



Energy research Centre of the Netherlands

# Financing Technology in the Copenhagen Agreement

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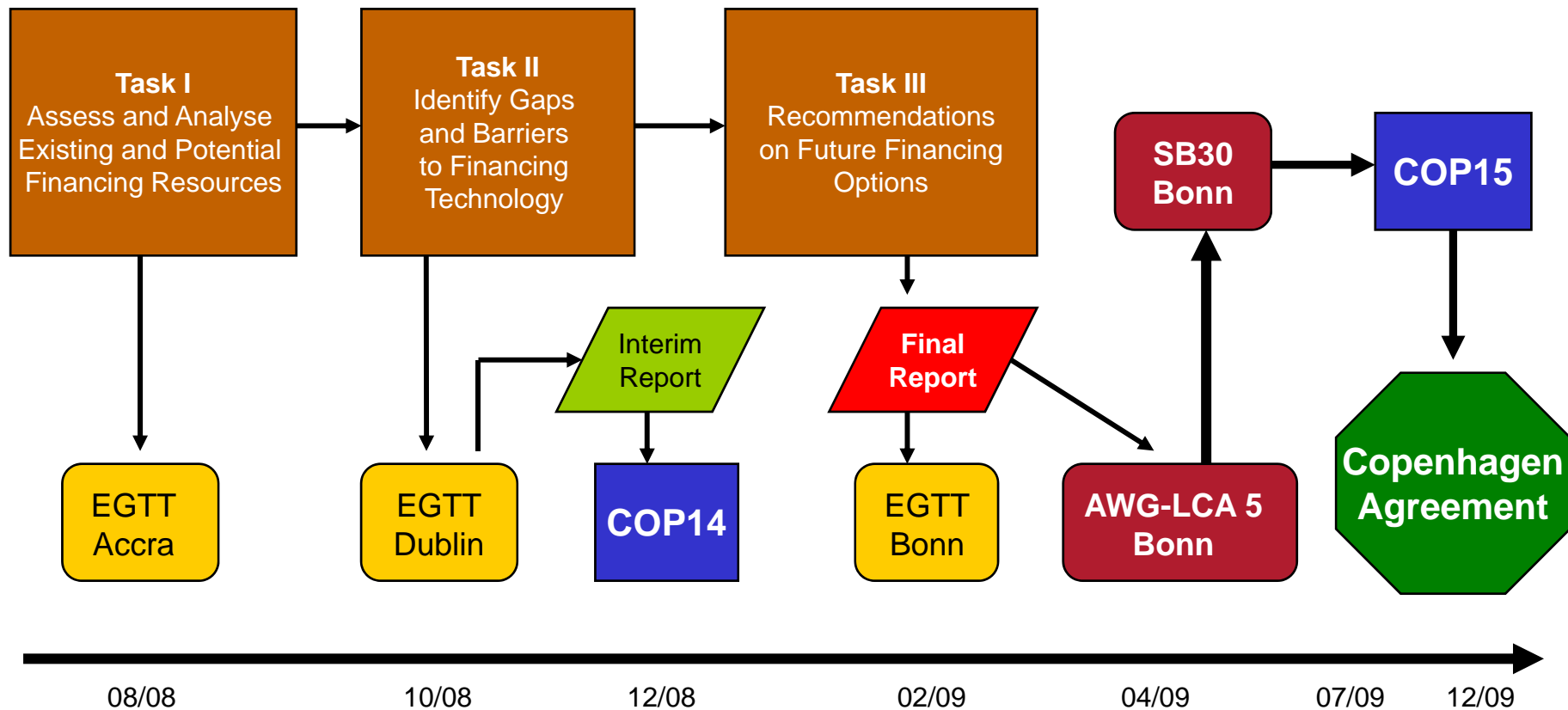
## Structure of Presentation

- Background and methodology
- Summary of existing financing resources
- Summary of financing needs
- Financing gaps and barriers
- Potential sources of additional finance
- Policy options for Copenhagen

## Importance of finance and technology in a post 2012 climate change agreement

- Bali Action Plan – 4 essential building blocks for Copenhagen:
  - Mitigation
  - Adaptation
  - **Finance**
  - **Technology**

# Bali Action Plan Work Programme

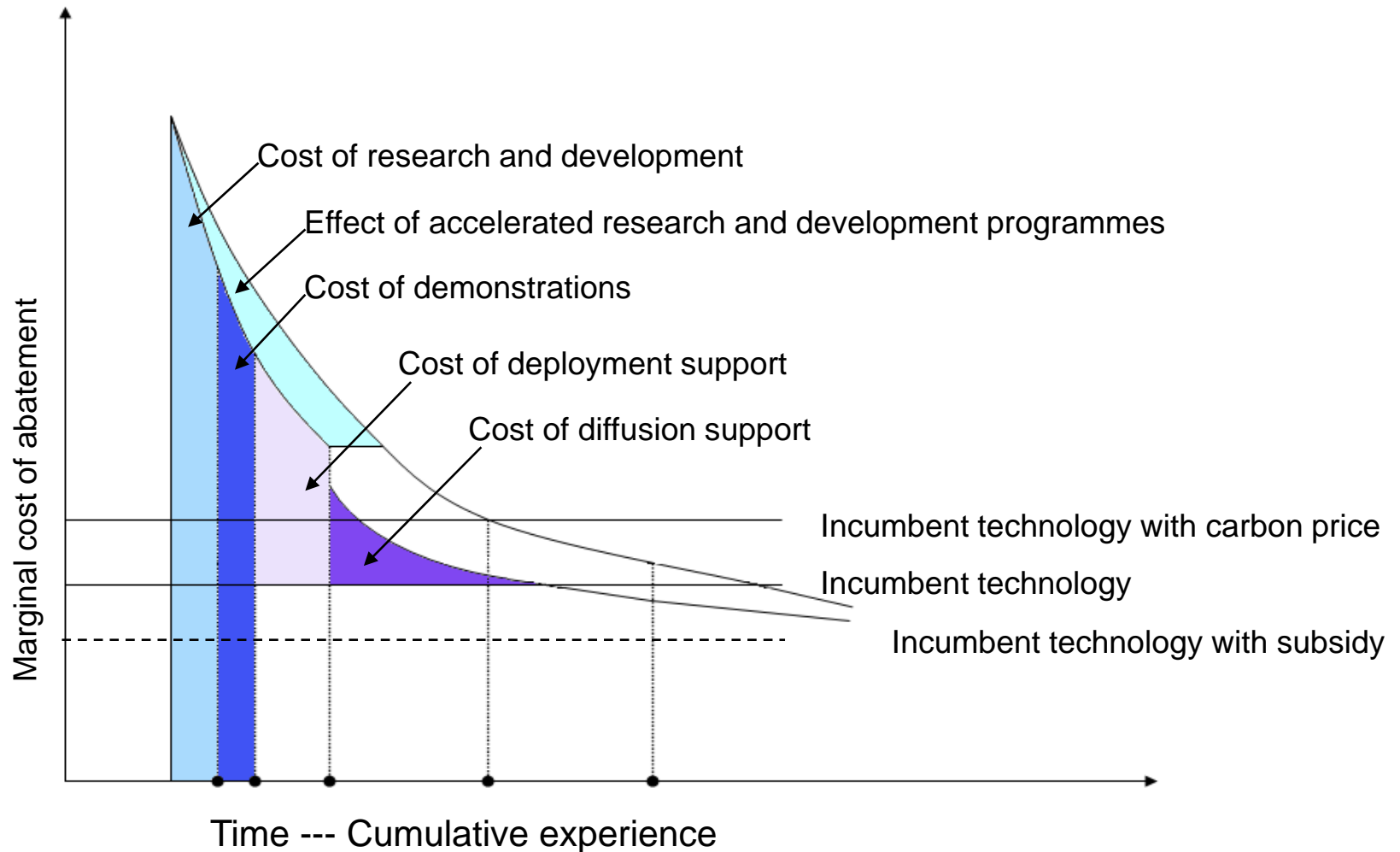


EGTT = Expert Group on Technology Transfer

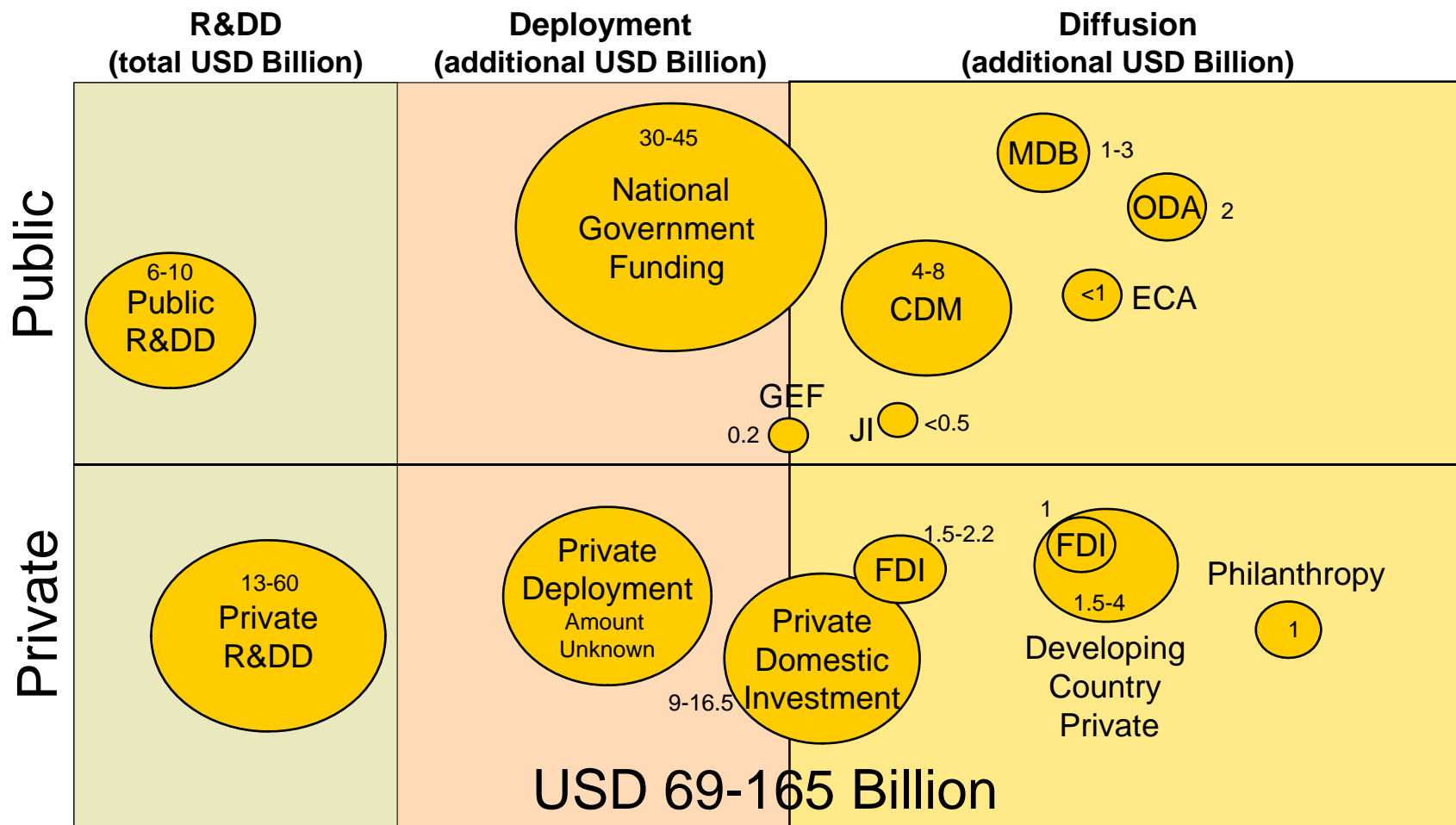
## Methodology

- 15 member expert team from 12 countries
- Technology assessment and investment analysis:
  - **312** mitigation and adaptation **technologies**
  - detailed global **technology typology**
  - stages of **technological maturity**
  - incorporating 30 global technology/financing studies
  - assessment of current financing and required financing
- Optimising the role of the public and private sectors
- Design of potential technology and financing policy ‘packages’ for a Copenhagen Agreement

# Defining Technology Investment Needs



# Existing financing resources: Mitigation



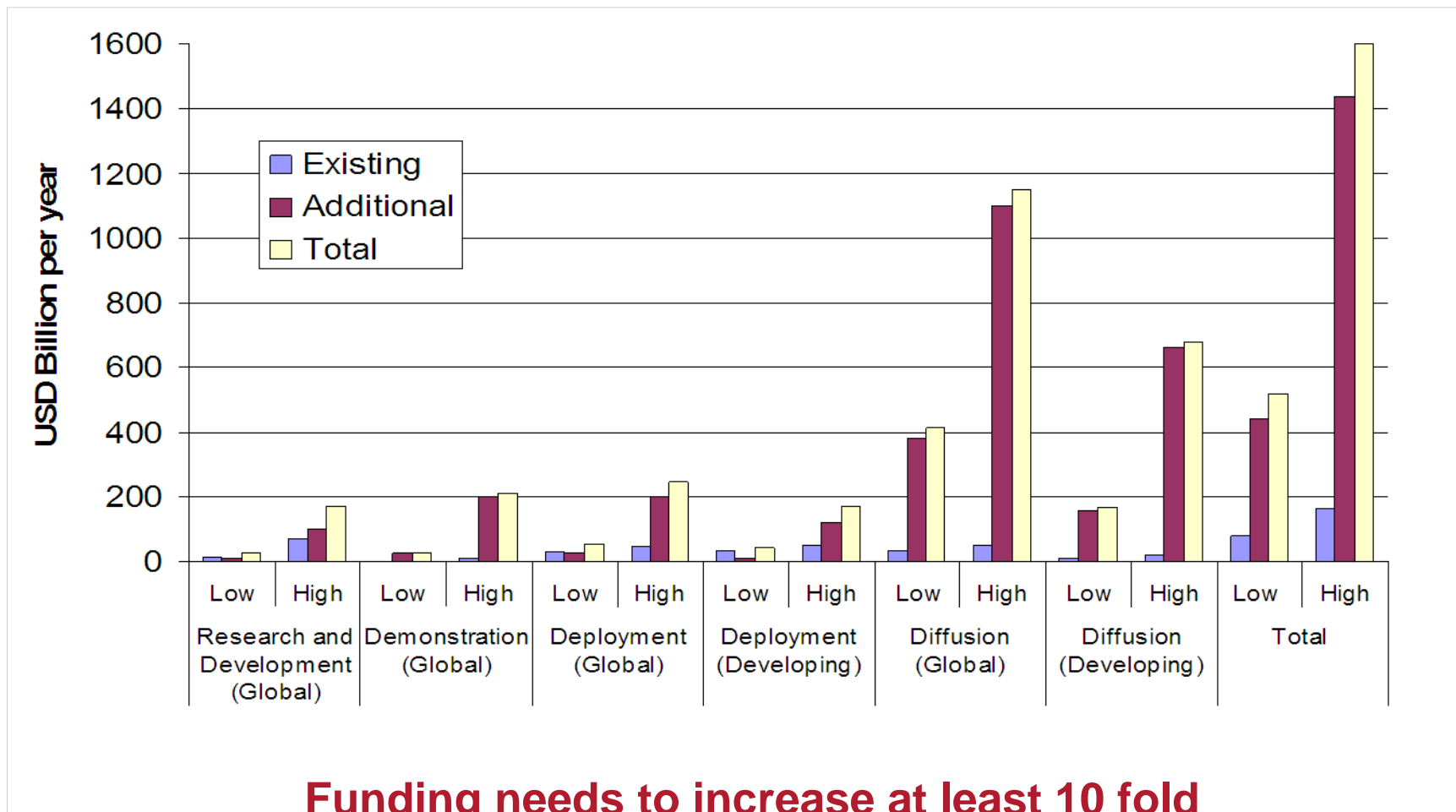
Emissions reduction policies and deployment subsidies are the crucial drivers for investment

## Summary of existing/needed financing : Adaptation

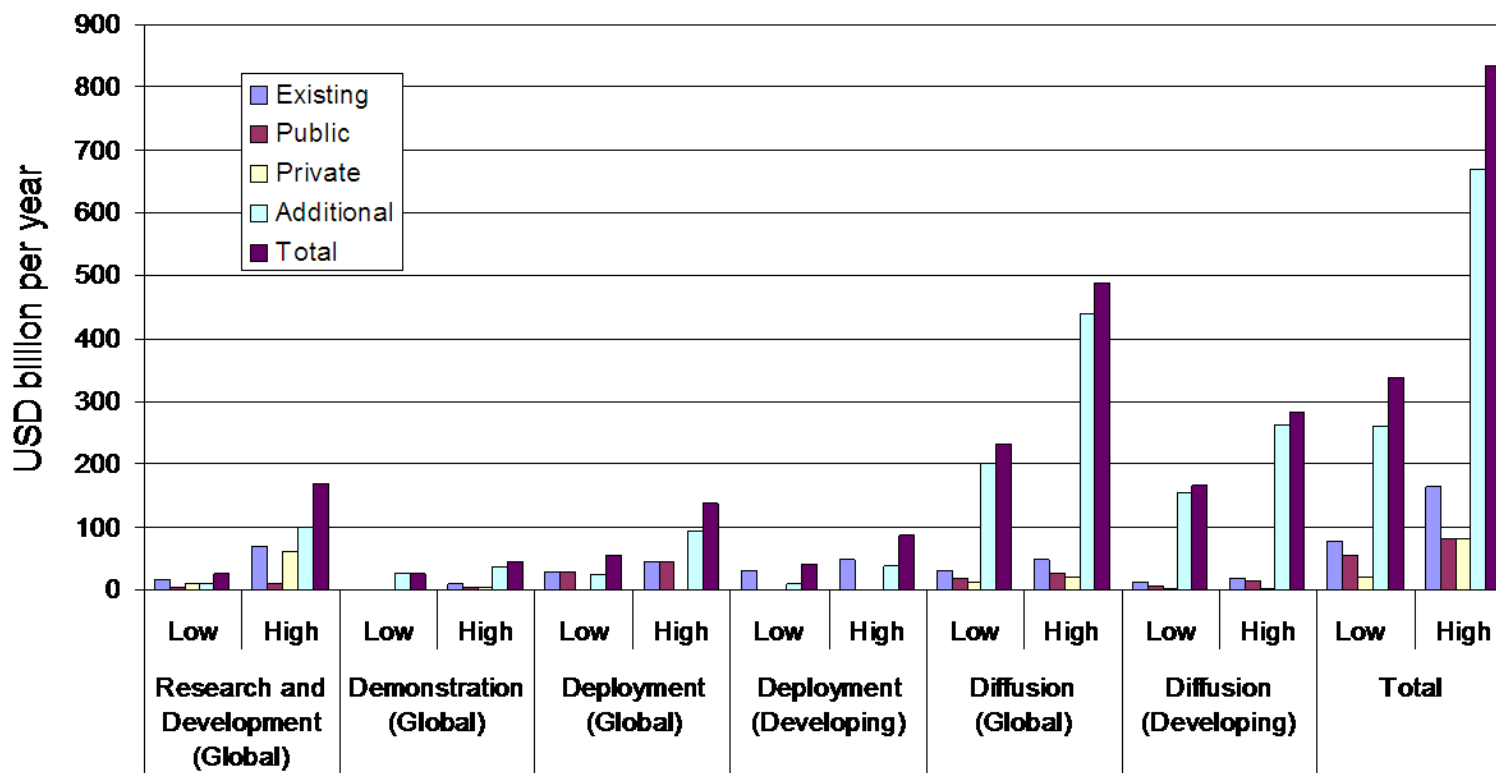
- **Current spending on adaptation projects in developing countries is less than USD 0.6 billion/year.**
- **Adaptation needs estimated at 10s to 100s of billion USD/yr.**

**Funding for adaptation needs to increase at least 100 fold**

# Summary of annual financing needs for mitigation – up front investment costs



## Summary of financing needs – incremental costs

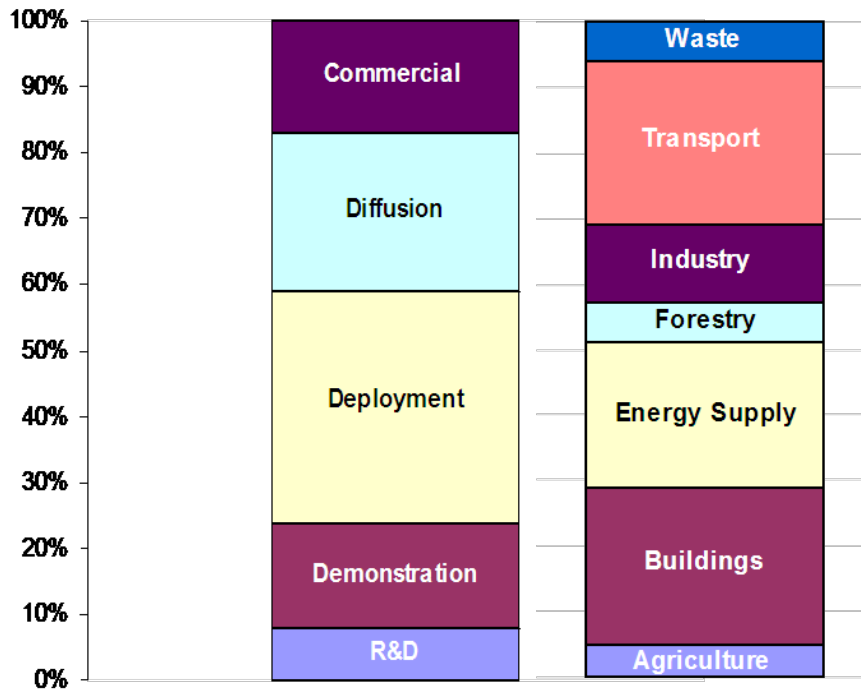


High and low range of abatement costs by stages of technological maturity

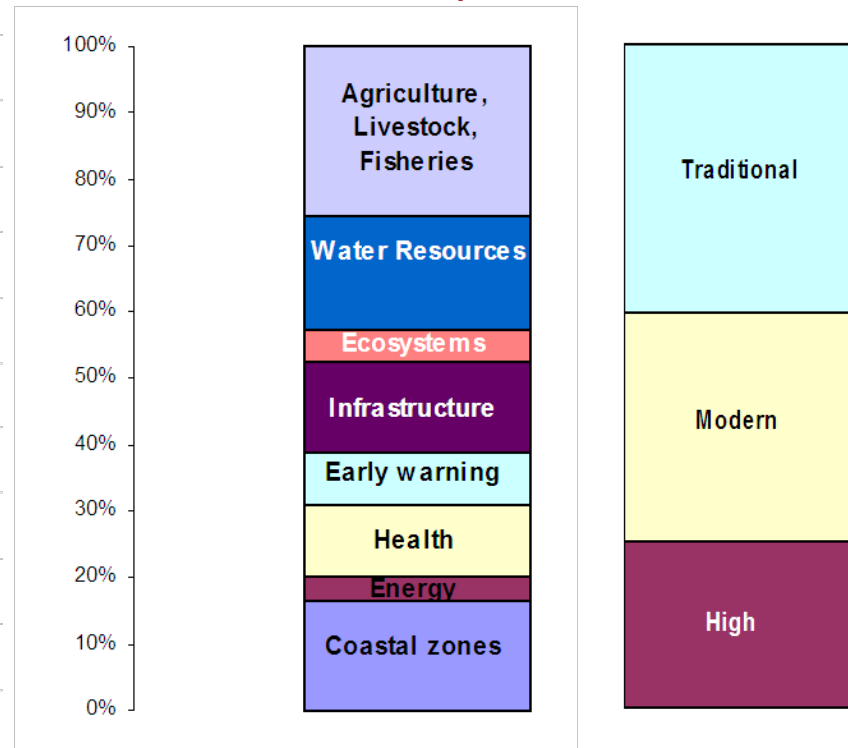
**Funding needs to increase 3 to 4 fold**

# Coverage of Technologies

Mitigation



Adaptation



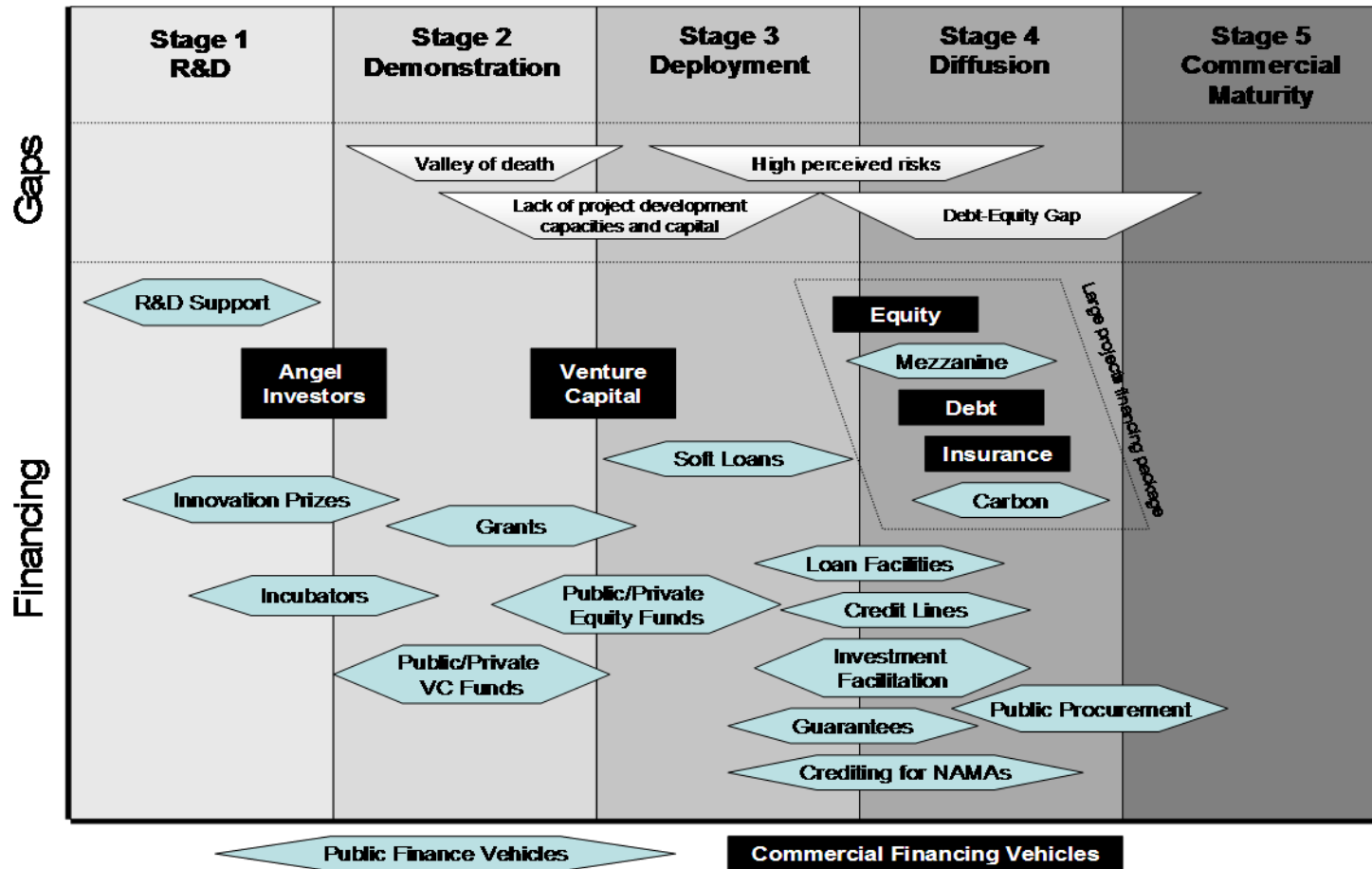
Nearly 60% of technologies face large economic barriers, require innovative financing for demonstration or are still in the R&D phase

Most technologies are available now and require large scale programmes focused on local delivery

Stage of maturity	Technology application	Convention sources				Technology programmes and IEA Implementing agreements				
		TNAs	GEF	CDM	JI	Japan	US	EU	APP	IEA-IA
R&D	Biomass fuel-cell and CCS power generation	No	No	0	0	No	No	No	No	No
	Power storage	No	No	0	0	Yes	Yes	No	Yes	Yes
	Solar nanotechnology photovoltaic	No	No	0	0	Yes	No	No	No	Yes
Demonstration	Ocean Power (saline gradient (osmosis), thermal gradient (OTEC), wave)	No	No	0	0	No	No	Yes	No	Yes
	Offshore Wind (Floating)	No	No	0	0	Yes	Yes	Yes	No	Yes
	Geothermal – Enhanced Geothermal Systems	No	No	0	0	No	Yes	No	Yes	Yes
	Concentrated Solar Power/Solar Thermal	No	Yes	0	0	No	Yes	Yes	Yes	Yes
Deployment	Offshore Wind (fixed)	No	No	0	0	Yes	Yes	Yes	No	Yes
	Biomass IGCC, gasification and pyrolysis	Yes	Yes	578	16	No	Yes	No	Yes	Yes
	Biogas	Yes	No	429	2	No	Yes	No	Yes	Yes
	Solar Photovoltaic	Yes	Yes	13	0	Yes	Yes	Yes	Yes	Yes
	Concentrated Solar Power/Solar Thermal (parabolic trough)	Yes	Yes	1	0	No	Yes	Yes	Yes	Yes
	Tidal (barrier, stream)	No	No	1	0	No	Yes	No	No	Yes
Diffusion	Onshore Wind	Yes	Yes	504	16	Yes	Yes	Yes	Yes	Yes
	Run of river hydropower	Yes	Yes	676	2	No	Yes	Yes	Yes	Yes
	Geothermal - Conventional	Yes	Yes	13	0	No	Yes	Yes	Yes	Yes
Commercial	Hydropower (dam)	Yes	No	334	3	No	Yes	Yes	Yes	Yes
	Biomass co-firing	Yes	Yes	578	16	No	Yes	No	Yes	Yes

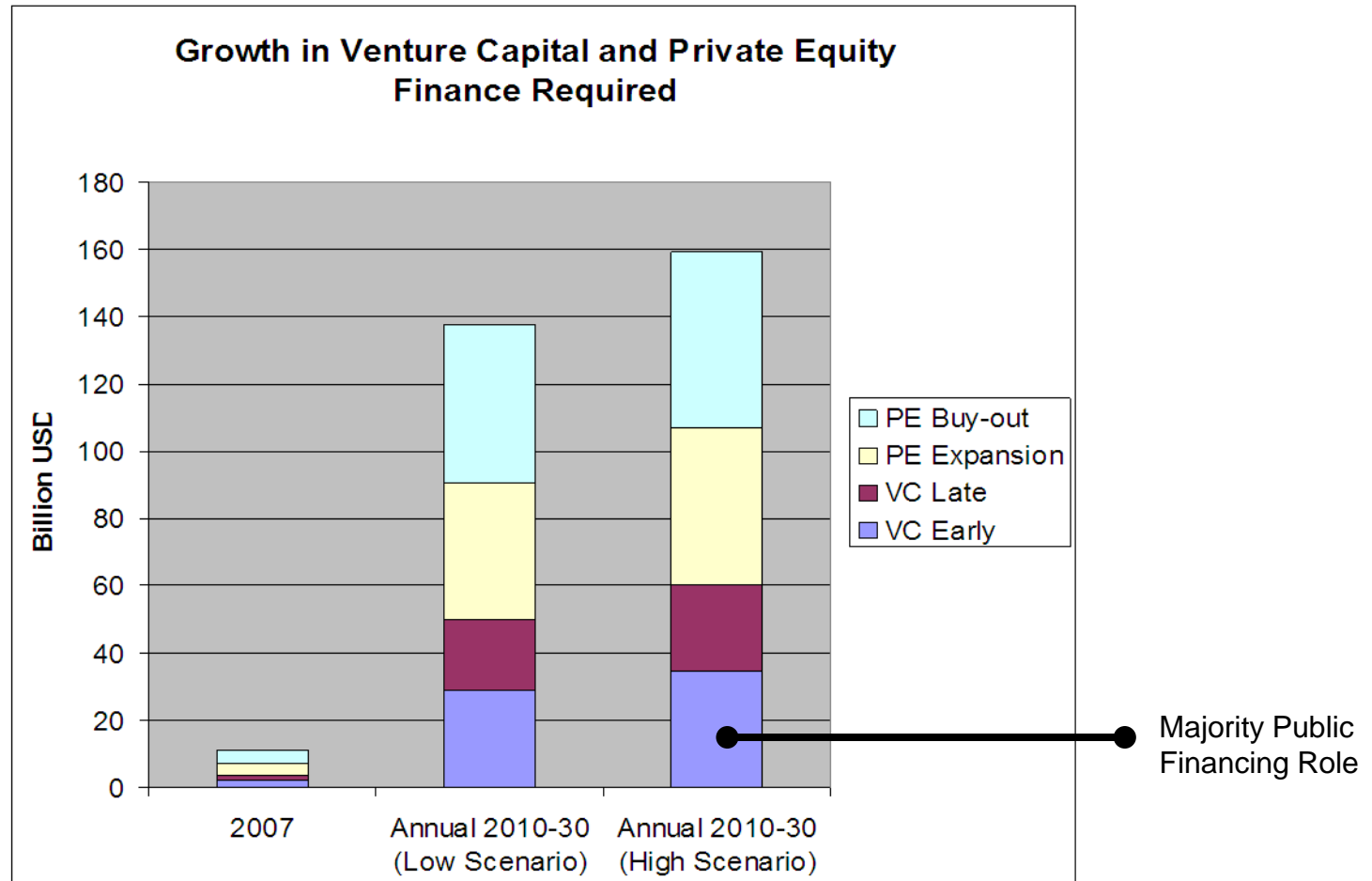
Stage of maturity	Technology type	Technology application	Convention sources				Technology programmes and IEA Implementing agreements				
			TNAs	GEF	CDM	JI	Japan	US	EU	APP	IEA-IA
R&D	Alternative fuels	Synfuels - CCS - Biomass	No	No	0	0	No	Yes	No	Yes	Yes
		Aviation	Alternative fuels	No	No	0	0	No	No	No	No
	Shipping	Hydrogen	No	No	0	0	Yes	No	Yes	No	Yes
		Biofuels	No	No	0	0	No	No	No	No	No
		Alternative fuels	No	No	0	0	No	No	No	No	No
		Renewable energy	No	No	0	0	No	No	No	No	No
		Hydrogen fuel cells	No	No	0	0	Yes	Yes	Yes	No	Yes
Demonstration	Alternative fuels	Hydrogen/fuel cells	Yes	Yes	0	0	Yes	Yes	Yes	Yes	Yes
	Reducing vehicle loads	Lightweight materials	Yes	No	0	0	No	Yes	No	No	No
	Transport systems	Non-motorised transport	Yes	Yes	0	0	No	No	No	No	No
	Aviation	Lightweight materials	No	No	0	0	Yes	Yes	No	No	No
Deployment	Reducing vehicle loads	Aerodynamics	Yes	No	0	0	No	Yes	No	No	No
		Mobile Air Conditioning	Yes	No	0	0	No	No	No	No	No
	Improved drive train efficiency	Advanced Direct Injection	Yes	No	0	0	No	No	No	No	No
		Hybrid drive trains	Yes	Yes	0	0	Yes	Yes	No	No	Yes
	Alternative fuels	Biofuels	Yes	No	0	0	Yes	Yes	Yes	Yes	Yes
		Electric vehicles	Yes	Yes	0	0	Yes	Yes	No	No	Yes
	Transport systems	Eco-driving	No	Yes	0	0	No	No	No	No	No
	Rail	Lightweight materials	Yes	No	0	0	Yes	No	No	No	No
	Aviation	Aerodynamics	No	No	0	0	Yes	Yes	No	No	No
Engine fuel efficiency		No	No	0	0	Yes	Yes	No	No	No	
Diffusion	Transport systems	Transport management systems	Yes	Yes	0	0	Yes	Yes	No	No	No
	Intramodal shifts	Freight shifts	Yes	Yes	0	0	Yes	No	No	No	No
		Freight efficiency	Yes	Yes	0	0	Yes	No	No	No	No
	Rail	Aerodynamics	Yes	No	0	0	Yes	No	No	No	No
	Aviation	Air traffic management	No	No	0	0	No	No	No	No	No
	Shipping	Hydrodynamics	No	No	0	0	Yes	No	No	No	No
Optimal routes/speeds		No	No	0	0	No	No	No	No	No	
Improved drive train efficiency	Engine fuel efficiency	Yes	No	0	0	No	No	No	No	No	
	Nitrous Oxide	No	No	0	0	No	Yes	No	No	No	

# Financing gaps and barriers



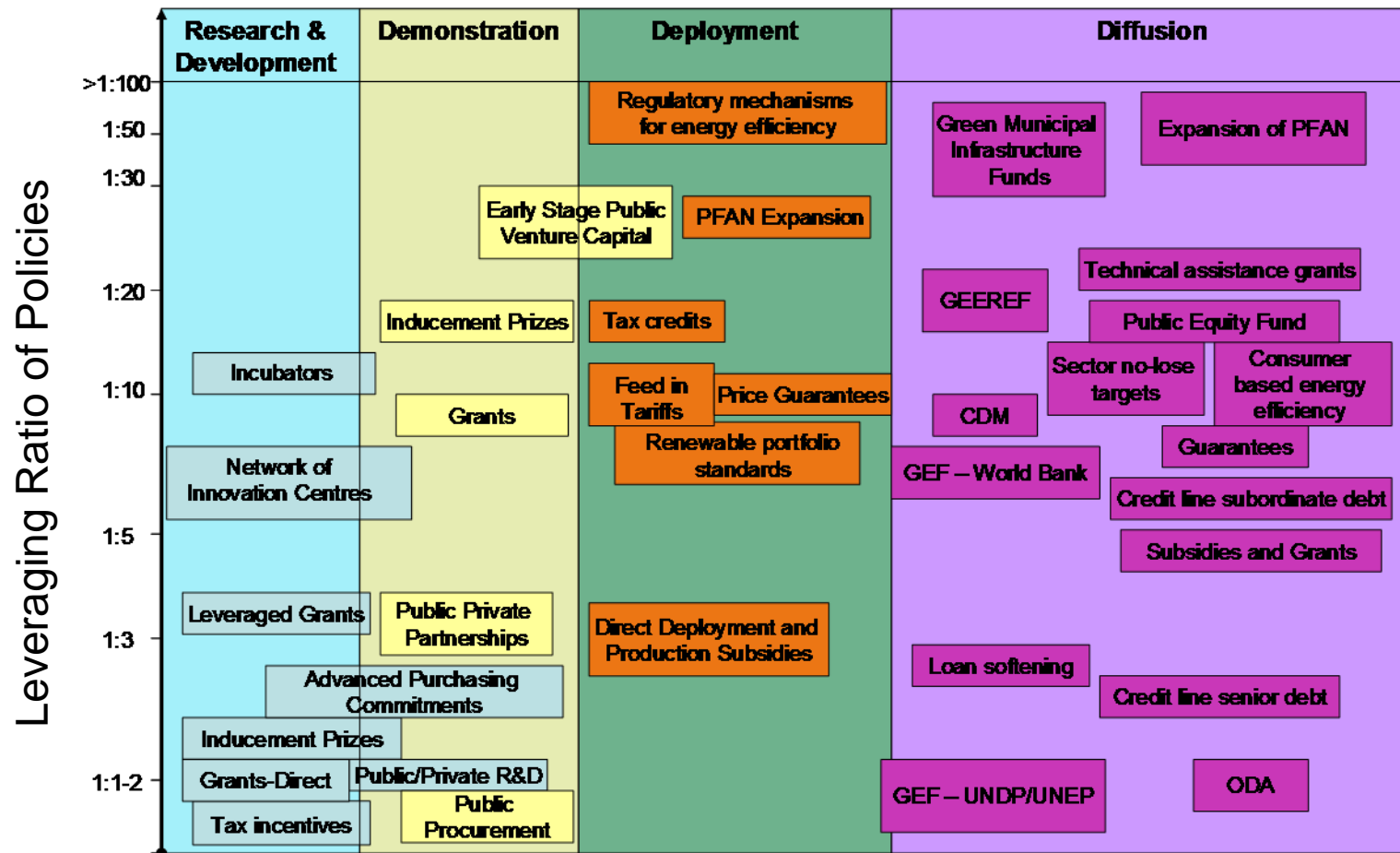
Innovative financing mechanisms can address gaps and barriers across all technology stages

# Public Early Venture Capital Investment Needs



Source: New Energy Finance, 2008

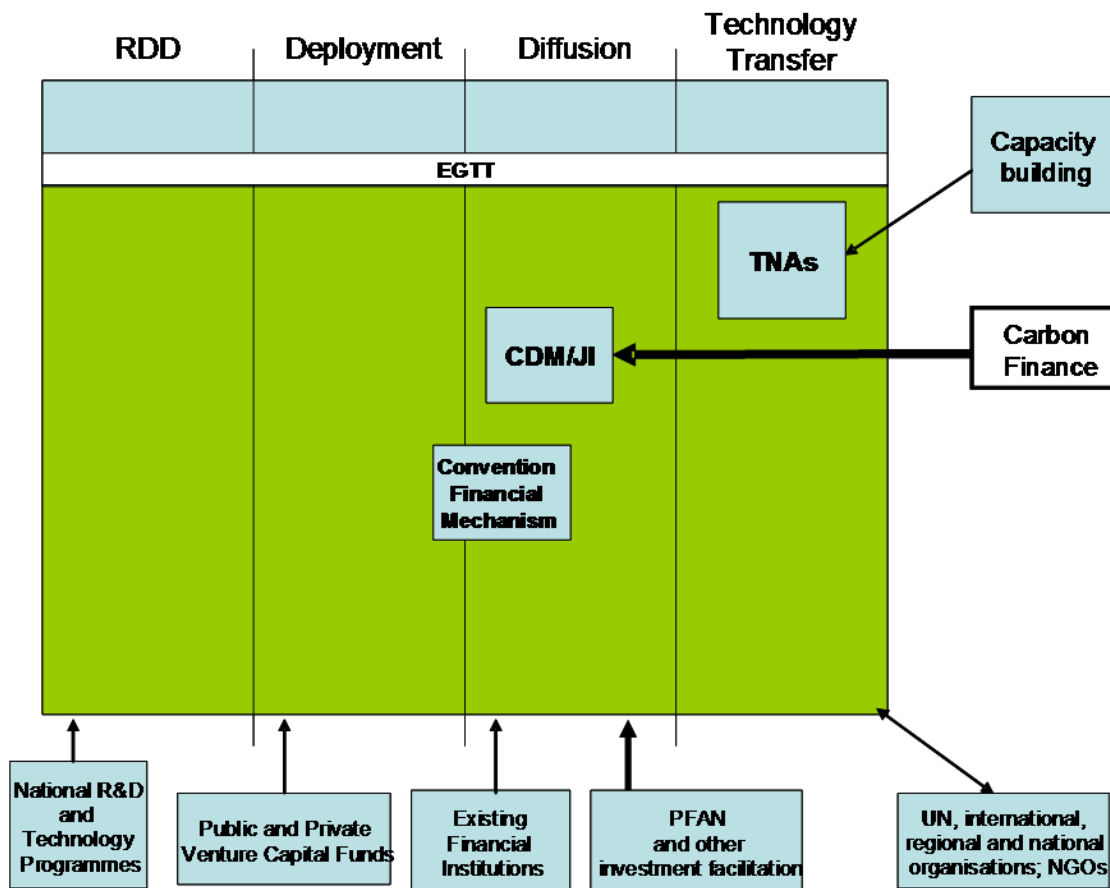
# Potential to leverage the private sector



Even with all new policies that maximise private sector leveraging, public investment of USD 114-152 billion per annum will be necessary.

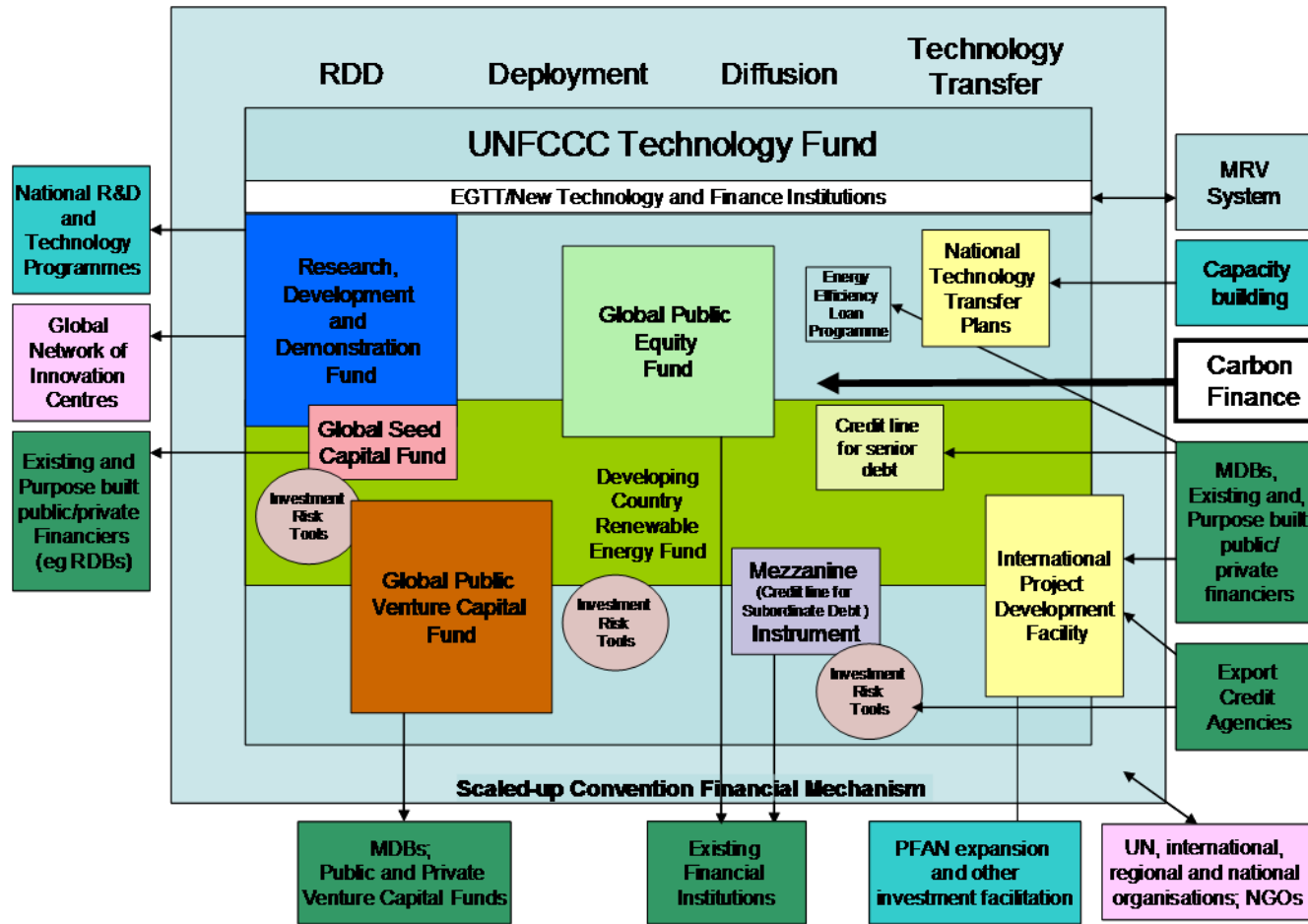
# Evaluating options: Gaps in existing Convention financing framework

90% of current financing occurs outside the Convention



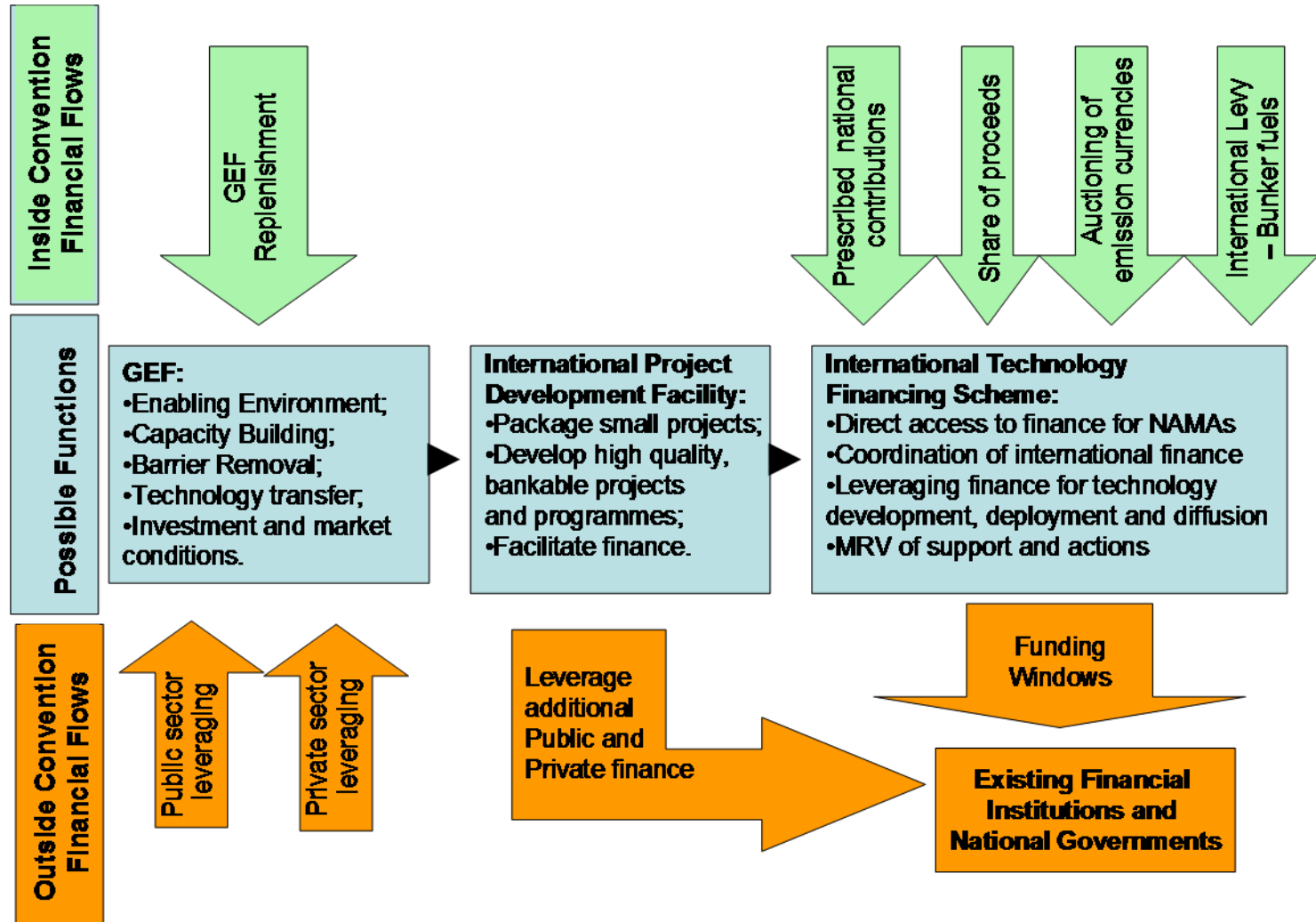
Existing Convention financing mechanisms focus on technology diffusion

# Potential additional finance mechanisms & vehicles

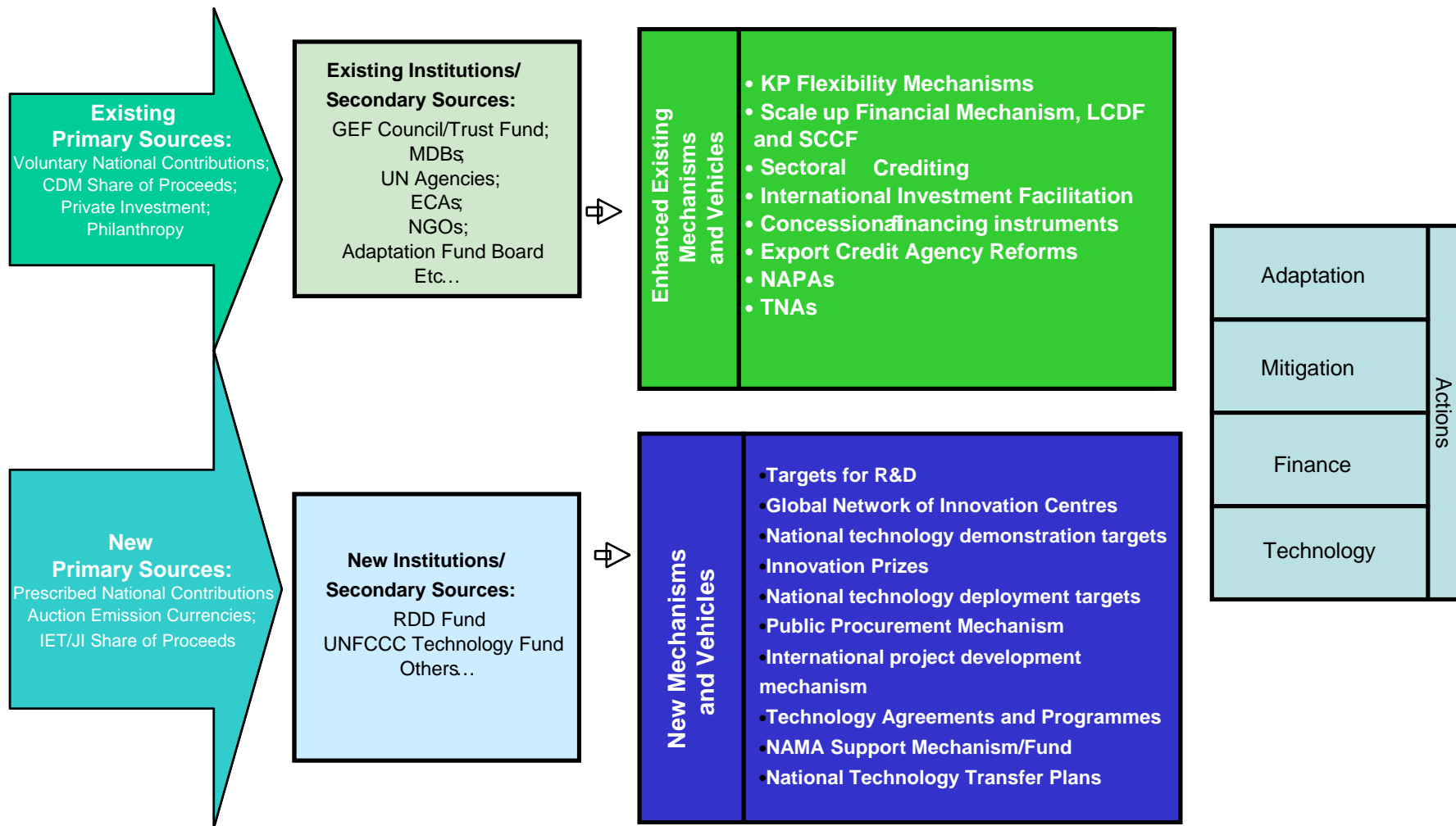


**New financing options focus on gaps and catalytic role of Convention**

# Potential functions for the GEF and a Decentralized new finance scheme



# Potential enhanced/new finance mechanisms & vehicles



# Policy Package Options

## **Option A: Enhancement of existing and emerging financing arrangements.**

- Scale-up by enhancing existing financing arrangements (GEF, CDM, JI, Kyoto Protocol Adaptation Fund, and national, bilateral, regional and multilateral initiatives)
- Mostly outside the Convention.
- Convention provides guidance.
- Financial contributions by developed countries would remain voluntary.

## **Option B: A comprehensive new international technology financing scheme.**

- Under the Convention with a wide ranging mandate
- Either a centralized (new World Bank) or decentralized structure (Fund of Funds).
- Targeted financing instruments and funding windows coupled with the carbon market and nationally appropriate mitigation actions.
- Funds in the order of USD 50-100 billion per annum raised through Convention

## **Option C: Combination of Option A and B.**

- New international technology financing scheme under the Convention - more facilitative role and fewer operational responsibilities
- Funds in the order of USD 5-50 billion per annum raised through Convention