Building an Innovation and Entrepreneurship Driven Economy: How Policies Can Foster Risk Capital Investment in Renewable Energy

Webinar
May 4, 2011
The Solutions Center is designed to assist Clean Energy Ministerial countries and partners with the design and adoption of clean energy policies and deployment programs. It serves as a virtual clearinghouse of clean energy policy information and tools and leverages assistance available through other Clean Energy Ministerial initiatives. It also offers peer-to-peer learning, remote expert assistance, and online training.

Webinars are facilitated learning sessions to discuss and learn about experiences and best practices in priority areas from our global colleagues.
• Executive Director
• The Joint Institute for Strategic Energy Analysis conducts leading-edge interdisciplinary research and provides objective and credible data, tools, and analysis to guide global energy investment and policy decisions. The Joint Institute for Strategic Energy Analysis is operated by the Alliance for Sustainable Energy, LLC, on behalf of the U.S. Department of Energy’s National Renewable Energy Laboratory, the University of Colorado-Boulder, the Colorado School of Mines, the Colorado State University, the Massachusetts Institute of Technology, and Stanford University.
Policy Approaches To Mobilize Capital for Clean Energy Innovation

Douglas J. Arent, Executive Director
CESC/CEM Briefing
May 2011
Financial Value Chain

Tech R&D → Tech Commercialisation → Manufacturing → Support & logistics → Project Development → Project Construction → Project Operation

Venture Capital >30% → Venture Capital & Private Equity >25% → Private Equity & Listed Market 10-25% → Private equity & listed market 10-20% → Venture Capital, Private Equity, Corporate >25% → Infra Fund, Private Equity, Corporate → Infra fund, Corporate >10%
Innovation & Policy Portfolios

- **Invention**
  - Innovation (new or better product)
  - Learning By Doing

- **Adoption** (early use)

- **Diffusion** (improved technology)
  - Learning By Using

**R&D**
### Example Policies

<table>
<thead>
<tr>
<th>Direct Government Funding of Research and Development (R&amp;D)</th>
<th>Direct or Indirect Support for Commercialization and Production; Indirect Support for Development</th>
<th>Support for Learning and Diffusion of Knowledge and Technology</th>
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<tbody>
<tr>
<td>• R&amp;D contracts with private firms</td>
<td>• Patent protection</td>
<td>• Education and training</td>
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<td>• R&amp;D grants and contracts with universities</td>
<td>• R&amp;D tax credits</td>
<td>• Codification and transfer of knowledge</td>
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<td>• Intramural R&amp;D conducted at gov’t laboratories</td>
<td>• Production subsidies or tax credits to firms bringing new technologies to market</td>
<td>• Technical standard-setting (non-regulatory)</td>
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<tr>
<td>• R&amp;D contracts with consortia (2 or more of the actors above)</td>
<td>• Tax credits or rebates for new technology buyers</td>
<td>• Technology and/or industrial extension services</td>
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<td>• Government procurement</td>
<td>• Publicity and consumer information</td>
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<td>• Demonstration projects</td>
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</tbody>
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Source: Alic, Mowery and Rubin, 2003, NAS America’s Climate Choices, 2010
Robert dos Reis Alvarez
ABDI

- International Affairs Manager
- The Brazilian Agency for Industrial Development (ABDI) is the Brazilian Government Agency in charge of promoting the implementation of the Country Industrial Policy (that is, Brazil's Innovation and Development Strategy). ABDI bridges and works together with different Government agencies and the private sector in Brazil.
Energy, clean technology, business and innovation in Brazil

Roberto dos Reis Alvarez, Ph.D.
International Affairs Manager
ABDI - Brazilian Industrial Development Agency

Brasília, Brasil
May 5th, 2011
- Brazil
- Innovation in Brazil
- Energy
- The VC/PE industry
- Final remarks
Facts and figures

- Borders with 10 countries
- 50% of South America’s surface
  More than 8 million sq. km
- 50% of the South American Population
  184 million inhabitants
- 55% of South American GDP
  US$ 1.9 billion
  8th world’s largest economy

* VENEZUELA:
  full MERCOSUR member,
  in process of adhesion
121,000 NEW GRADUATES A YEAR IN SCIENCE & TECHNOLOGY AREA

source: MCT
161 TECH TRANSFER OFFICES IMPLEMENTED SO FAR... source: ANPROTEC
400 Technical Incubators Involving 6,000 Innovative Businesses

Source: ANPROTEC
Desafios da política de desenvolvimento científico e tecnológico

- Reduzir a defasagem tecnológica por meio da ciência e da inovação
- C,T&I como eixo estruturante do desenvolvimento sustentável
- Contribuir para a inserção internacional soberana do Brasil
- Contribuir para a erradicação da pobreza e redução das desigualdades sociais
- Fomentar a economia verde e criativa
STIMULATING INNOVATION in four years...

4 Rounds of grants → 825 Projects → $800 Million were committed by FINEP

Source: MCT
Energy Investment next 10 years

- 38 US$ billion for Liquid Biofuels
- 125 US$ billion for Electricity Supply
- 391 US$ billion for Oil and Natural Gas

Source: EPE
SMART SOLUTIONS FOR GLOBAL PROBLEMS
Ethanol as a fuel
Industry Overview as of December 2009

Investors
- US$ 36.1 bn Committed Capital
- Main LPs: Pensions 22%, Parent Orgs. 18%, Endowments 10%, GP Orgs 9%, Family Offices 9%

General Partners
- 144 PE&VC Firms
- 258 Investment Vehicles
- Est. 1,593 Professionals & Staff

Portfolio Companies
- 502 portfolio cos., Dec 09
- 2005-2009 Period:
  - 414 new investments
  - 103 total exits
  - 39 IPOs
The evolution of committed capital is impressive, increasing more than 6 times since 2004 and 2 fold as percentage of GDP.

Source: Interim results 2010 Census, GVcepe research.
Investments by Sectors of Economic Activity in US$ MM

2005-2008 (Includes New and Follow-on Investments)

- Food and Beverages: 24%
- Various Industries*: 14%
- Civil Construction/Real Estate: 13%
- Retail: 12%
- Financial Services: 11%
- Energy and Oil: 4%
- Education: 4%
- Communication: 4%
- Agribusiness: 3%
- IT and Electronics: 3%
- Pharmaceutical/Medical/Aesthetics: 3%
- Entertainment/Tourism: 2%
- Extractive Industries: 2%
- Infrastructure - other: 1%

* Various Industries: E.g.: Chemicals, Mechanicals, Electric, Metallurgic, Packaging, Textiles.
** Various Services: E.g.: Call Center, Consulting.
Investments by Sectors of Economic Activity in US$ MM

2009 (Includes New and Follow-on Investments)

- Energy and Oil: 54%
- Financial Services: 14%
- Entertainment/Tourism: 11%
- Extractive Industries: 9%
- Transportation and Logistics Services: 8%
- Education: 7%
- Agribusiness: 6%
- Infrastructure - other: 5%
- Various Services**: 5%
- Pharmaceutical/Medical/Aesthetics: 4%
- Food and Beverages: 4%
- Retail: 3%
- Various Industries*: 2%
- IT and Electronics: 2%
- Civil Construction/Real Estate: 1%

Including all investments
Excluding one US$ 0.765bn investment in energy transmission

Sample 2009: 95 investments by 45 PE&VC Organisations
- 6 Fundos de Capital Semente
- 14 Fundos de Venture Capital
- 4 Fundos de Private Equity

Volume Total dos Fundos: ~ R$ 3 bilhões
Comprometimento Total FINEP: ~ R$ 300 milhões
Participação Média por Fundo: 21,4%
70 empresas investidas pelos fundos
Final remarks

- The challenge: knowledge → economic value
- A global leader in renewables
- Energy investments are going up... and up...
- Public & private initiatives (& partnerships)
- Growing VC/PE mkt
- Public support (Finep, BNDES etc.) to new funds
Thank you!

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Melinda Richter
PreScience International

• Founder & CEO
• PreScience International is a firm dedicated to the commercialization and global adoption of science. With industry expertise in the future of technology markets, PreScience International creates, manages and develops centers of excellence in the form of research parks, research centers/incubators, research foundations, research institutes, and emerging companies.
A New Model of Commercializing Innovation

Melinda Richter
Founder & CEO Prescience, Intl.
About PRESCIENCE
Accelerating the Commercialization of Science & Technology

Quick Economic ROI
Company formation/funding, job growth, tax $,

Self-Sustaining Incubators
little to no ongoing support

Impact on the Environment
and Healthcare
making a difference

Centers of Innovation that give early stage companies that “Big Company Advantage”

Educational Commercialization Programs for entrepreneurs and executives

Deals between early stage innovation and funders/big companies

Impact on the Environment and Healthcare making a difference
Leveraging a Network
Creating a Powerhouse of Innovation

PRS Proprietary Database
40,000 in Life Sciences & 30,000 in Cleantech
>100 Partnerships/Collaborations
with Industry Organizations & Research Institutes
Incubator-in-a-Box™ Model
Sourcing & Commercializing Innovation Anywhere

Identify and Establish Business Case
- Market Study
- Financial Analysis & Financing Strategy
- Building and Equipment Requirements
- Operating Plan

Set-up and Management Incubator-in-a-Box™
- Detailed Operations
- Marketing, Programs
- Fiscal management

Custom Creation and Delivery Targeted Programs
- Entrepreneurship
- Start-up Toolkit
- Executive Education

Facilitate and Negotiate Company Growth
- Funding
- Licensing & Partnering
- M&A
BioCenter: Big Company Facilities
Plug & Play Infrastructure to Decrease Investment

Equipped and operated shared facilities
- Common Equipment Rooms
- Service Alcove
- Cold Room
- CORE ChemLab
- CORE BioLab
- 3 Tissue Culture Rooms
- Conference/Meeting Rooms
- Library/Kitchen/Break Room
- Reception
- Business Center
  - mail room, photocopier, fax machine, postage machine, document shredding service, moving equipment, tools, etc
- Shipping & Receiving Area

Turn-key & expandable wet lab units
Fume hoods, benches, RO/DI water, gas, vacuum, emergency showers/eye wash stations, hazmat storage cabinets, 110V, 220V & emergency power
## Environmental Business Cluster

First and largest cleantech incubator in the US

### Coaching
- Practice Leaders/Coaches
- Pitch Practice Sessions
- On-site Service Provider Office Hours

### Networks
- Funding Sources
- Policy Makers/Regulatory Agencies/Government
- Innovation Partners

### Education
- Bootcamp/The Academy
- Funding (Stimulus/Grant, Angel, Venture, Project)
- Business Priorities
- Regulatory/Policy Education

### Infrastructure
- Furnished Offices & Common Areas
- Business & Ops team
- Community of entrepreneurs
Selected Strategic Growth Partners
Getting the Decision Makers to the Table Fast

Funding Partners - Government Agencies - Investors - Corporate Players

MERCK
Abbott
NOVARTIS
Bristol-Myers Squibb
Together we can prevail.

Takeda
TEVA
AMGEN
Genentech
IN BUSINESS FOR LIFE

sanofi aventis
BAYER
The Michael J. Fox Foundation for Parkinson’s Research

NATIONAL INSTITUTES OF HEALTH
NATIONAL CANCER INSTITUTE
DARPA
CALIFORNIA INSTITUTE OF TECHNOLOGY

Chevron
BOSCH
Invented for life

Pacific Gas and Electric Company

Khosla Ventures
venture assistance, strategic advice, venture capital
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Clean Technology Investments Top $1.0 Billion

Q4 saw a 26% increase in dollars to $1.0 billion.

# of deals completed Q1 increased 11% to 69 deals compared with 62 deals in the Q4.

The increase was driven by several large rounds, including 5 of the top 10 deals.

The quarter marks the 4th time in history that Clean Technology investing exceeded $1 billion.

MoneyTreeTM Report from PricewaterhouseCoopers LLP (PwC) and the National Venture Capital Association (NVCA), based on data provided by Thomson Reuters
$2.57 billion across 159 companies.

By dollars invested was up by 52% compared to the Q4 2010 ($1.69 billion) and was also 13% higher than Q1 2010 ($2.28 billion).

Conversely, the # of deals was 159, a total which is likely to be the lowest quarterly count since mid 2009, though this tally may rise once all investors have completed reporting deals.

Of these deals, 65% (104) were follow-on rounds, accounting for 93% ($2.39 billion) of all money invested during the quarter.
Global Investment

North America accounted for 85 percent of the total, while Europe and Israel accounted for 6 percent, Asia for 7 percent, and the Rest of the World 2 percent.

North American companies raised $2.19 billion, up 115% from 4Q10 and up 43% from the same period a year ago. The total of 101 disclosed rounds compared to 103 in the previous quarter.

The largest deals were for: BrightSource Energy ($201 million), a California-based developer of utility-scale solar thermal power plants; Plastic Logic ($200 million), a California-based developer of plastic semiconductors; and Fisker Automotive ($150 million), a California-based plug-in hybrid vehicle developer.

California led the way with $1.5 billion investment (68% share), followed by Ontario ($144 million, 7%) and Massachusetts ($119 million, 5%).
Other Financing Options

Many Areas for Funding

Department of Energy

- Advanced Research Projects Agency - Energy
- Office of Science
- Office of Electricity Delivery & Energy Reliability
- 21 National Laboratories

Plus Many Other Federal Agencies

- Defense Advanced Research Projects Agency
- National Science Foundation
- Small Business Administration
- General Services Administration
- Homeland Security
- Agriculture
- Navy
- Army
- Marine Corps
- Air Force
- EPA
- Transportation
- Interior
- Commerce
- Treasury
Different Stages of Funding

- Basic Research & Development
  - DARPA
  - NSF
  - DOE - Science
  - DOE - ARPA-E
  - SBA
  - Commerce - NIST

- Applied Research; Pilot & Demonstration
  - DOD
  - DOE - OE
  - DOE - EERE

- Market Entry
  - EPA
  - DOE - OE
  - Loan Guarantees
  - DOT

- Market Penetration
  - Tax Credits
  - GSA

- Market Maturity
  - Commerce - ITA
  - USDA
Inderpreet Wadhwa
Azure Power

- CEO
- Azure Power is an independent solar power producer and the first private sector company to implement a megawatt scale grid connected solar photo-voltaic power plant in India.
Webinar for Clean Energy Ministerial

Inderpreet S Wadhwa, CEO
Azure Power
Azure Power Introduction.

Azure Power, India’s first independent solar service provider offers clean and affordable solar energy to its customers with minimum upfront cost and ongoing operational expenses.

- **Projects**
  - **Punjab (2MW):** India’s first commercial grid connected MW scale solar power plant in Awan.
  - **Gujarat (10MW):** One of the largest solar plant under construction in India.
  - **Rajasthan (5MW):** Azure Power has been allotted 5 MW under the prestigious National Solar Mission which is under development in Rajasthan.

- **Services**
  - Azure Power creates innovative solutions to deliver solar energy to its utility, government, and commercial customers.
  - Azure Power’s Solar As a Service model, manages the entire project process for its customers, reduces costs of generating electricity, and provides long term predictable pricing.

- **Alliances**

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New Market Expansion: Policy Mechanisms

- **Finance**
  - 100% FDI allowed in Clean Energy Company. No special approvals required to invest in clean energy sector.
  - Direct loans to SMEs by US govt agencies and export finance.
  - Repatriation of Profits

- **Renewable Energy Policy**
  - Single window clearances
  - Feed in tariff regulation
  - Common infrastructure access through Special Economic Zones & Parks
  - Indirect tax concessions for technology imports
  - 10 Year Tax holiday

- **Energy Collaboration Forums**
  - Platform for sharing best practices
  - Technology collaboration
  - Market Access
New Market Expansion: Challenges

- **Permitting**
  - Land Acquisition is complicated; government, community and private
  - Pollution, Forests, Industries, Renewable Energy, Ministry of Power, Railways, Revenue, Transmission, Land Use
  - Most permitting is done manually and is time consuming (several months)

- **Finance**
  - Project finance options limited in the local market for size of current projects
  - Most banks look for strong balance sheets for power projects finance
  - PPAs offer limited payment security, MOUs generally not bankable

- **Construction**
  - Ports in Mumbai and Delhi are congested. Materials logistics processes should ensure proper lead time to mitigate these risks
  - For imports, concessions provided; Tax Regime understanding key for foreign players (Direct & Indirect)
  - Strong design & engineering talent available, but requires rigorous training/re-tooling
The future is bright..

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• Bloomberg New Energy Finance is the world’s leading independent provider of news, data, research and analysis to decision-makers in renewable energy, carbon markets, energy smart technologies, carbon capture and storage, and nuclear power. The firm has staff of more than 130, based in London, Washington D.C., New York, Beijing, New Delhi, Hyderabad, Cape Town, São Paulo, Singapore and Sydney.
Feel free to pose questions to the panel or individual speakers via the web conference Q&A messaging feature
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- Frequent webinars
- Ask an Expert & Peer Forum
- Other feedback/suggestions: webinars@cleanenergysolutions.org