The role of state investment banks in technological change: The case of low-carbon energy in Australia, Germany and the UK

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EPG | Energy Politics Group
CP Climate Policy

Mitigating climate change will require…

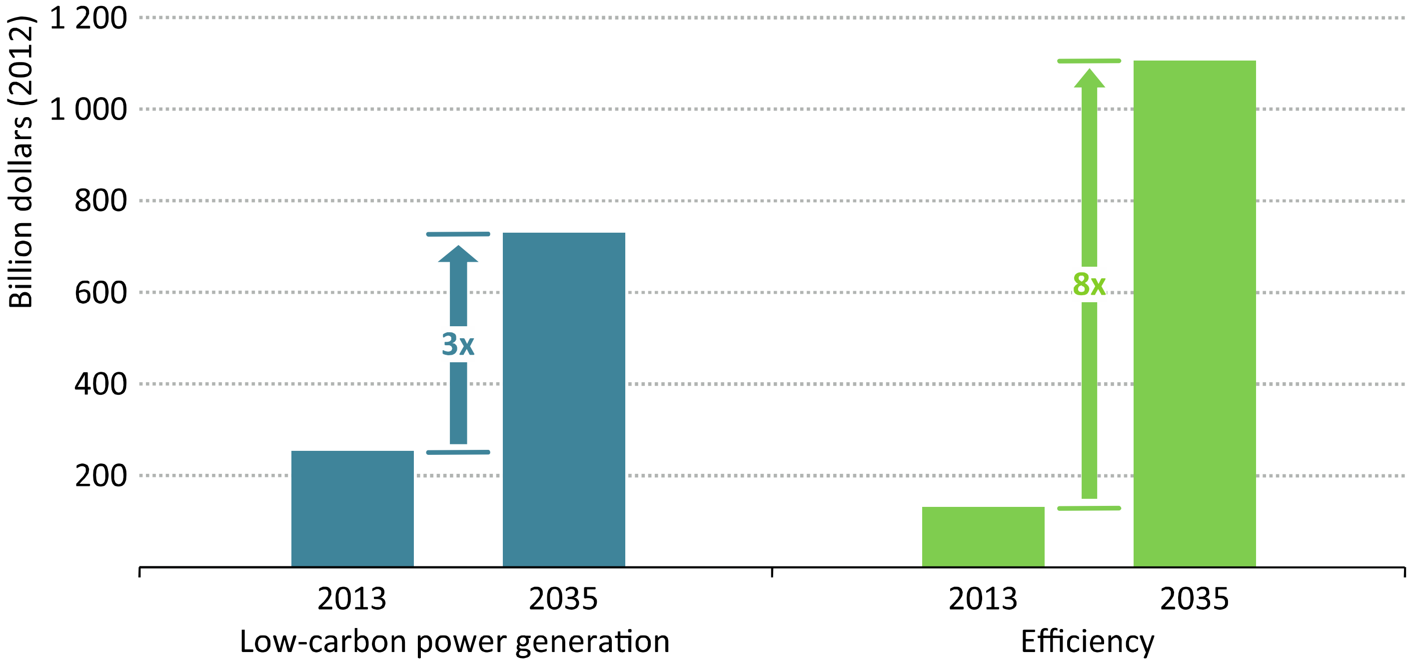
Energy System Transition

Technological Change
(Invention, Innovation, Diffusion)

Low-Carbon Technologies
Renewable Energy & Energy Efficiency (REE)

But! There's a financing gap for low-carbon technology deployment

IEA estimates global investments in low-carbon technologies will need to total US$730b by 2035, tripling the 2013 figure of US$255b, then US$1.6t annually from 2030-2050 to meet global climate targets.



Growth in investment needs in low-carbon power generation technologies and EE in the 450 Scenario

State Investment Banks (SIBs)

Green Investment Bank

CEFC CLEAN ENERGY FINANCE CORPORATION

KfW BANKENGRUPPE

The UK's GIB, Australia's CEFC and Germany's KfW address the above issues by:

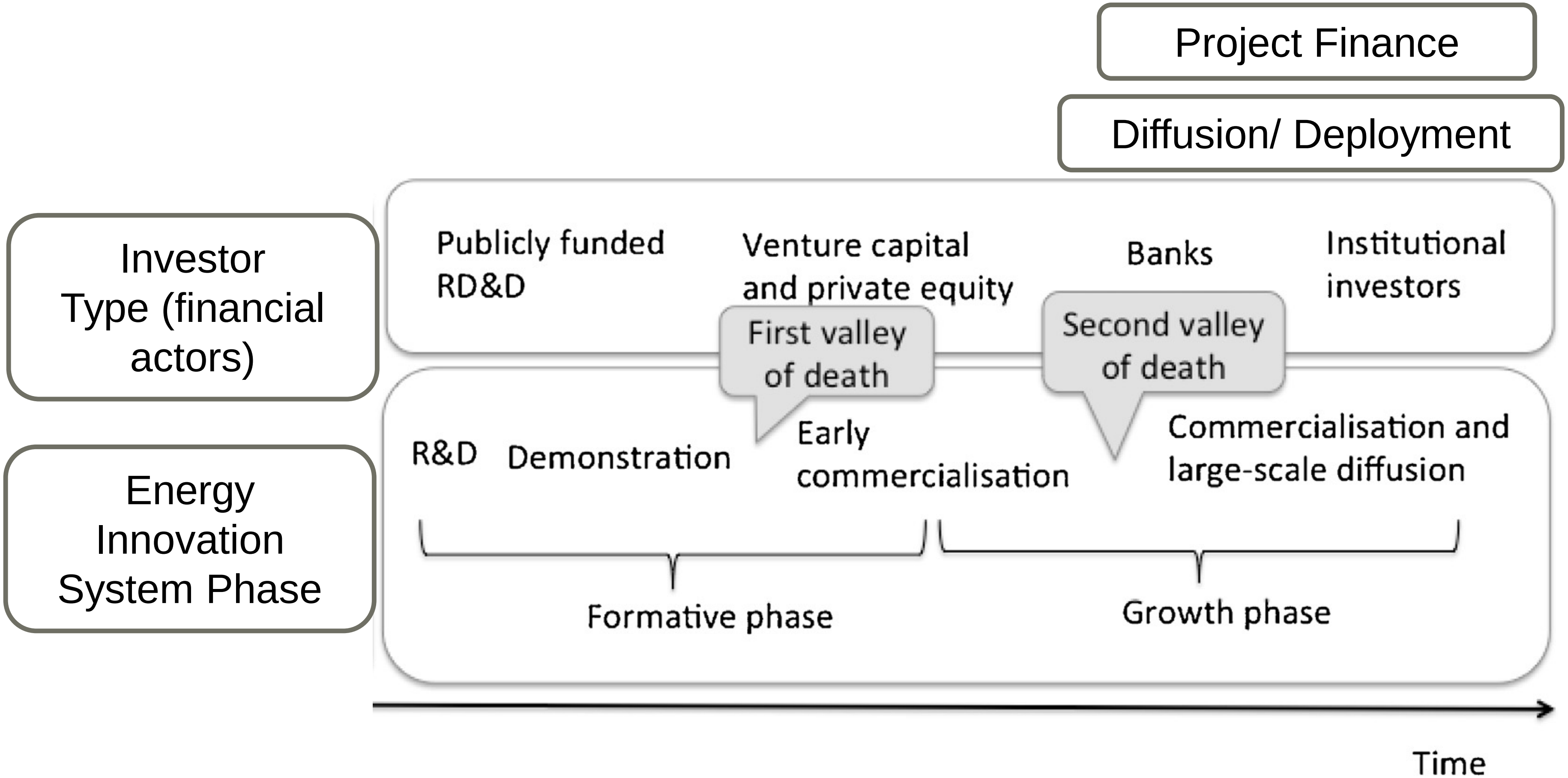
- providing capital to low-carbon projects where sufficient or commercial funding isn't available whilst simultaneously mobilising private sector investment
- accelerating the deployment of low-carbon technologies
- assisting their country's transition to a greener, more innovative economy

These SIBs

- operate within different political, geographical and historical contexts
- differ in how established their country's low-carbon sectors are.

Studies on why SIBs are being created and their role in the economy exist, but questions still remain regarding their impact *on technological change*

SIB activity and the importance of learning feedbacks



Energy innovation system and its financing (Karltorp, 2014)

Research Area

- What role do SIBs play in mobilising finance for REE projects?
- How and to what extent do SIBs contribute to (or stall) technological change in the REE fields**?**
- We wish to better understand the role that (public) finance plays in technological change.
- 50 semi-structured interviews with developers, SIBs, investors (equity & debt), experts + publicly available project & SIB data
- As a starting point we perform an in-depth analysis of how SIBs strengthen the Technology Innovation Systems (TIS) function of mobilising finance.

Technology Innovation Systems (TISs) approach as a lens:

- Informs policy makers about obstacles to the development and deployment of a technology type.
- Identifies a set of functions that need to gain strength for the successful development and diffusion of a technology

Building Blocks

1. Actors
2. Networks
3. Institutions
4. Technologies & Infrastructures

Functions

F1 Entrepreneurial activities
F2 Knowledge development
F3 Knowledge diffusion
F4 Guidance of the search
F5 Market formation
F6 Resource mobilisation
F7 Creation of legitimacy

Findings – SIBs provide capital

SIBs have mandates to provide capital to low-carbon projects where sufficient or commercial funding isn't available and where possible to simultaneously leverage in private or alternative finance to projects.

SIB investments 2013-2015

Country, SIB	National	SIB	Leveraged	SIB % National
Australia, CEFC	$11.8bn	$1.4bn	$1.8	12%
UK, GIB	£35.2bn	£2.7bn	£3	8%

In 2014, the entire KfW group invested €26.6bn in climate and environmental protection projects (approx. 36% of its total promotional business volume)

Findings – SIBs provide capital

What type of capital are they providing?

- KfW concessional finance, grants and long-term debt vs CEFC & GIB commercial terms
- Flexible with type of finance/ instrument (equity and de-risk signal)
- Attracting co-investors
- But capital (esp. equity) still lacking for smaller developers in Australia and UK

Findings - SIBs perform de-risking activities

It's the risk profile of these projects, both perceived and actual, that limits capital availability. SIBs do more than 'just' provide capital…

- Traditional de-risking e.g. KfW guarantees
- Non-financial de-risking
- "First mover" role is key! SIBs help projects that contain innovation (high risk) earn a track record
- But… generally SIBs are not taking first loss piece/ sub-ordinated debt, requested by smaller developers

Findings – SIBs do more than just provide capital and de-risk

- Harness expert capabilities (assess risk)
- Create new knowledge (innovate)
- Standardise knowledge
- Diffuse knowledge
- Create trust

Effects of SIBs on TIS functions

SIBs do much more than mobilise finance: we see that they actively strengthen other functions within the TISs

Functions

F1 Entrepreneurial activities

F2 Knowledge development

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Policy Implications – A contrast and comparison of our SIBs

Contrasts

- Concessional vs commercial finance
- Access to capital markets
- (In)flexibility, debt/equity
- Policy alignment and political context

Comparisons

- Hire industry experts
- Innovate-develop new products
- Standardise
- Actively diffuse their knowledge, learning spill-overs
- Go beyond commercial banks role by being first movers

Policy Implications –The role of SIBs in technological change?

- SIBs can be used in a pro-innovation way to accelerate technological change
- KfW model (concessional finance & guarantees) vs CEFC & GIB model (commercial terms)
- Either model can have a positive impact on technological change as long as they go beyond commercial banks’ role by leveraging their technical expertise and being first movers to pull through project innovation.
- SIB mandates matter
  - Focusing on capital provision and de-risking is too narrow
  - Should be guidelines on being a first mover AND an innovator
  - Actively diffusing knowledge is also important to having a positive impact on technological change

Policy Implications - The role of SIBs & public finance in technological change.

- We see how many ‘functions’ SIBs help to address and strengthen when we look at their activities through a TIS lens.
- The mobilisation of finance is in fact a systemic issue and needs to be addressed by a systemic solution
- SIBs could be a systemic solution as they help address systemic bottlenecks thrown up by finance and the financial system.

Next steps

- How well do State Investment Banks address low-carbon developers' de-risking needs? An explicit analysis of differences between technology and country.
- What difference (if any) does the source of an SIB's capital have on it's activities?
- An analysis of the impact each country's political context has had on the impact of SIBs.
- An assessment of the consistency and coherency of SIB mandates with the corresponding country's climate change, energy and innovation policies.
- Given the importance of learning spill-overs, a more detailed assessment of the mechanisms of how SIBs' activities and new knowledge spills over to private financial actors (investors and commercial banks etc.)

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- Consultant to UNDP on de-risking renewable energy investments

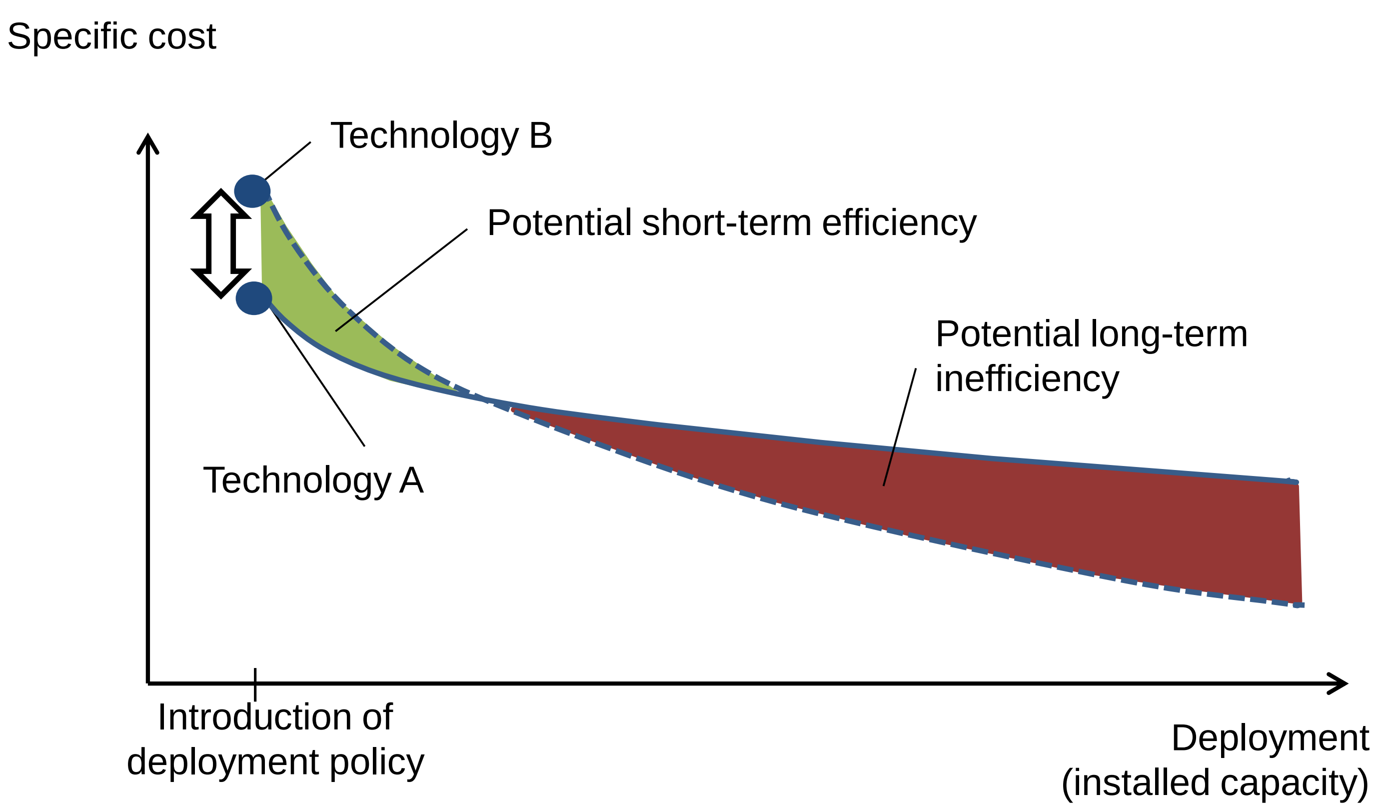
Methods and data

Interviewee	UK	Australia	Germany	International[2]
Developer	6	12	4	5
Expert Intermediary[1]	5	4		1
SIB	1	4	2	
Investor		2		4
Total	12	22	6	10

- We performed semi-structured interviews with 50 project developers equity & debt investors, bankers and industry experts.
- We collected publicly available data on each bank, their projects, and also data from developers who both have and haven't dealt with SIBs.
- We define innovation to include technical and organisational aspects. If something is considered new or even uncommon to a country or its actors, then it is considered innovative.

Overcoming the technology-neutral vs technology-specific policies debate

- Assuming technological substitutes, costs are key adoption criterion
- Cost differences at market introduction can determine technology selection by users (often found in energy sector)



Why did we choose to study these countries and their SIBs?

- We chose these three countries due to the existence of an SIB in each, their focus on low carbon projects and due to the differences in how established their REE TISs are.

- 3 industrialised countries with SIBs: UK (GIB), Australia (CEFC) and Germany (KfW).

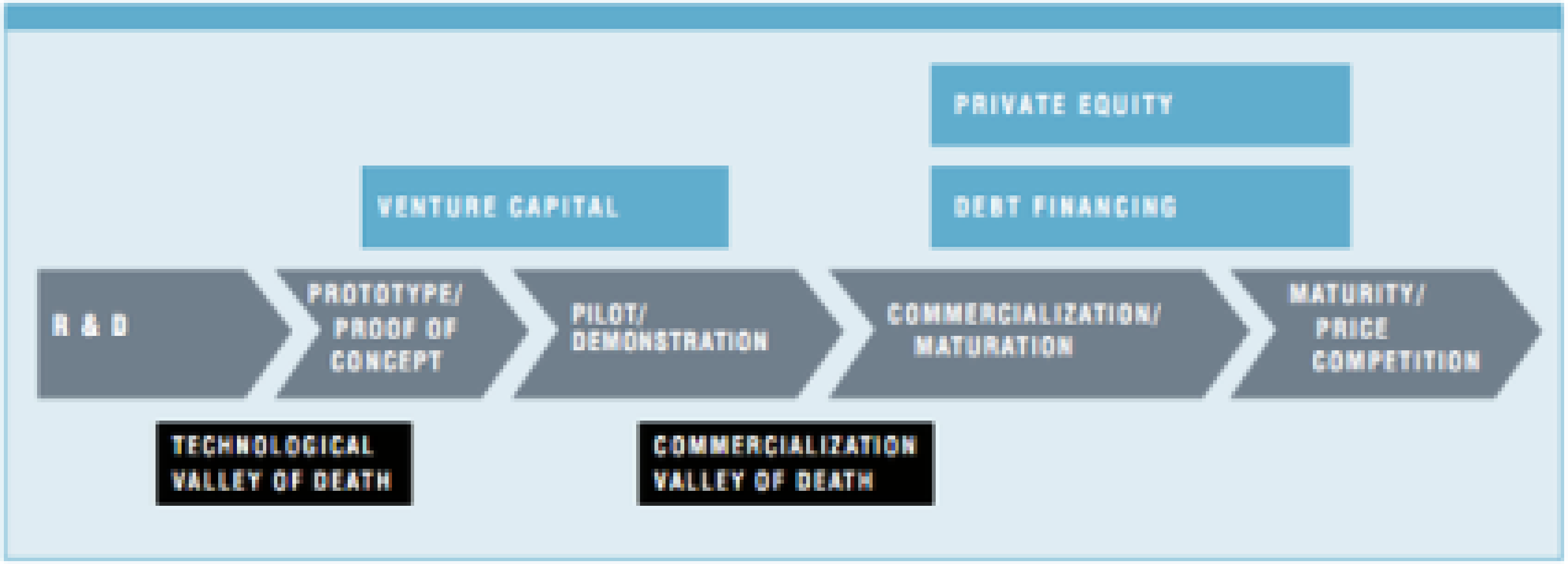
- These SIBs operate within different political, geographical and historical contexts and have varying explicit and implicit policies around supporting the deployment of innovation

Findings - SIBs create trust

- Investors lack experience and so tech. understanding
- Very difficult to estimate and analyse risk without experience – often it is overestimated
- SIBs' decisions to invest in projects, and the DD processes they perform, have become worthy of trust
- See many cases where financiers invest with SIBs before projects are 'proven'

Figure 1

THE ENERGY INNOVATION CYCLE AND THE CLEAN ENERGY VALLEYS OF DEATH



Outline of the study

Issue

Study Background:

- There is a private financing 'gap' for investment in the renewable energy (RE) projects needed to reduce global CO_2 emissions to target levels.
- Several industrialised countries have founded publicly funded 'green' banks to help de-risk RE projects, leverage the private finance needed to close their investment gaps and foster RE diffusion and innovation (e.g. Australia's CEFC, UK's GIB, Germany's KfW).
- However public and private banks' requirements for proven technology may constrain RE technology selection and diffusion.

Questions

Study Questions:

- What are your views on how well 'green' public banks address RE developers' needs?
- What are your views on how private and public banks' requirements impact on developers' ability and motivation to introduce innovation within RE projects?

Methodology

Study Methodology:

- Focuses on diffusion of renewable energy technologies in the project development phase.
- Analyses 3 industrialised countries with 'green' public banks: UK, Australia, Germany.

Methodology for interviews:

- Anonymised 45 min-1h in-person/ Skype/ phone interviews.
- Using the Chatham House Rule, all recorded data and statements collected will be anonymised fully, used in aggregation with data provided by other interviewees and no names or affiliations will be identifiable or traceable in any publication.

Initial results – some interesting cases

Solar developer debt facility for residential and commercial solar PV in Australia
- innovative business model, commercial banks not interested
- CEFC stepped in…commercial banks have followed

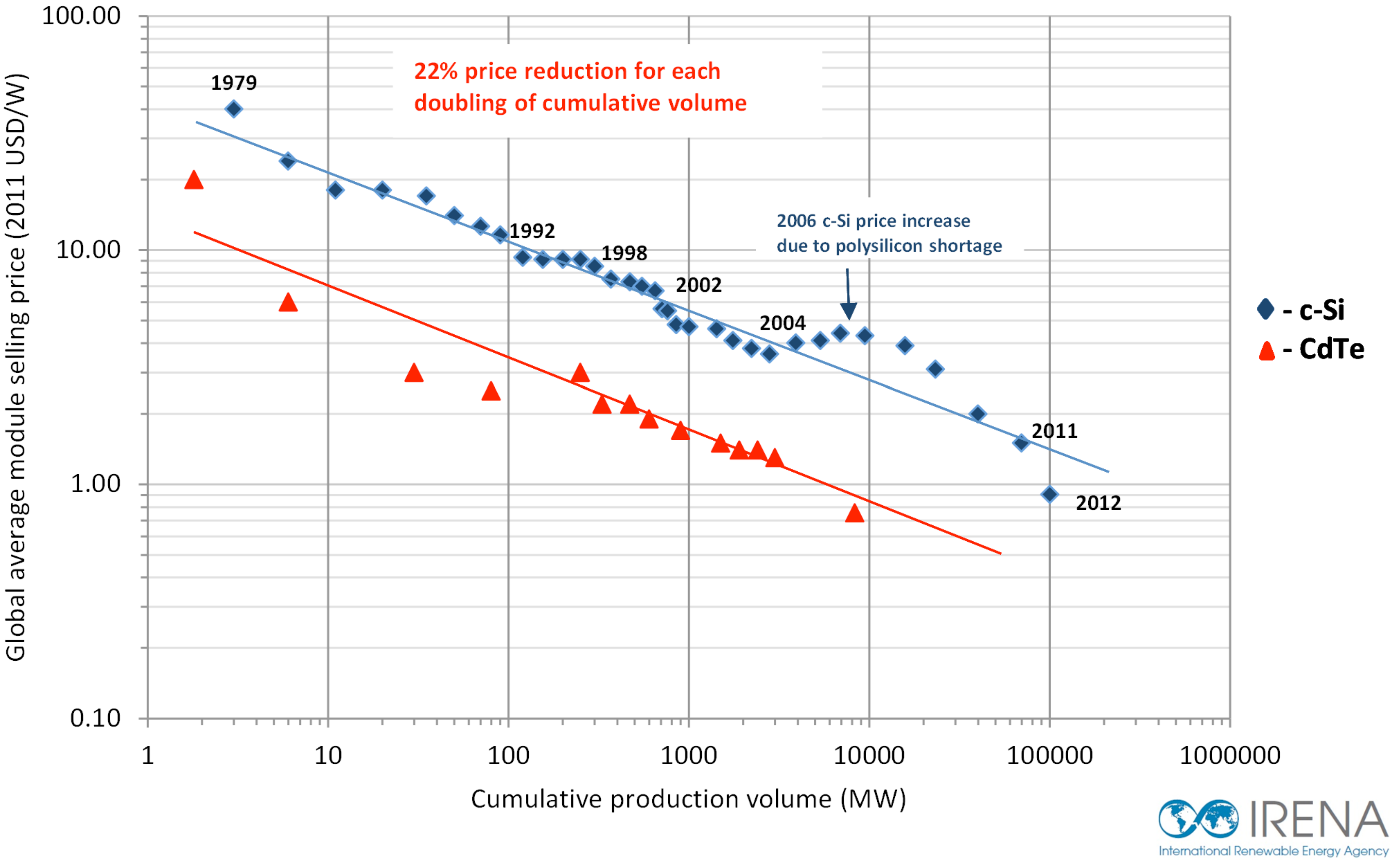
Large-scale solar farm in Australia
- considered innovative technology
- CEFC is addressing policy uncertainty and lack of long term PPAs

Energy Efficiency in UK
- GIB arranging financially complex deals

Biomass
- Australia CEFC: not offering equity, only debt instruments
- UK GIB: not offering first loss piece (higher risk piece)

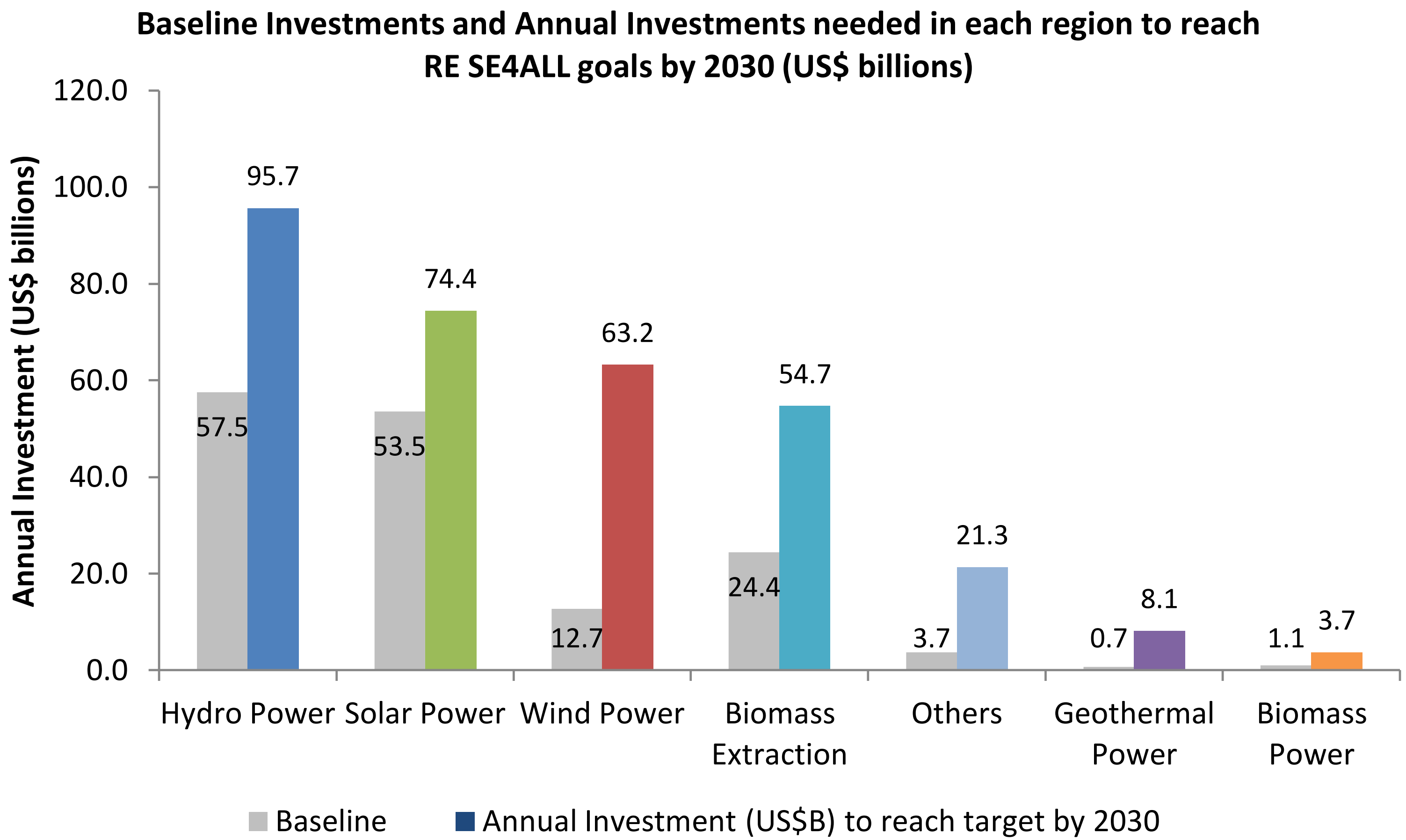
Knowledge/ learning feedbacks and diffusion

Solar PV crystalline silicon and thin-film module cost learning curve (IRENA, 2014)



Financing gap for REE deployment

Annual Investment of US$320b required from a current baseline of US$154b to reach the SE4All goal.



OXFORD 2016
RESEARCH CONFERENCE

Innovation systems and the low carbon transition

14.30 21st September 2016
Chair: Tom Jennings

14.30 Path dependence & path creation: roles for incumbents in the low carbon transition?
Prof Peter Pearson, Imperial College, London

15.00 The role of State Investment Banks in enabling low-carbon technological change.
Anna Geddes, ETH Zurich

15.30 The drivers for China's wind energy technology innovation system.
Rui Hu, Imperial College, London