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Low carbon innovation in developing countries

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Overview

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1. Low carbon innovation and technology transfer: key concepts and rationales
2. Empirical evidence from China and other countries
3. Enabling environments and developed country firms
4. Implications for the UNFCCC and the TEC

Low carbon innovation and technology transfer

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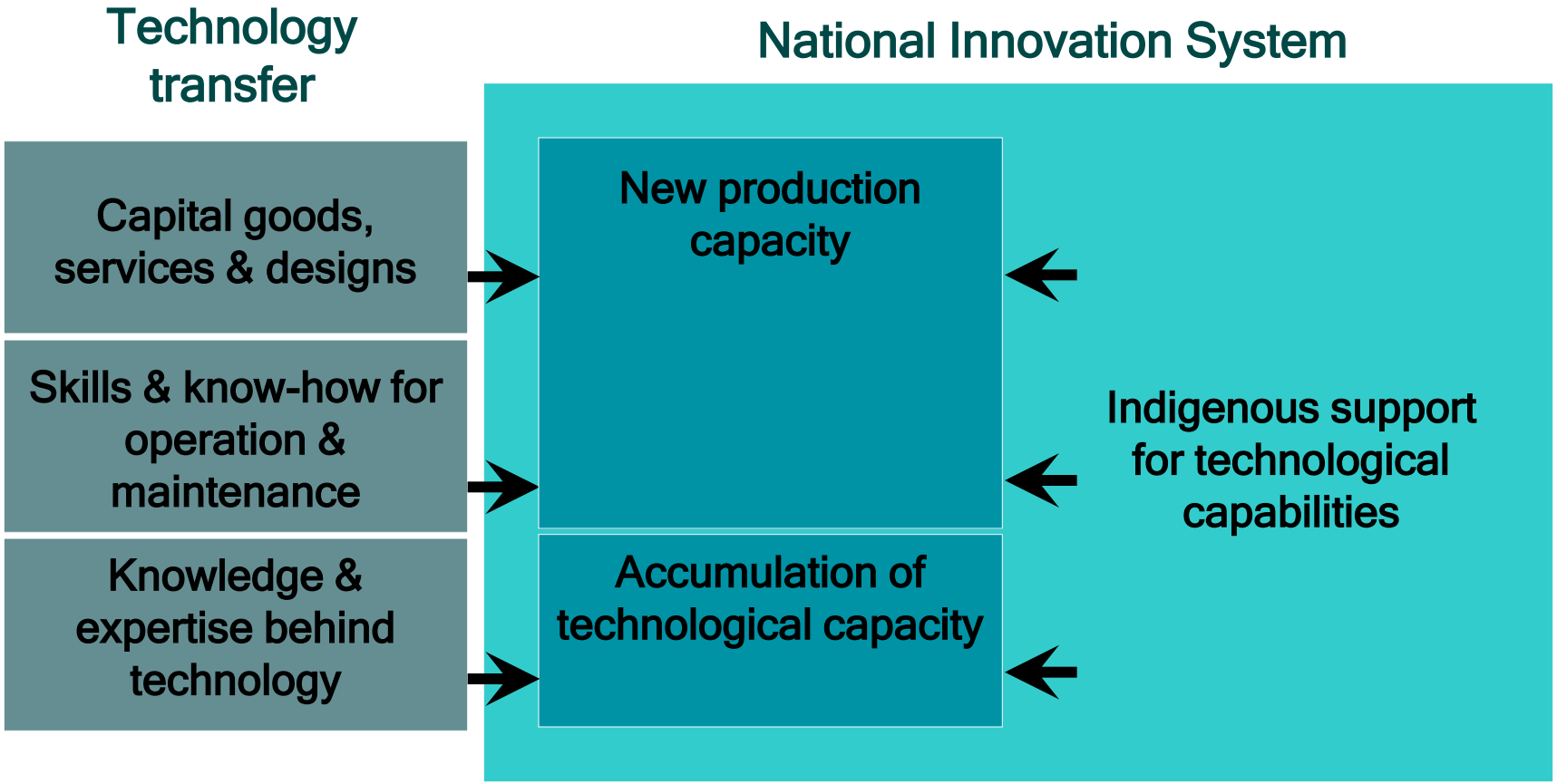

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Low carbon innovation and technology transfer

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Rationales for our approach to technology transfer:

- It strengthens the capacity of developing country firms and organisations to ‘learn by doing’
- Many low carbon technologies need to be adapted to local circumstances
- It contributes to ‘catching up’ strategies within developing country firms and industries

Some empirical evidence

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Evidence primarily from research in China:

- Study commissioned by UK government to provide new evidence on low carbon innovation in China
- Four cases: energy efficiency in cement production, electric vehicles, offshore wind power and efficient coal-fired power
- Focus on factors that influence innovation and technology transfer (technological capabilities and policy incentives)

Supplemented by insights from completed and ongoing research on India, Kenya, Tanzania and Chile

Key conclusions 1 (China)
Large differences between technologies

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- **Different development stages, markets and economics**
- **Energy efficient cement:**
  - Deployment of existing technologies with incentives / subsidies
  - Capital goods market; focus on large enterprises
- **Electric vehicles:**
  - R&D, collaborations, charging infrastructure, subsidies
  - Consumer goods market; focus on end consumers / manufacturers

Key conclusions 1 (other countries)
Large differences between technologies

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- **Some technologies need to be adapted to local circumstances, e.g. adaptation of coal gasifier designs so they can handle high-ash Indian coal**
- **Some have not been adopted successfully for cultural / social reasons – e.g. solar cookers are a 'poor fit' with practices in some countries**
- **Extent of capabilities required for operations and maintenance vary significantly: but even solar PV systems require local operations and maintenance skills**

Key conclusions 2 (China/India)

Hard to generalise from China's case

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- **Particularly strong rationale for innovation (energy intensity)**
- **Significant resources for national R&D support (e.g. 863 programme)**
- **Strong deployment policies (e.g. electric vehicle demonstrations)**
- **Strong role for central government in managing technology acquisition (e.g. supercritical coal)**
- **India different: fewer resources and less central government influence / co-ordination**

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Key conclusions 3 (China)
China's capabilities are developing fast

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- **Examples of 'catching up', e.g.**
  - Rapid development of onshore wind: will this apply to offshore?
  - Catching up in ultra supercritical coal, with licenses from global firms
  - Pioneering firms in electric vehicles
- **Some limitations to this, e.g.**
  - Engineering / design capabilities
  - Links between enterprises and research base
  - Advanced gas turbines for IGCCs
  - EV battery components / systems

Key conclusions 3 (General)
Which capabilities matter?

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Adaptation and modification of existing technology	**Capabilities to appraise, select and support technology adoption**
	Capabilities to operate, maintain and further develop technologies once they are deployed
Addressing needs ignored by markets	**Capabilities to identify needs, to select, implement (and fund) policies to support new markets**
Further development / long-term innovation	**Innovation capabilities: what, why and how they can be enhanced**

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Key conclusions 4 (China/India)
IPR access possible in many cases

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- **We didn't focus in detail on IPRs (focus of companion study)**
- **Most patents still held in OECD, but increasing activity in China**
- **Tacit knowledge also important**
- **In most cases, access to low carbon technology possible for Chinese (and Indian) enterprises**
- **Licenses from international suppliers remain important**
- **Some high barriers to entry (e.g. advanced gas turbines)**

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Key conclusions 5 (China)
Policy frameworks are often essential

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- **National policies in China very important (e.g. R&D support, deployment support, infrastructure)**
- **International policy support significant in some cases (e.g. finance for IGCC)**
- **CDM a strategic source of finance, especially in wind and cement cases**
- **CDM projects in offshore wind / ultra-supercritical coal**
- **Bilateral support too, though results sometimes hard to identify**

Key conclusions 5 (general)
Policy frameworks are often essential

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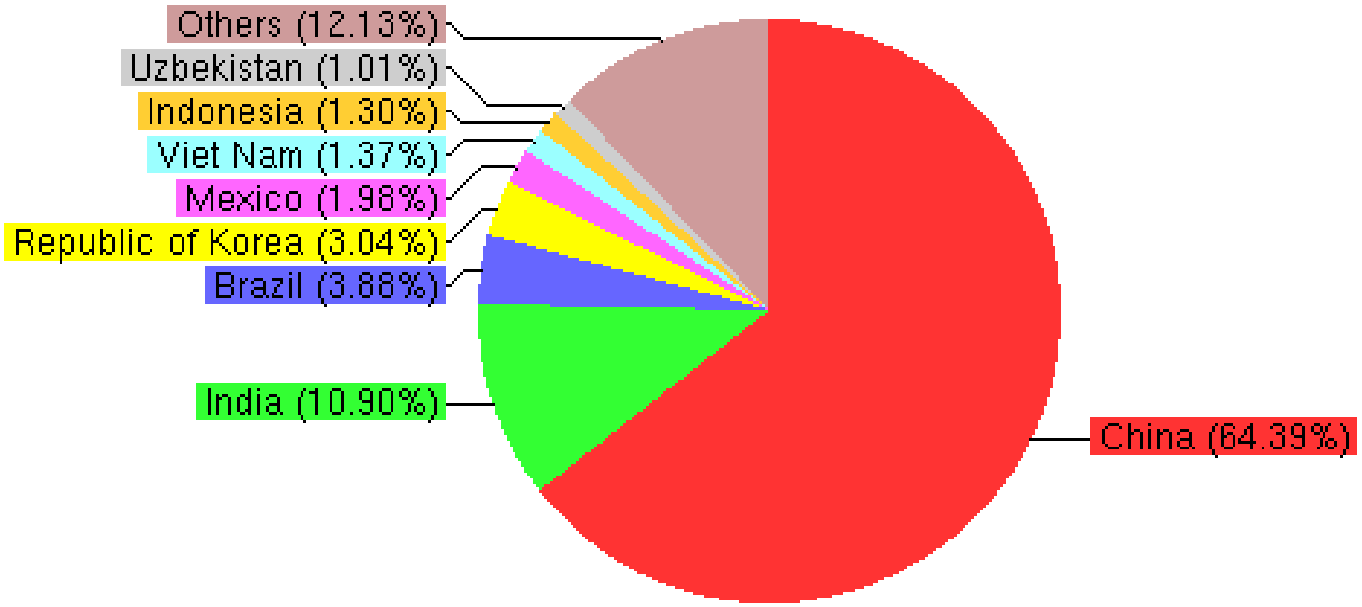
Expected average annual CERs from registered projects by host party. Total: 641,376,290



Enabling environments and developed country firms

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- Technology transfer is a normal part of business practice for many developed country firms
- Willingness to transfer (and extent) depends on many factors, e.g. size of foreign markets; speed of technology development; extent of international competition
- Unclear how ‘enabling environments’ in developed countries can influence propensity for technology transfer
- Smaller firms may be less likely to transfer technology, or may need more policy support to do so
- Climate finance, aid or export credits from ‘home countries’ may help: but can be concerns about ‘tied aid’

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Lessons for the UNFCCC / TEC

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- Implementation of technology mechanism needs to take into account national, sector and technology differences (not‘one size fits all’)
- Crucial links between finance, policy frameworks and technology / innovation: integrated approach necessary for technology mechanism to be effective
- International interventions work best when they complement existing national initiatives & institutions
- Evaluation of existing institutions and mechanisms important to build on what works (e.g. Climate Investment Funds; Climate Innovation Centres)

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Thanks

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