



International Technology Collaboration and Low Carbon Innovation: Recasting “Truisms” with insights from emerging economies

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UNITED NATIONS WORKSHOP ON DEVELOPMENT, TRANSFER AND
DISSEMINATION OF CLEAN AND ENVIRONMENTALLY SOUND
TECHNOLOGIES

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Is this technology sustainable?

<http://www.youtube.com/watch?v=a9fpoICvM-8>

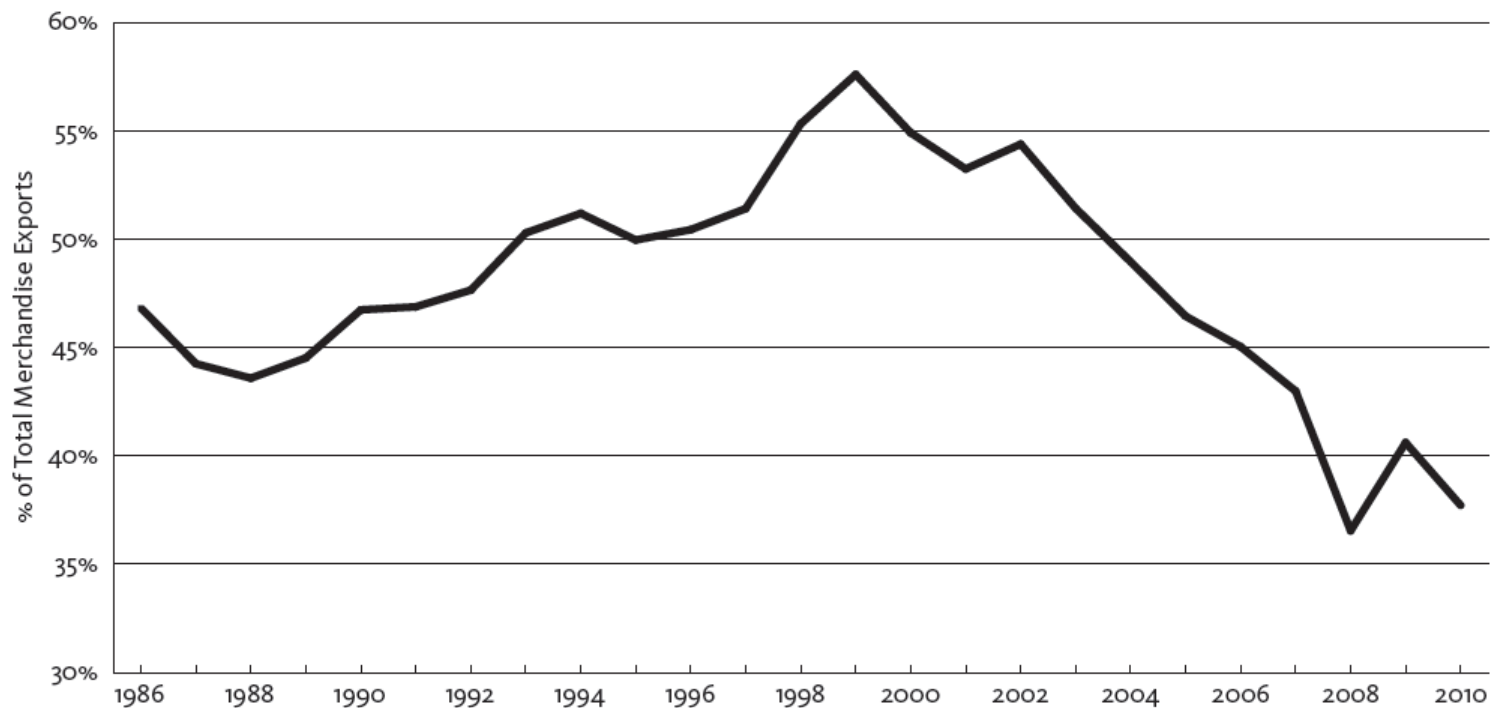


Recap

- Defn - inclusive and importance of the private sector (Dalhman)
- Systemic approach and networks important (Sagar)
- World is changing - Rise of South (Srinivas)



FIGURE 1 Value-Added Products as Share of Total Canadian Merchandise Exports, 1986–2010



Data on Canada - Source: Stanford 2012

China exports: climbing the ladder, regional share of global exports in 2001 and 2010

(export product categories sorted by developed economies global export share in 2001)

■ Developed □ World ■ China

2001

Cars, aircraft, integrated circuits, pharmaceuticals, advanced equipment, medical appliances.

Household appliances, processed metal products, assembled electronics, simple chemicals, print circuitry.

Textiles, toys, shoes, simple plastic products.

2010

Cars, aircraft, integrated circuits, pharmaceuticals, advanced equipment, medical appliances.

Household appliances, processed metal products, assembled electronics, simple chemicals, print circuitry.

Textiles, toys, shoes, simple plastic products.



Why are clean and environmentally sound technologies unique?

- Urgency (climate change, voracious appetite for NR in era of increasing scarcity)
- Public good - govts can take the 'long view'
- Often technologies are immature / less known in settings

Technology Approach so far: focus on output



Key Themes	Conventional notions	Emerging Perspectives
Movement of goods and services (technologies)	<ul style="list-style-type: none"> • North to South • Technology transfer • One way 	
Solutions	<ul style="list-style-type: none"> • Technical / economic options • Bias for over-arching prescriptions • Piecemeal 	
Policy measures	<ul style="list-style-type: none"> • Direct; intl and natl level 	
Innovators and innovation	<ul style="list-style-type: none"> • Experts; frontier, 'breakthrough' technologies • Linear 	
Actors	<ul style="list-style-type: none"> • Donor / recipient • Often 'lumped together' 	
Channels	<ul style="list-style-type: none"> • Within firms is dominant (from HQ to subsidiary) • Between firms – JVs and licensing (North to South) • Some triple helix 	



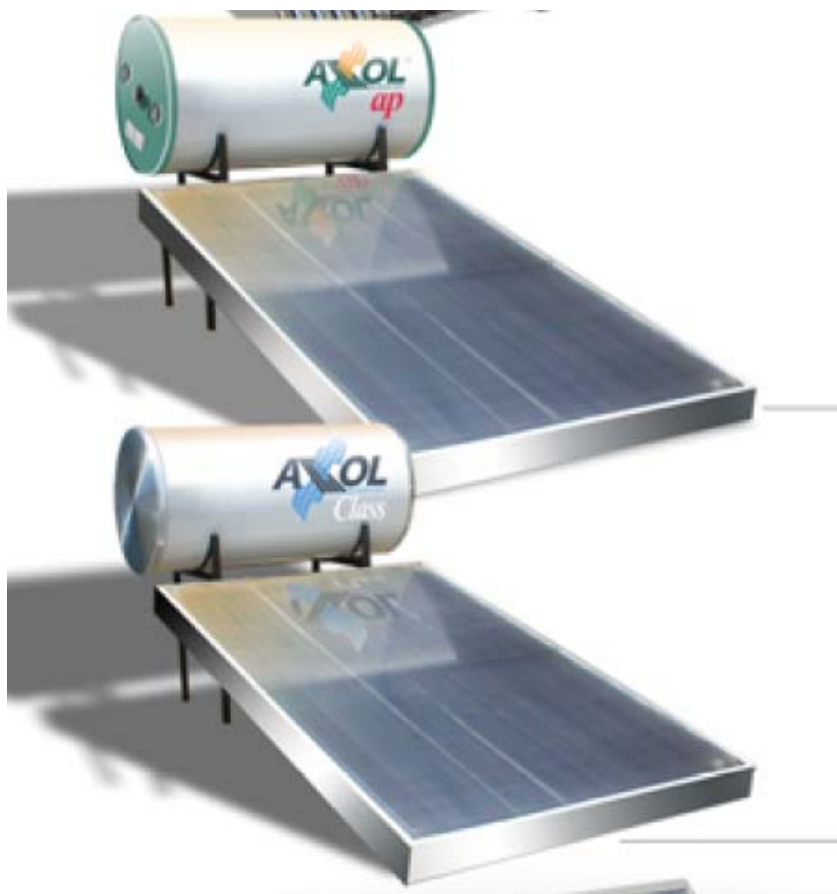
Two distinct features with research approach:

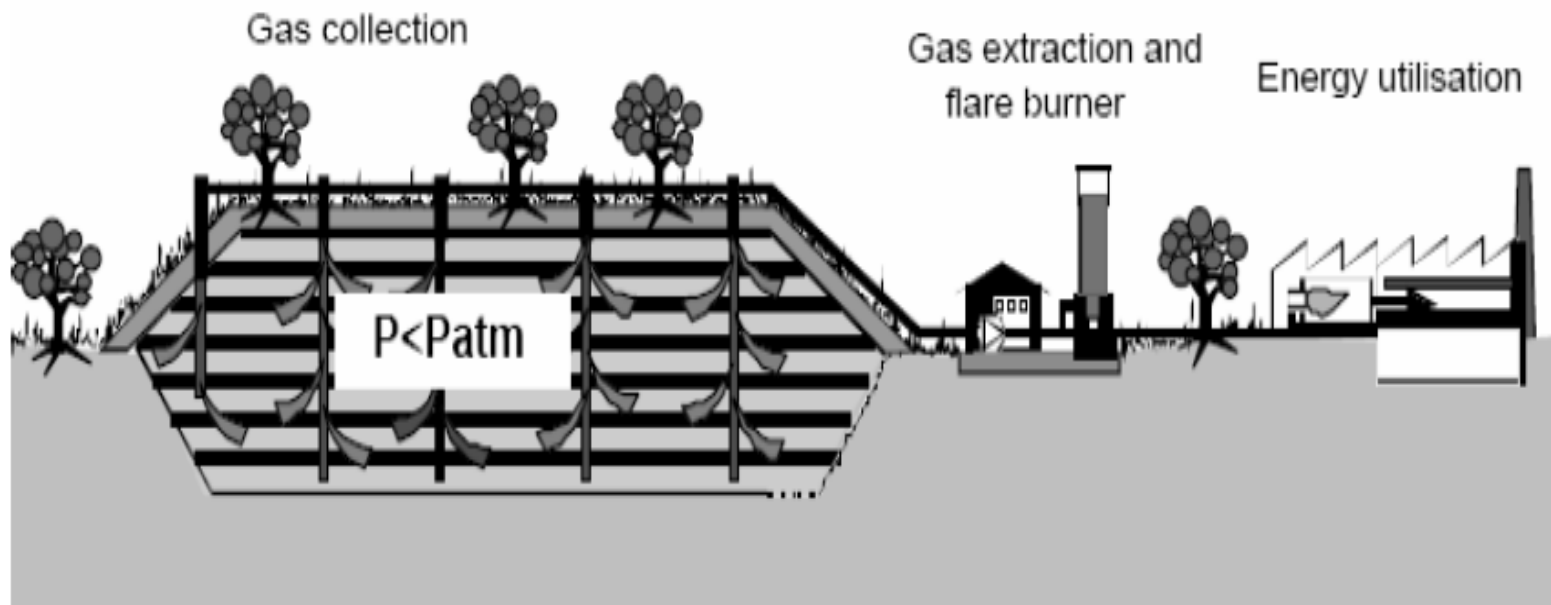
- Systematic approach (attempts to capture various dimensions)
- Innovation *and* adoption (integral relationship between how a technology is developed, produced and used)

Empirics

- Informed by research in Mexico, Brazil, India and China and beyond - cities and national level and mitigation; leading-edge and 'appropriate'; consumers and producers
- Mainly: Solar water heaters, biogas, PV, wind, IGCC, EE techs for SMEs





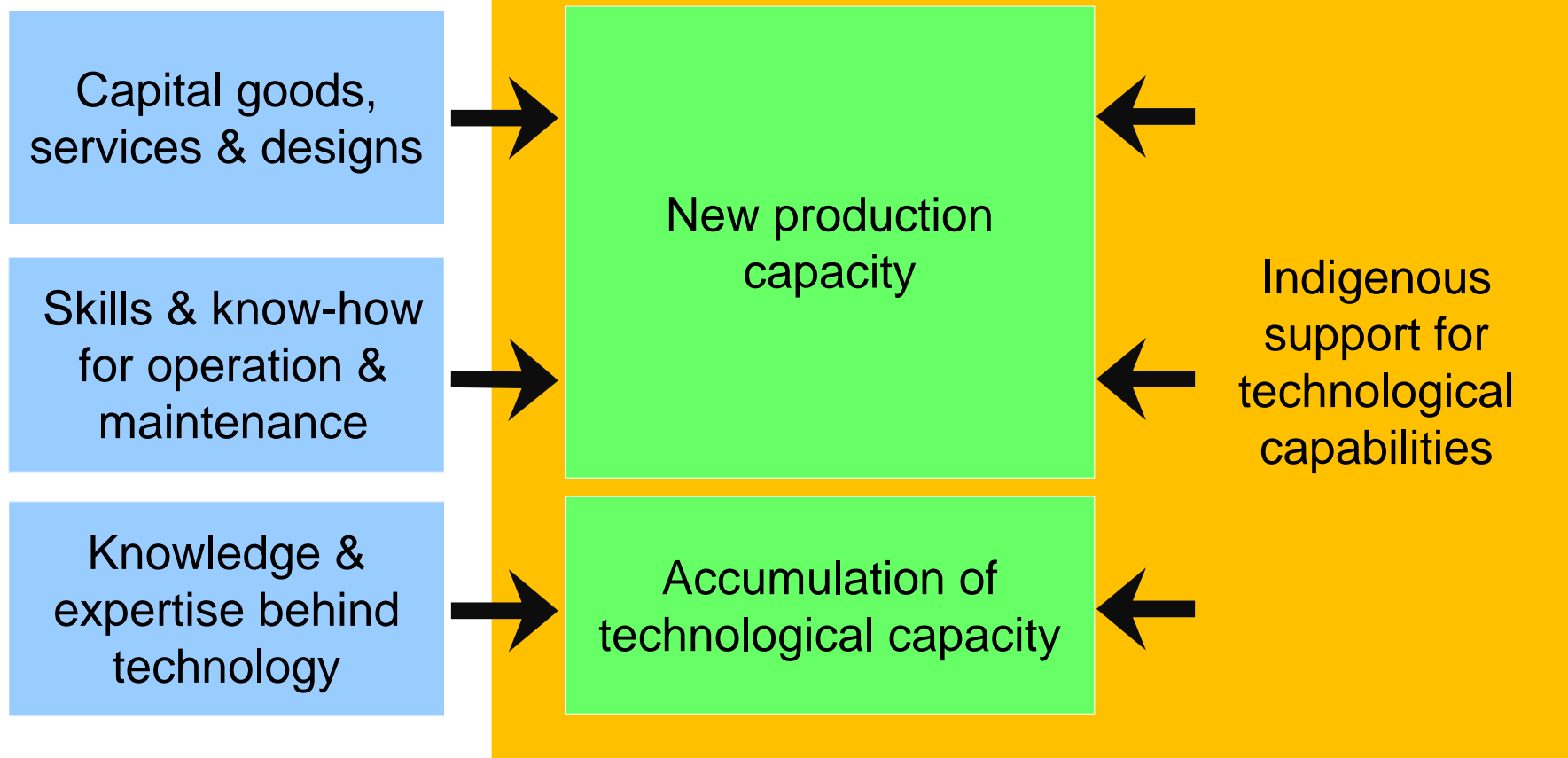


Source: Clean Development Mechanism Project Design Document
(CDM-PDD) Bandeirantes 2005, p. 5



Technology Transfer

National Innovation System





KEY CONCEPTS

Innovation

World, market, organization

Innovation capacities

Know-why, principles, Flow C, knowledge

Technology cooperation

Two or more-way flows

Socio-technical fit

Social / cultural dimensions





What is happening?

Bulk of activity - private sector

Channels - are changing

- JVs and subsidiaries and licenses (Tata BP solar, GE, GM)
- BUT also acquiring majority share or outright purchase of Northern firms (Reva, Suzlon / Goldwind)
- Movement from technology transfer to cooperation - perceptions are changing

India - emerged as a key destination for offshore corporate R&D (Herstatt et al. 2008)



Innovation and Innovators are changing

Leadbeater (2005) “special people in special places”

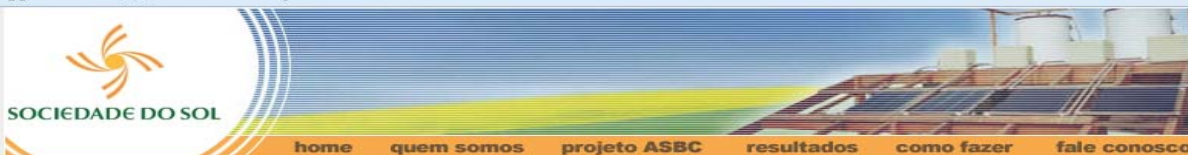
- Sociedade do Sol and frugal innovation (MacGuyver)
Termed *jugaad* in Hindi, *gambiarra* in Brazil, etc.; an “innovative fix; an improvised solution based on ingenuity and cleverness” (see Radjou et al. 2012); pro-poor innovation (Kaplinsky 2011)

<http://www.sociedadedosol.org.br/en/presentation.htm>

Open innovation

Non-linear innovation

R&D in the South - to North (GE and GM)



SOCIEDADE DO SOL

home quem somos projeto ASBC resultados como fazer fale conosco

HOME



ASBC: Sigla de **Aquecedor Solar de Baixo Custo, projeto gratuito** de um aquecedor solar de água, de 200 a 1.000 litros, destinado a substituir parcialmente a energia elétrica consumida por 36.000.000 de famílias brasileiras usuárias do chuveiro elétrico, em casas e apartamentos.

Este projeto está sendo desenvolvido, desde janeiro de 1999, pela ONG Sociedade do Sol, sigla SoSol, sediada no CIETEC - Centro Incubador de Empresas Tecnológicas, no Campus da USP/IPEN.



Chalés com ASBC no interior paulista

O projeto contou em sua fase inicial com o apoio da FAPESP, MCT, CNPq e FINEP.



ASBC

Aos interessados no Aquecedor Solar de Baixo Custo (ASBC), sugerimos a leitura da [Introdução à forma de disseminação da tecnologia do ASBC](#) antes de dar início em suas pesquisas pelo [site](#).

últimas notícias

- **CONVOCAÇÃO PARA AS ASSEMBLÉIAS ORDINÁRIA E EXTRAORDINÁRIA EM 28/02/2011.**
Clique nos links abaixo para conhecer os editais:
 - [- edital AGO](#)
 - [- edital AGE](#)
- [PRÓXIMOS CURSOS DA SOSOL](#)
Fonte: Newsletter da SoSol.
- [Estudantes produzem aquecedor solar](#) fonte: [site do Jornal A Cidade - Ribeirão Preto](#)
- [EcoMoradia terá Aquecedor Solar de Baixo Custo](#) fonte: [site da Prefeitura de](#)

CADASTRE-SE

para receber por e-mail as novidades desta entidade



SOCIEDADE DO SOL
CURSO ASBC
Aquecedor Solar de Baixo Custo

INSCREVA-SE E SEJA AVISADO!

Inscrições online

Assista ao vídeo/aula sobre a "Importância da Energia Solar" apresentada pelo Prof. Augustin T. Woelz



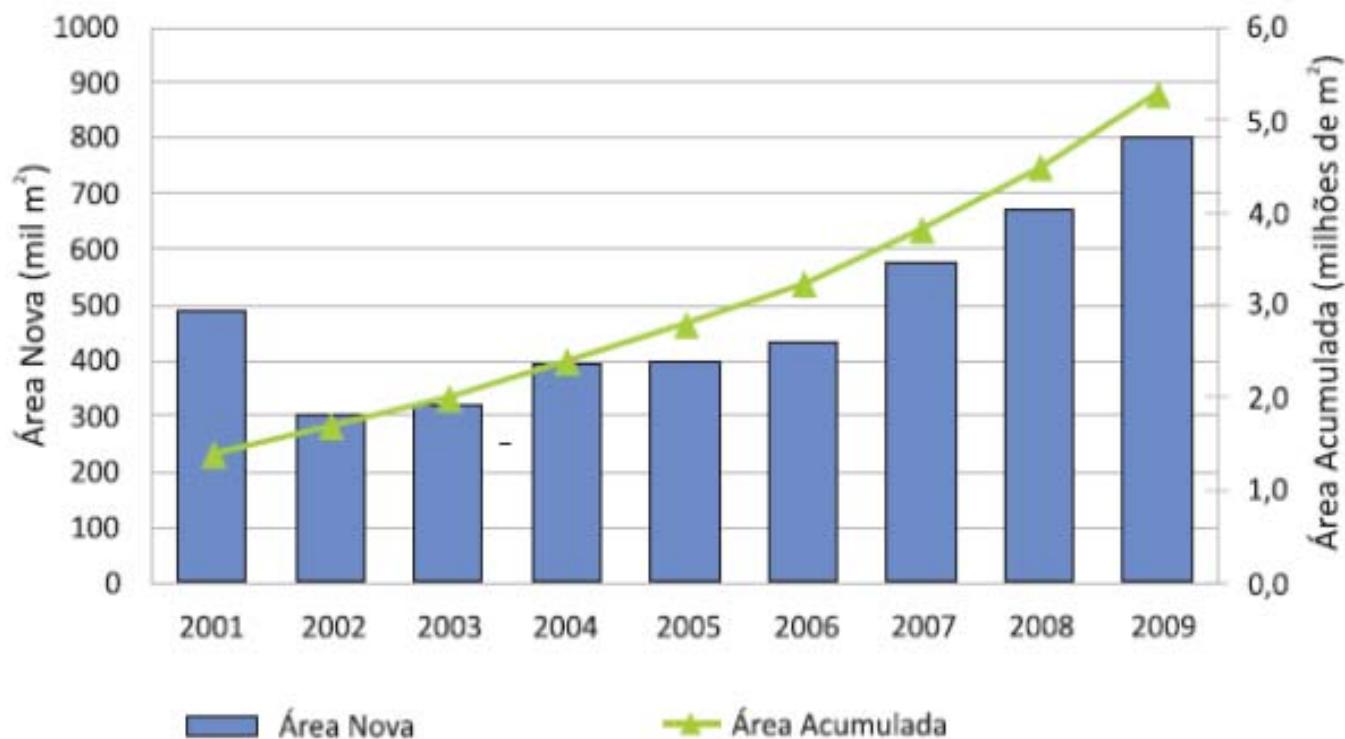
OBS.: essa apresentação pode demorar para carregar se a velocidade de sua conexão for baixa
[Para fazer o download do arquivo compactado dessa apresentação clique aqui](#)

Recomendado:
Construção Sustentável
pela ANAB - 80 horas



Examples - Context: Experiences matter

Evolution of Solar Water Heater market in Brazil (2009) (ABRAVA-DASOL 2010)





Context: Experiences matter

Apagão of 2000 / 2001

Impact of negative perception (SWHs in Mexico - all painted with the same brush - major ramifications - word of mouth)

But not with biogas technologies - social construction of technologies - less entrenchment, more room for change?



EXAMPLES Policy measures - Indirect policies are also key (Privatization yes, but mainly foreign investment / industrial rules key; taxes less of a role)

Supply chain issues

Solar Water Heater “Wars”

Govt-sanctioned standards: INMETRO seal

Perceptions – “ownership” vs. “inferior imports”

China – 863 programme; complement 973 (benefit of time – 1986, 1997)

Sub-national / local level? State policies to complement national level in India (PV); Brazil and Mexico – targeted municipalities just getting implemented (modeled on Barcelona)

Disconnect? International mechanisms little salience for Indian firms while CDM played a role in wind in China; SWHs little, whereas biogas very important





EXAMPLES Actors - Relationships matter

São Paulo – networks are more institutionalized, organized, unified – more examples of cooperation across sectors (academic, govt, industry and (albeit only a little) citizens; two streams but groups come together on larger issues; strong indigenous expertise

Mexico City – links are more recent, *ad hoc*; public-private partnerships exist but not considered effective; more in-fighting and more difficult to mobilize groups; less indigenous expertise but growing

India – more rapid rates of low carbon uptake when international links present



Key Themes	Conventional Notions	Emerging Perspectives
Movement of goods and services (technologies)	<ul style="list-style-type: none"> • North to South • Technology transfer • One way 	<ul style="list-style-type: none"> • South to South, South to North • Technology cooperation • Two or more ways
Solutions	<ul style="list-style-type: none"> • Technical / economic options • Bias for over-arching prescriptions • Piecemeal 	<ul style="list-style-type: none"> • Social dynamics just as if not more important • Context matters (experiences) • More systematic
Policy measures	<ul style="list-style-type: none"> • Direct; intl and natl level 	<ul style="list-style-type: none"> • Disconnect? Indirect; local level
Innovators and innovation	<ul style="list-style-type: none"> • Experts; frontier, 'breakthrough' technologies • Linear 	<ul style="list-style-type: none"> • 'lay people' and experts; incremental, adaptive technologies; frugal innovation • Non-linear
Actors	<ul style="list-style-type: none"> • Donor / recipient • Often 'lumped together' 	<ul style="list-style-type: none"> • Partners; engaged throughout, in a meaningful way • Heterogeneous
Channels	<ul style="list-style-type: none"> • Within firms is dominant (from HQ to subsidiary) • Between firms – JVs and licensing (North to South) • Some triple helix 	<ul style="list-style-type: none"> • Within firms (subsidiary to HQ) • Acquisition or majority ownership of Northern by Southern firms • While rare, some instances of quadruple helix



Considerations in Developing a Technology Facilitation

Mechanism

- 1) More attention needed on the technology cooperation *process*
- 2) Things happening but public policy action needed (esp. SMEs)
- 3) Engaging local partners (early on, more meaningful ways)
- 4) International involvement - increase rate of diffusion
- 5) Policy 'windows' - build on momentum, less entrenched
- 6) Disconnect with international policy mechanisms? Indirect policies are also key (trade)
- 7) South-North: China / India - Germany, Canada; **Subsidiary to HQ (India to US)** and South - South: **Brazil and India (biomass; 'unfinished' adapted), Sociedade do Sol - intl cooperation;**



Ways Forward

- 1) Low carbon innovation centres
- 2) Cross sectoral partnerships
- 3) Policy coherence across jurisdictions and issues e.g. Microgrids - hype buzzword or feasible?
- 4) Collaborative international RDD&D - National Hybrid Propulsion Program (creative ways to address IPRs), ownership, diaspora

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