

# **Perspectives on Financing CCS in Emerging Economies**

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**Asian Development Bank**

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**2007**

**ADB**

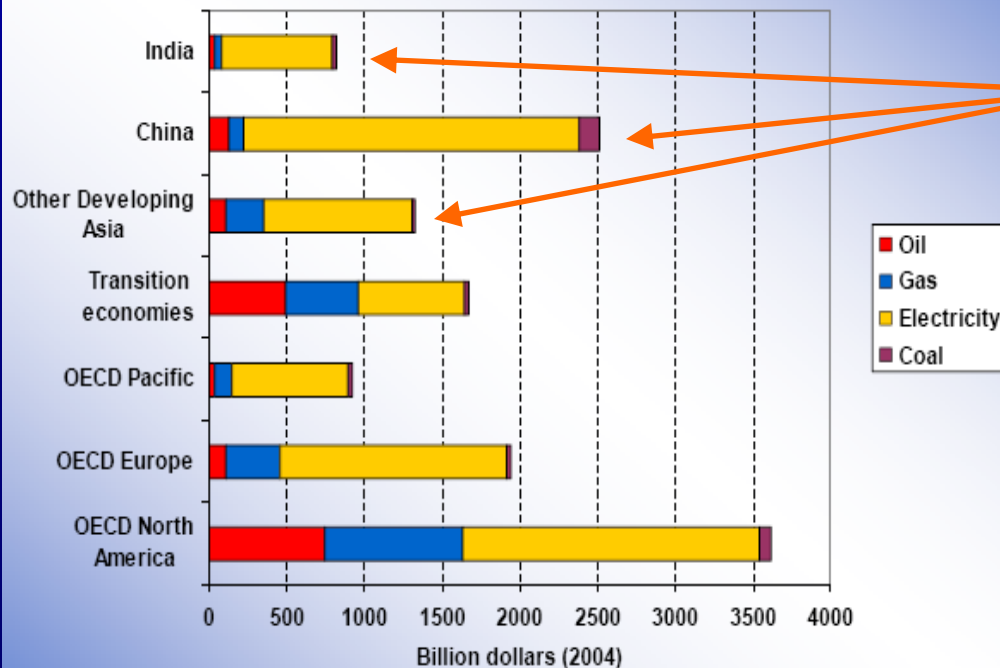
# Outline

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- The Clean Energy Challenge for Asia
- ADBs Activities
- Perspectives on Financing CCS

# Current Energy Path

## Energy Investment Needs by Sector 2004-2030



Energy use in Asia-Pacific increasing to support economic growth

Energy investments (mostly for electricity) largest in Asia-Pacific through 2030

Chart: IEA World Energy Outlook 2005

# The Asian Energy Challenge

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- 2003-2030 Asian energy growth: 89% (IEA)
- \$6.3 trillion for energy infrastructure by 2030 (IEA)
- Provide energy access for 930 million people
- Asian GHG Growth:
  - 1973 – 9%
  - 2003 – 24%
  - 2030 - 29%
- The Stern Review – 20 yrs to make change
- 40% replacement of generation stock in same period
- Energy Security a major issue

# ADB Activities & Interventions

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- \$1bn investment in Clean Energy & Energy Efficiency
  - Public Sector Investment
  - Private Sector Investment (Sponsor and Funds)
  - Risk Mitigation – co financing & guarantees
- Clean Energy Financing Partnership Facility
- Carbon Market Initiative
- Technical Assistance
- The “Trillion Dollar Challenge!”

# ADB in India

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- i. Renovation and modernization of existing hydro & thermal plants
- ii. Replacement of inefficient power plants to enhance energy efficiency
- iii. Renewable and clean energy development
- iv. Loss reduction on transmission & distribution facilities
- v. Mainstreaming demand side management
- vi. 2007-2010 \$3.8 bn plus TA sector support

# ADB & CCS

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- PRC dialogue
- Low cost financing to offset higher transaction costs
- Grant based funding for technical support, knowledge sharing
- Mobilizing carbon finance beyond 2012
- Acknowledgment to find solutions “out of the box”
- Support for IGCC pilots – PRC & India

# Emerging Market Perspectives.

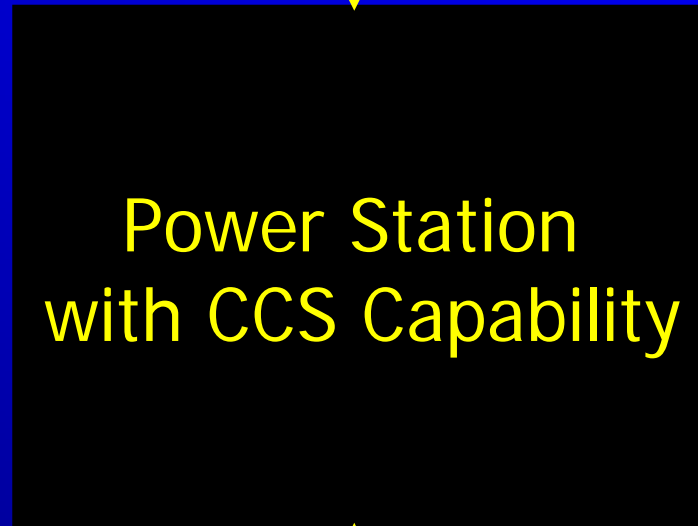
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- Technical & Engineering solutions may be more advanced than economic, institutional, risk mitigation solutions.
- Carbon Price Signal (or equivalent) critical.
- Requirements for private capital
- Unresolved issues are not inevitable barriers to CCS

But fundamental issues require addressing

- It is all about scale

Plant & Equipment



Fuel Costs

O&M



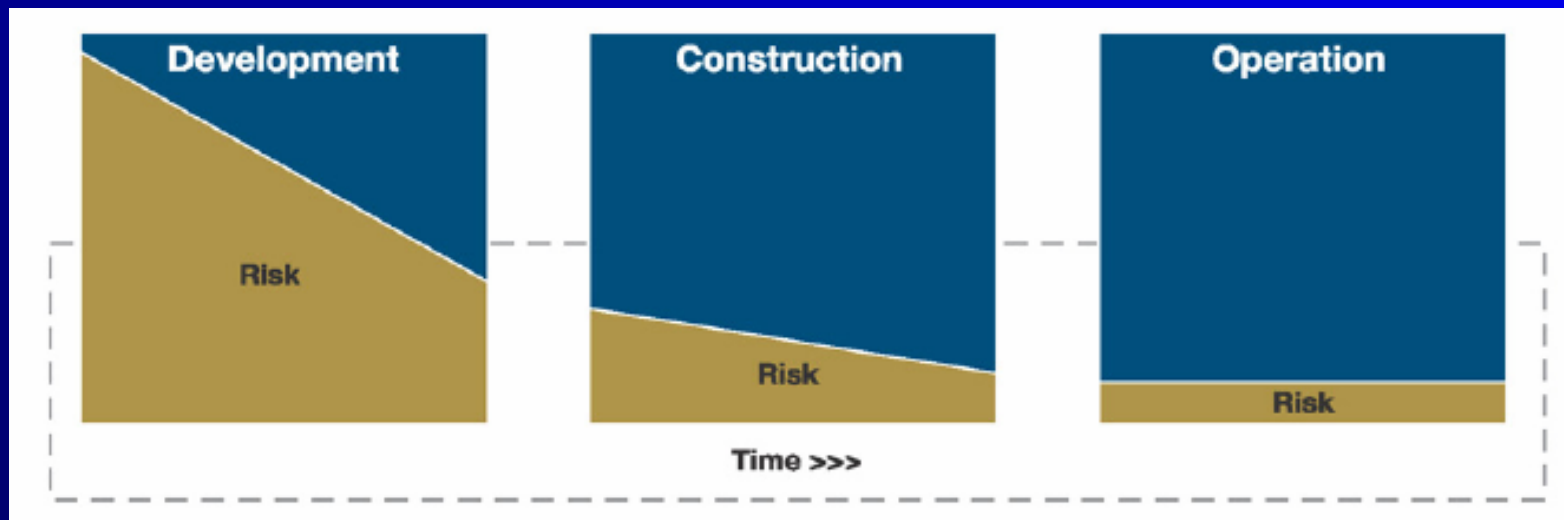
# CCS Project Development Risks.

*Investors & financiers prefer projects with short development timeframes, low transaction costs, low technology risk and low revenue volatility.*

- Lead time from “concept” to “commissioning”
- Financing
- Project Risk
- Regulatory Uncertainty
- Costs
- Banks don't like surprises!

# CCS Risks

- Risk Assessment
- Risk Apportionment
- Risk Mitigation



# CCS Risk Assessment

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## ➤ Legal Liability issues

### a. Operational liability

Risks associated with capture, compression, transportation and injection of CO<sub>2</sub>. Apportionment between actors in supply chain.

### b. In situ liability

Leakage and CO<sub>2</sub> migration issues from geological formation.  
Health impacts, Environment Impacts, Economic impacts.

### c. Climate liability

Climate change impacts from GHG leakage.

# CCS Risk Assessment (ii)

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## ➤ Legal Liability issues

- a. National regulation, licensing and Approval regime
- b. EIA to include rigorous analysis on site selection, post closure, monitoring, remediation, long term stewardship
- c. Any “carbon crediting” regime to be closely linked to ensure environmental integrity of CCS carbon credits.
- d. Remediation obligations for owner/ operator
- e. Passing risk to Government?
- f. Residual liability for operator post closure?
- g. Establishment of Statutory Fund (self insurance)?
- h. Insurance products for long term liability?

# CCS Risk Assessment (iii)

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## Property issues

- No international consensus on application of property rights to CCS activities
- Ownership & title issues regarding:
  - i. CO<sub>2</sub> after capture and during transport;
  - ii. CO<sub>2</sub> once injected and stored;
  - iii. Ownership of storage cavity or reservoir;
  - iv. CCS infrastructure.
- **Cross Border Issues, Seabed issues, harmonization of approaches**
- **Intellectual Property Rights – IP licensing and protection.**
- **Property, title and security issues critical to financiers**

# CCS Regulation and Institutions

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*“The only thing holding up the development of CCS in the UK and elsewhere is the lack of clear, robust and enduring policy relating to incentives and a positive regulatory framework for CCS. Without these commercial projects are not viable”.*

*J. Chapman CEO, Carbon Capture and Storage Association, 1 May 2007.*

# Price signals & incentives

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- CCS unlikely to be economically viable unless there is a price on carbon
- Annex 1 countries targets and EUETS
- CDM & Beyond Kyoto Regimes
- Regional and National schemes
- Other national incentives, tax, excise relief
- CCS Permanence is key issue
- Customer ability & willingness to pay.

# CCS & Carbon Prices

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## US Pulverized Coal Plant

- **USD 40 CO<sub>2</sub> capture & storage cost**
- **With CCS 73% increase in capital costs**
- **71% increase in O&M costs**
- **41% increase in fuel costs**

## US IGCC Plant

- **USD29 CO<sub>2</sub> capture & storage cost**
- **Need \$29-40/tonne carbon price or equivalent**

# Emerging Market Investment

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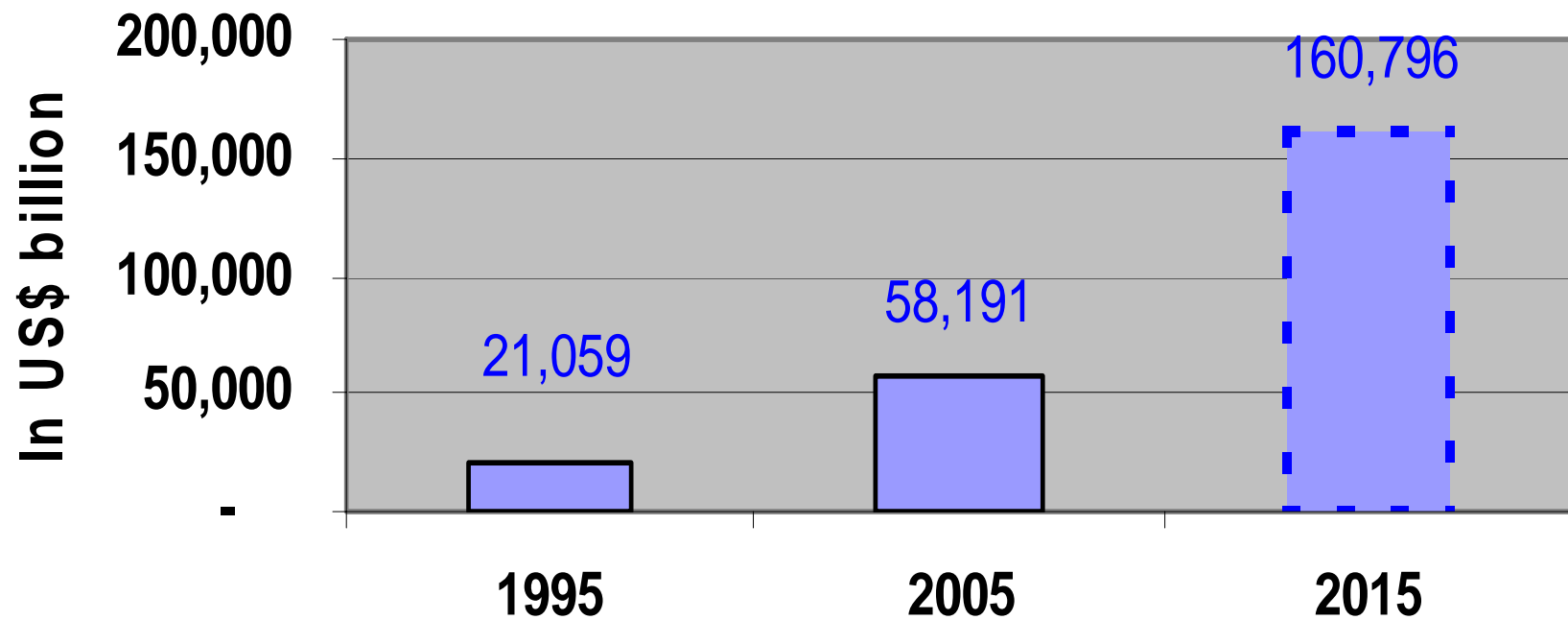
- **Political risk & perceptions of risk**
- **Counterparty credit issues**
- **Risk Mitigation Instruments**
- **Matching finance with revenue  
currency**

# Attracting the Capital

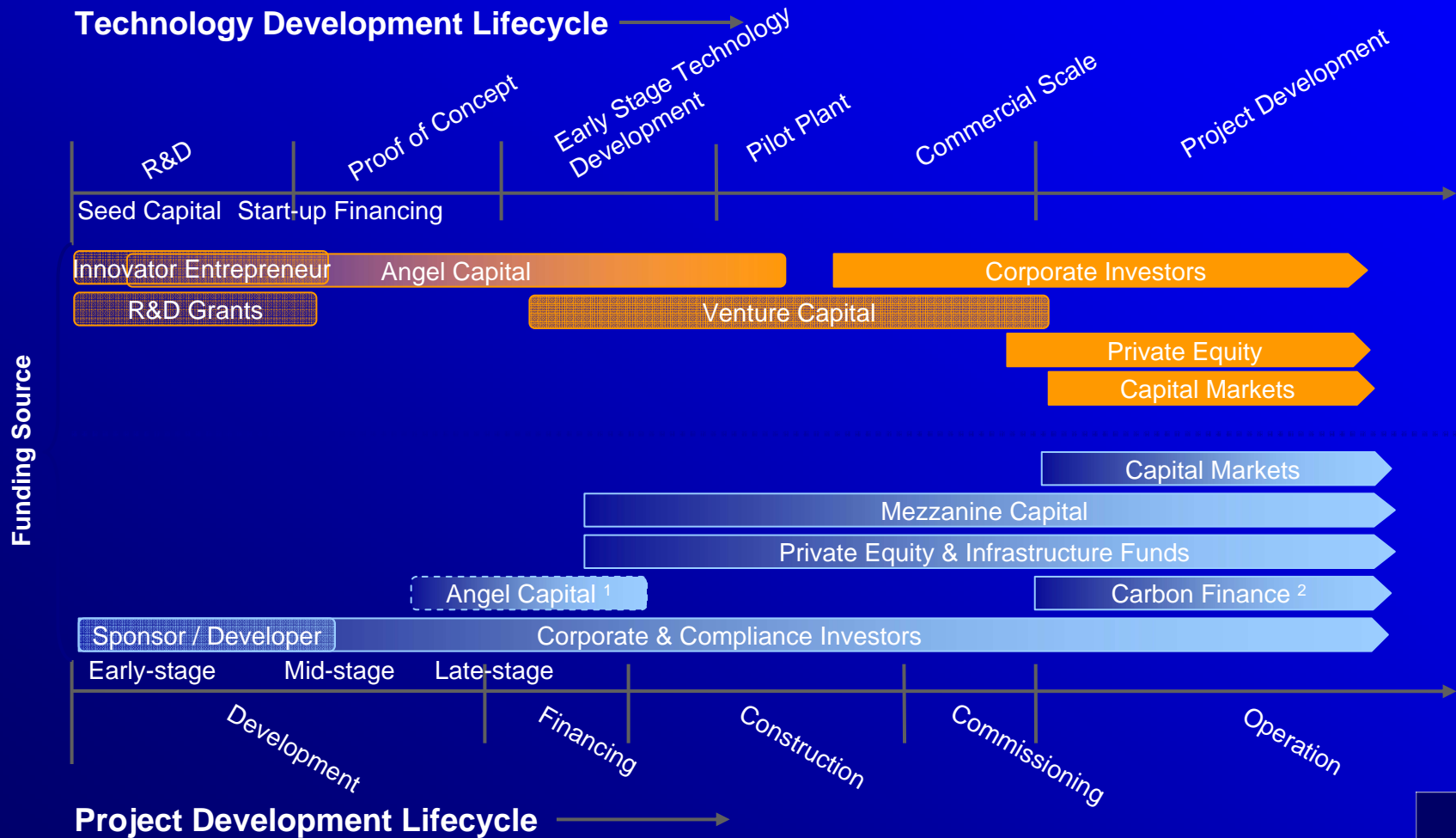
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- **The “trillion \$\$ challenge”**
- **Emerging Markets and Alternatives**
- **Classes of private capital**
  - **Corporate Investment**
  - **Private Equity**
  - **Infrastructure Funds**
  - **Mezzanine Finance**
  - **Domestic Capital, FDI & Portfolio Investment**

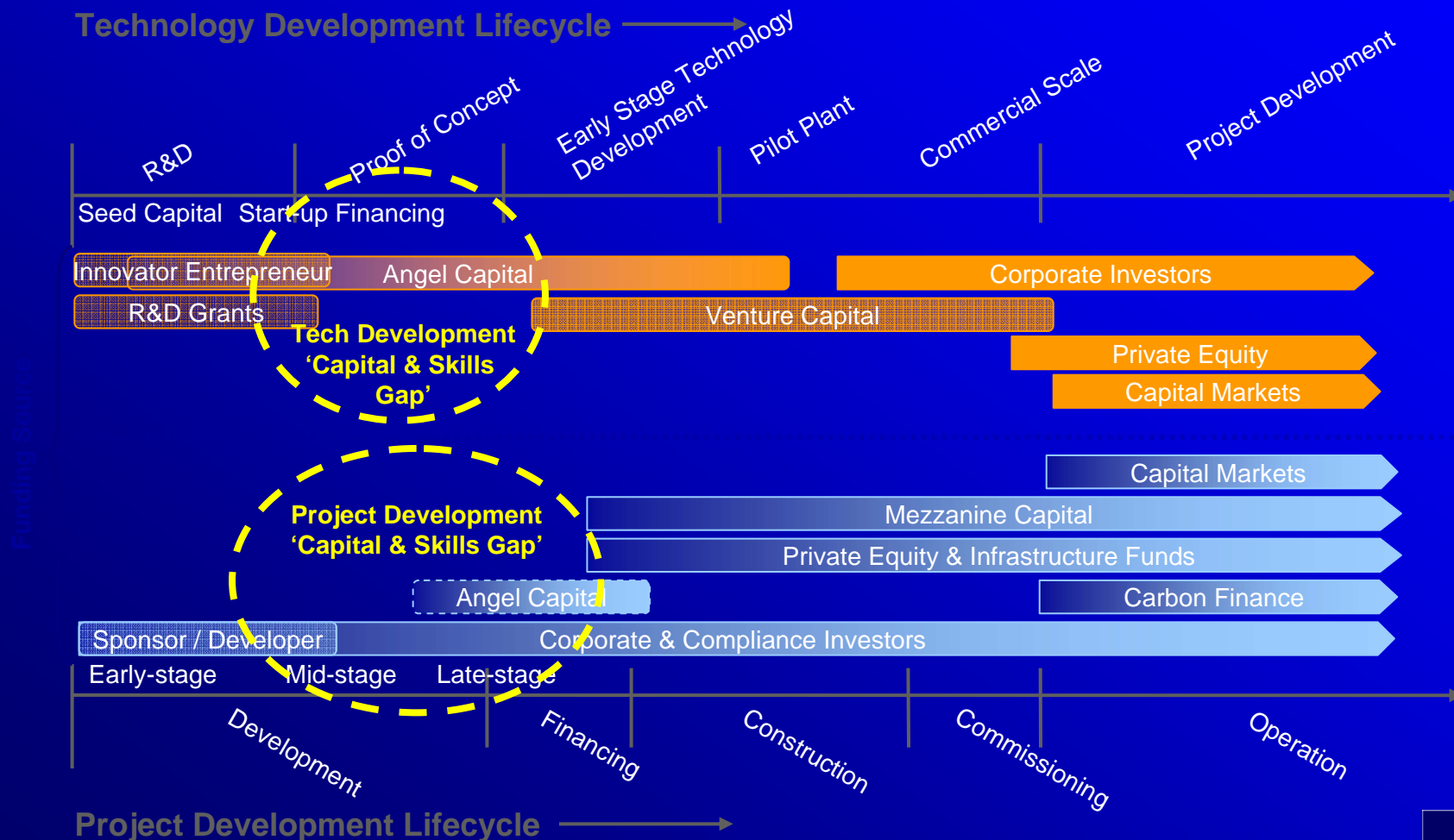
## Growth of Holdings by Institutional Investors (assuming 10.70% growth)



# Investment Development Lifecycle



# Investment Development Lifecycle



# Competition for Capital

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*“ On the basis of information currently available, the Commission believes that by 2020 all new coal fired power plants would be built with CCS. Existing plants should then progressively follow the same approach.”*

*Communication from Commission to the European Parliament, “Sustainable Power Generation from Fossil Fuels, Aiming for Near Zero Emissions From Coal after 2020”, Brussels January 2007.*

# Attracting the Capital for CCS.

- Private Capital is essential for large scale CCS projects in Emerging Markets
- Carbon Price Signal is important element but not the only element
- Regulatory certainty is a must (at international and national level)
- National policies, institutions, processes need encourage private capital
- IFIs import enabling function to play esp. regarding risk management.

# Thank You

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