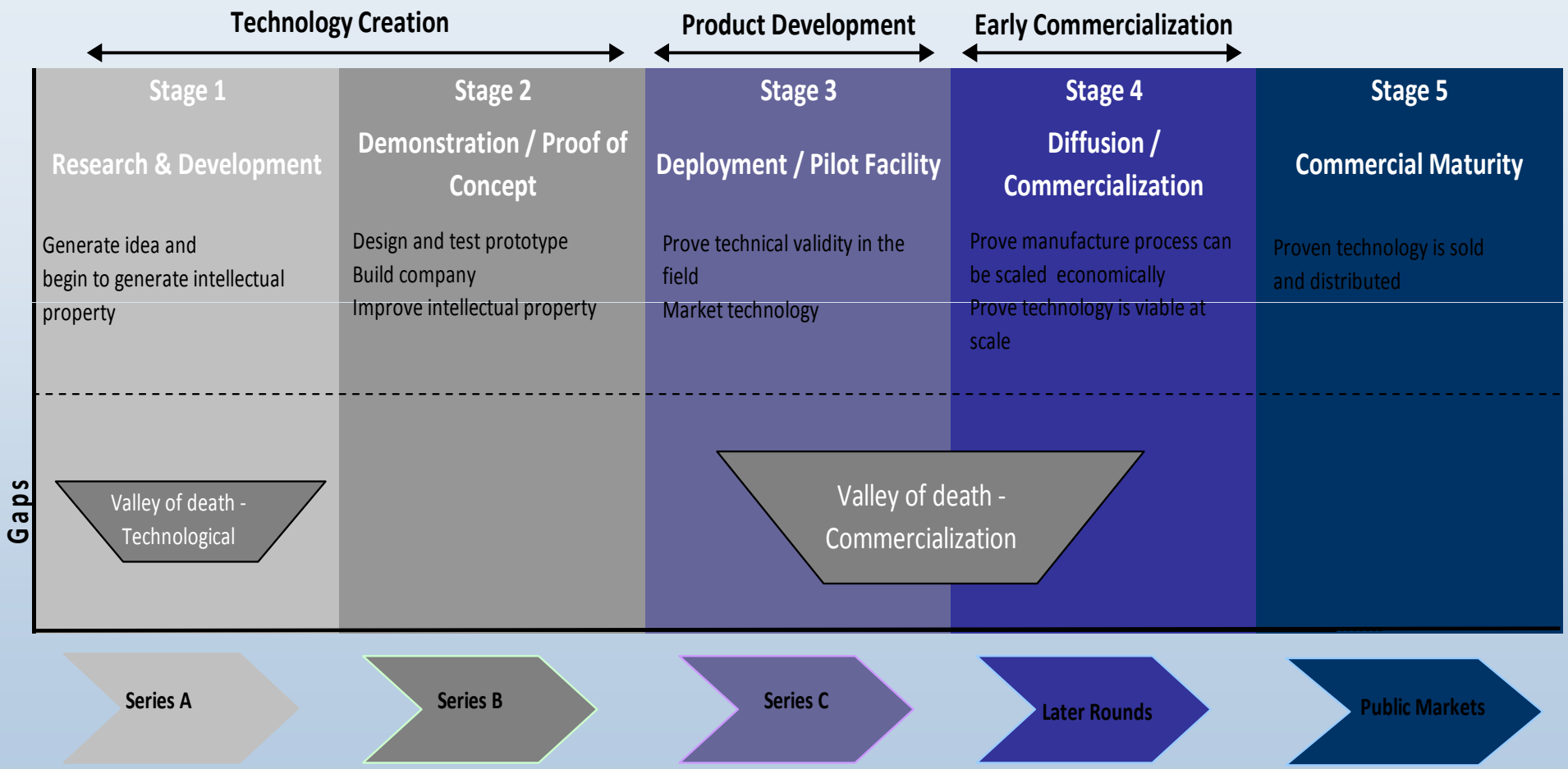
The old valley – commercialization to scale-up

- As old as time
- Intractable
- A problem, *regardless* of project finance environment
- Government support always needed

The new valley – lab to start-up

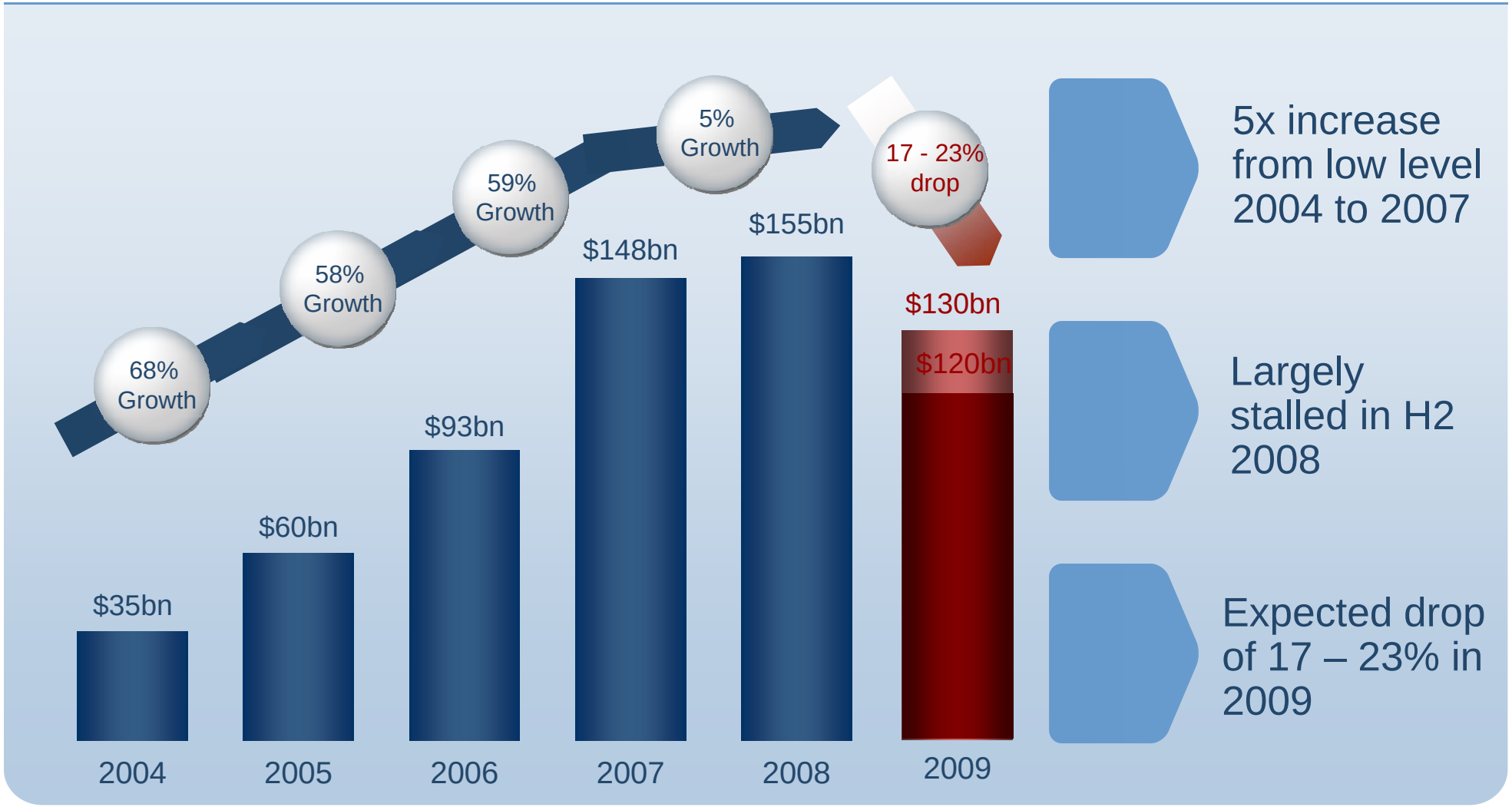
- Disappeared briefly but now back with a vengeance
- Benefitted from recent boomlet in clean energy VC investment
- Exposed again now that early stage capital has disappeared
- Probably needs government support
- Poses important questions about role of VC

The valleys


Technology Creation
Product Development
Early Commercialization
Stage 1
Research & Development
Generate idea and begin to generate intellectual property
Stage 2
Demonstration / Proof of Concept
Design and test prototype
Build company
Improve intellectual property
Stage 3
Deployment / Pilot Facility
Prove technical validity in the field
Market technology
Stage 4
Diffusion / Commercialization
Prove manufacture process can be scaled economically
Prove technology is viable at scale
Stage 5
Commercial Maturity
Proven technology is sold and distributed
Gaps
Valley of death - Technological
Valley of death - Commercialization
Series A
Series B
Series C
Later Rounds
Public Markets

Global new investment in clean energy, 2004 – 2009

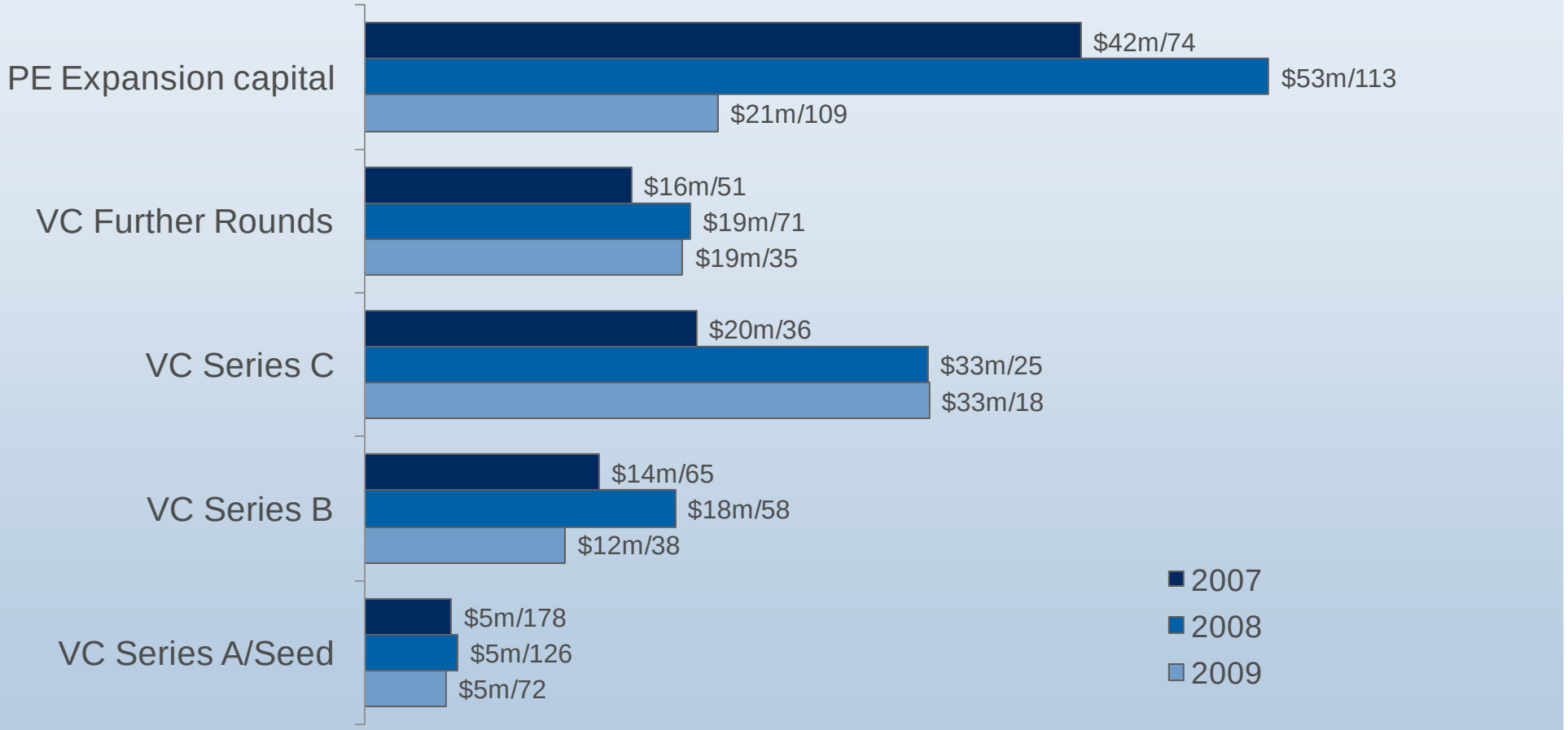
2009 Preview



Note: Adjusts for reinvested equity. Total value includes estimates for undisclosed deals.

Source: New Energy Finance

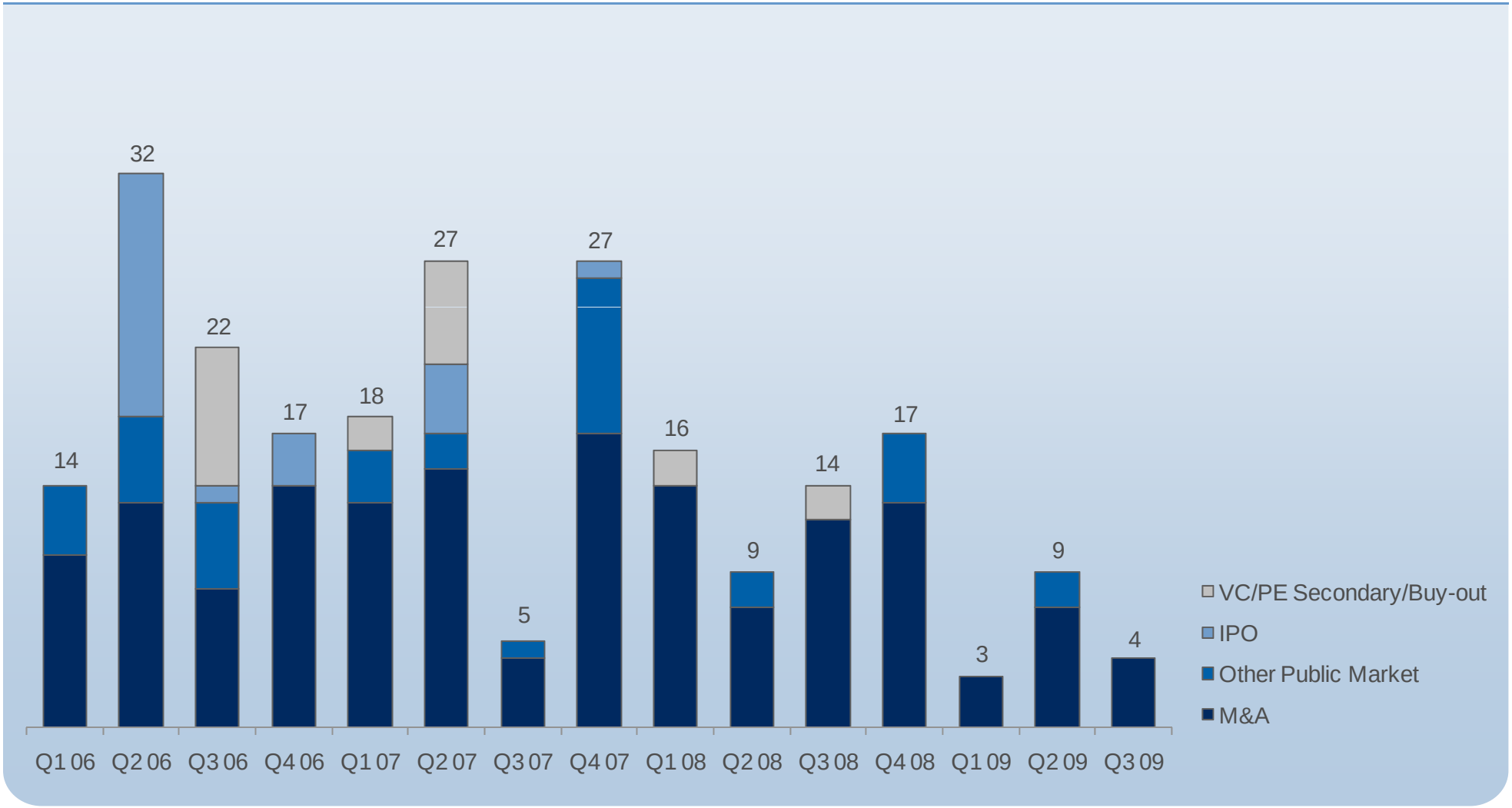
Global VC/PE investment by type: 2007 – 2009 (annualised)



Note: Chart labels show average deal size /total number of deals. Figures for 2009 have been annualised through to the year-end.

Source: New Energy Finance

Count of VC & PE exits by route: Q1 2006 – Q3 2009



Source: New Energy Finance

Proposed Solutions

Feed-in Tariffs

Structure

- Factors in avoided cost externalities
- Cap-and-trade punishes emitters; feed-in tariffs (FiTs) reward clean producers
- High fixed-price offered for every MWh of clean power produced
- Implemented widely in Germany and Spain
- In place or under development in Oregon, Hawaii, Vermont, Sacramento (SMUD), Gainesville, and California
- Federal action highly unlikely

Feed-in Tariffs

Advantages

- Eliminates time and uncertainty of negotiating individual PPAs
  - Shortens development cycle and facilitates financing
- Reliable cash flows
- Economic development

Drawbacks

- Inefficient and inflexible
  - Bubbly and inefficient technologies supported
  - Developers overpaid at times
- Does little to encourage use of cutting edge equipment
  - Tried and true favoured over the more ambitious
- Challenge/possibility: a FiT that fits next generation technologies

Government as a First Adopter

Structure

- Use government's buying power to promote clean technologies
- Global examples:
  - China – Central government to add more than 60,000 lower carbon vehicles by 2012
  - Brazil – Electrobras guarantees 20-year clean energy PPAs totaling 3.3GW and resells power to distributors
  - UK – Crown Estate to purchase first 7.5MW Clipper turbine when complete in 2-3 years
- US:
  - Federal agencies to up efficiency, cut oil use, and leverage purchasing power to promote low-carbon energy technologies
  - Billions in stimulus for federal improvements, plus state and local grants
  - Pentagon as first adopter of solar PV for use off-grid; algae-based jet fuel tested in Air Force jets

Government as a First Adopter

Advantages

- Economies of scale
- Ability to soak up excess capacity at times of low private sector demand

Drawbacks

- New technologies not specifically targeted
- Limited risk appetites (i.e. a military bases)
- US federal PPAs currently capped at 10 years
- Challenge/possibility:
  - Making government an effective first adopter of next generation technologies via PPAs, mandates, or some other policy

Efficacy Insurance

Structure

- Insurance that protects against underperforming technology
- Pays out at a rate that brings underperforming equipment up to original specifications
- Provides liquidated damages up to the value covered by the policy
- Totally unavailable today for new clean energy technologies, but used in the past to support new, relatively untested devices
  - Hartford Steam Boiler for new locomotive steam engines in 1850s
  - Nuclear power
- Potential structure: pooled capital to underwrite policies. Developers pay a premium and transfer the performance risk to the new insurance pool

Efficacy Insurance

Advantages

- Technology risk removed allowing typical project finance institutions to lend/invest
- Potentially simple financing structure: debt + equity, with appropriate insurance sprinkled on top

Drawbacks

- Private insurers highly unlikely to move on their own to create such a product
- Challenge/possibility:
  - Insurance industry is highly regulated - could regulators compel insurance firms to participate?
  - Public funds could be added to the pool to reduce private insurer exposure

Streamline Testing and Standards

Structure

- Complying with current standards can slow technology deployment, especially when seeking to get onto the grid
- The National Institute of Standards and Technology could work with private standard-setting organization (UL and others) to develop expedited processes for new energy technologies

Advantages

- Facilitated certification or third party testing to verify novel technology could enhance financing prospects, make investors more comfortable with associated risks
- Warranties to provide comfort for commercial lenders.

Drawbacks

- None, though it is far from a full solution

Delegated Investor Program

Structure

- A delegated commercialization finance authority could be created to assess and assume technology risks with government support, similar to the work of DoE 1703 program in the U.S.
- This authority could distribute some of the decision-making responsibility via the diffusion of capital to existing qualified private sector institutions, empowered to make decisions on a deal by deal basis.
- Banks, other investment mangers or experienced public sector agencies could do the actual processing of applications.

Advantages

- The approach should speed the capital allocation process – multiple delegated investors working with the technical assistance of a central commercialization risk assessment entity could deploy capital more quickly than a federal agency working in isolation.

Drawbacks

- Risks must be apportioned appropriately, which could prove challenging given the limited pool of investors with adequate technical expertise to address the commercialization finance issues.

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