Designing a Multilateral Scheme to Encourage Technology Innovation and Transfer to Reduce Greenhouse Gas Emissions in the Asia-Pacific Region

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Today's presentation:

1. Why policy and institution necessary?

2. Research questions

3. Barriers in technology innovation and transfer
   - Three barriers: technological, financial, institutional
   - Case studies

4. Institutional design: What policies and institutions necessary?
   - Lessons learned

5. Research (in progress and going forward)

Why policies and institutions necessary?

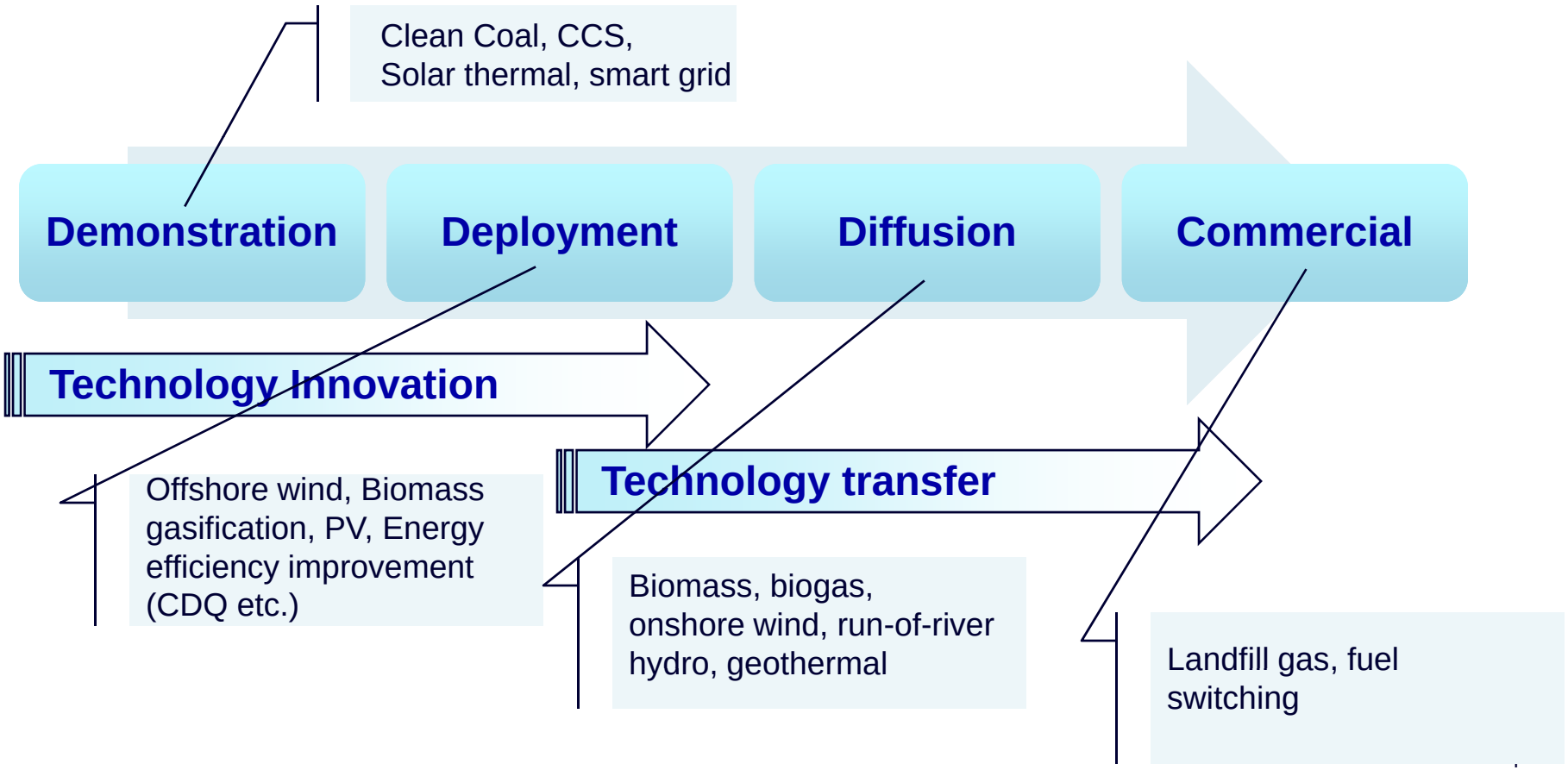
From the corporate perspectives:

- Technological gap between the developed and the developing parts in the Asia-Pacific region.
- Larger potentials with lower abatement cost in the developing part.
- New business opportunities for the companies in the developed countries (the US, Japan, and EU)?

From the policy perspectives:

- Copenhagen Accord: In order to enhance action on development and transfer of technology we decide to establish a Technology Mechanism to accelerate technology development and transfer(para.11).
- Cuncun：Technology Executive Committee (TEC) and Climate Technology Centre and Network (CTCN) established.

Technological development:



The original version of this figure is contained in UNFCCC (2009), Advance Report on Recommendations on Future Financing Options for Enhancing the Development, Deployment, Diffusion and Transfer of Technologies under the Convention: Note by the Chair of the Expert Group on Technology Transfer (FCCC/SB/2009/2). The author modified the figure by adding specific technologies along the technological development.

Research questions:

1. What policies and institutions are necessary to encourage technology innovation and transfer to reduce greenhouse gas emissions in the Asia-Pacific region?

2. How can we create business opportunities to diffuse renewable energy and energy efficiency improvement technologies in the region?

Three areas of research:

- "Potentials"

  (Estimation of the potentials of biomass and biogas power generation based on available resources of biomass and biogas in the region.)

- "Needs": Face-to-face interviews and/or survey among policymakers and project developers.

- "Barriers": Case study.

  (Example: University of Sussex Energy Group examining barriers for diffusing five technologies in India including 1) wind power, 2) solar PV, 3) hybrid vehicles, 4) energy efficiency in small and medium sized enterprises, and 5) IGCC.)

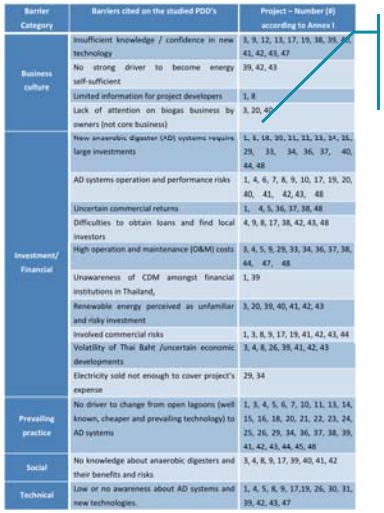
Barriers:

Technological, financial, institutional barriers.

Technological barriers	Financial barriers	Institutional barriers
• Lack of absorbing new technologies in general. • Limited access to the international technology market. Poor knowledge of available technologies in the market. • Lack of appropriate infrastructure. • Lack of local knowledge and expertise for imported technologies. Lack of skills and know-how for operation and maintenance.	• Lack of funding for R&D. • Lack of funding (debt and equity) for project implementation. • High investment costs. • Higher O&M costs in the developing countries. • Lack of private sector involvement. • Lack of enabling business environment. • Poor knowledge of financing opportunities among project participants.	• Lack of awareness and lack of access to regulatory information. • Lack of policy and incentive programs to promote clean energies. • Lack of middle or long-term goals to promote clean energy. • Lack of enabling regulatory environment. • Insufficient protection of intellectual property rights. • Political instability. • Lack of social acceptance and support for clean energy.

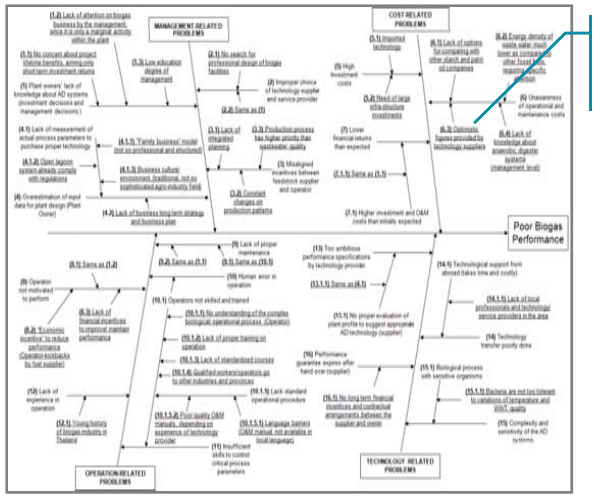
Case study: Biogas in Thailand

- Background: Many biogas power generation projects in Thailand as a CDM activity (67/115 as of Dec. 2010). However, many failing to produce enough biogas.
- Analysis: CDM PDDs (48 projects) and fish-born structure for barrier identification.
- Main barriers: 1) Lack of trained staff members. 2)Lack of local expertise for imported technologies.
- Lessons learned:
  - Supply chain as a whole.
  - CDM may not be enough.



Barrier Category	Barriers cited on the studied PDD's	Project – Number (#) according to Annex I
Business culture	Insufficient knowledge / confidence in new technology	3, 9, 12, 13, 17, 19, 38, 39, 41, 42, 43, 47
	No strong driver to become energy self-sufficient	39, 42, 43
	Limited information for project developers	1, 8
	Lack of attention on biogas business by owners (not core business)	3, 20, 40
Investment/ Financial	New anaerobic digester (AD) systems require large investments	1, 3, 18, 20, 21, 22, 23, 24, 25, 29, 33, 34, 36, 37, 40, 44, 48
	AD systems operation and performance risks	1, 4, 6, 7, 8, 9, 10, 17, 19, 20, 40, 41, 42, 43, 48
	Uncertain commercial returns	1, 4, 5, 36, 37, 38, 48
	Difficulties to obtain loans and find local investors	4, 9, 8, 17, 38, 42, 43, 48
	High operation and maintenance (O&M) costs	3, 4, 5, 9, 29, 33, 34, 36, 37, 38, 44, 47, 48
	Unawareness of CDM amongst financial institutions in Thailand,	1, 39
	Renewable energy perceived as unfamiliar and risky investment	3, 20, 39, 40, 41, 42, 43
	Involved commercial risks	1, 3, 8, 9, 17, 19, 41, 42, 43, 44
	Volatility of Thai Baht /uncertain economic developments	3, 4, 8, 26, 39, 41, 42, 43
	Electricity sold not enough to cover project's expense	29, 34
Prevailing practice	No driver to change from open lagoons (well known, cheaper and prevailing technology) to AD systems	1, 3, 4, 5, 6, 7, 10, 11, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 26, 29, 34, 36, 37, 38, 39, 41, 42, 43, 44, 45, 48
Social	No knowledge about anaerobic digesters and their benefits and risks	3, 4, 8, 9, 17, 39, 40, 41, 42
Technical	Low or no awareness about AD systems and new technologies.	1, 4, 5, 8, 9, 17,19, 26, 30, 31, 39, 42, 43, 47

Analysis of CDM PDD

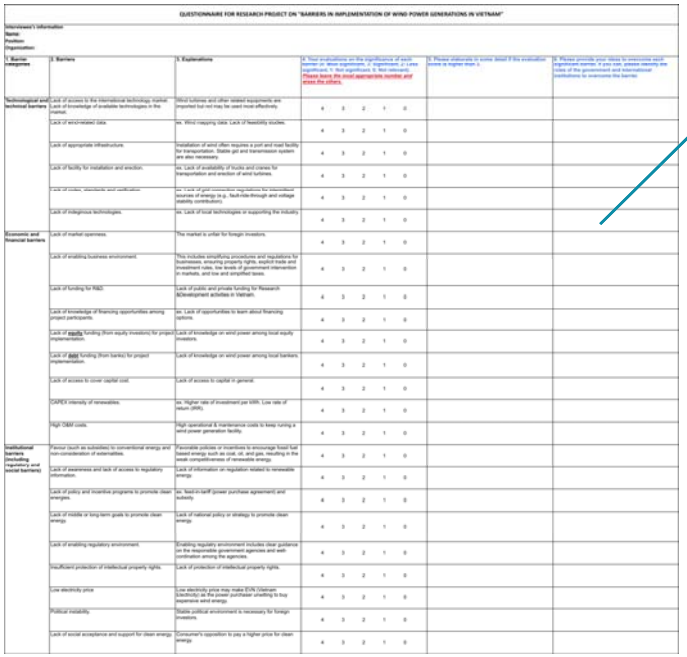


Fish born structure

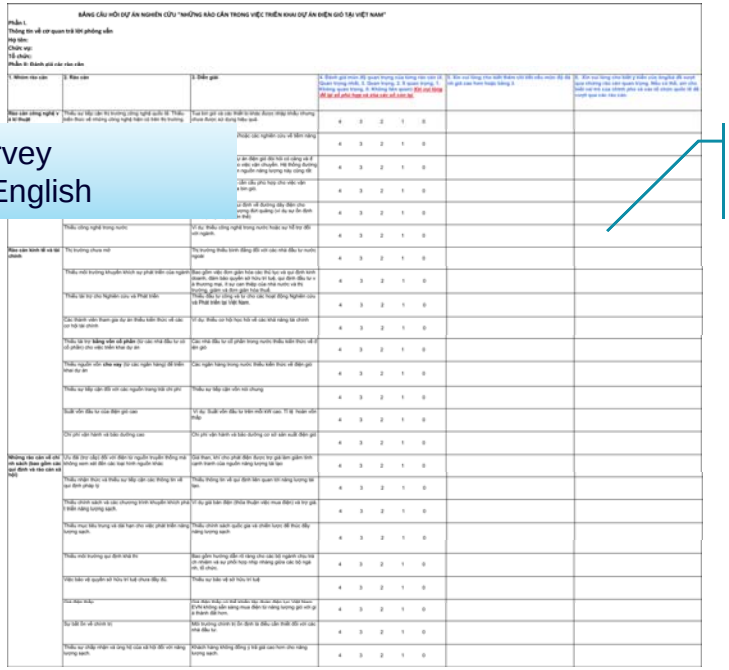
Sulabh Jain, Bernardo Kehdy, Masachika Suzuki, “Challenges and barriers in technology transfer and performance of biogas plants in Southeast Asia. An analysis of tapioca and palm oil industries associated with CDM business in Thailand”, Working paper for IMRE Alumni Conference 2011, July 2011, Institute of Technology Bandung, Indonesia.

Case study: Wind in Vietnam

- Background : High potential in on-shore and off-shore projects.
- Research : Significance of technological, financial and institutional barriers.
- Approach: Survey questionnaire among government officials, turbine manufacturers, consultants, project developers, local banks + semi-structured interviews. (working with Institute of Energy and WPD Energy Vietnam.)



Survey
In English



Survey
In Vietnamese

Institutional design: Lessons learned

1. Policies and measures should to be tailored to each technological development stage.

   - CDM: only effective at the diffusion and commercial stage.
   - The scaling-up of the public funding and the empowerment of the network of the research groups are necessary at the demonstration and deployment stage.
   - First step: mapping technologies with effective policies and measures for each stage.

Institutional design: Lessons learned

2. The scope of possible barriers for technology innovation and transfer should be more holistically examined by possibly considering the whole supply chain of technologies from their delivery to actual operations.

   - Lack of local knowledge and expertise for imported technologies.
   - Lack of skills and know-how for operations and maintenance.

Institutional design: Lessons learned

3. South-South dynamics.

- Increasing capacity among firms in the developing countries, especially in China and India, to develop renewable and energy efficiency improvement technologies.
- Examples: Wind turbine manufacturers in India. Photovoltaic panel manufacturers in China.
- The traditional model of technology transfer from the developed to the developing countries is becoming an old paradigm.

3. South-South dynamics.

	Wind turbines			PV		
2010	1	Vestas (Denmark)	14.8%	1	Suntech Power (China)	5.8%
	2	Sinovel (China)	11.1%	2	JA Solar (China)	5.4%
	3	GE WIND (U.S.)	9.9%	3	First Solar (U.S.)	5.2%
	4	Goldwind (China)	9.5%	4	Trina (China)	3.9%
	5	Enercon (Germany)	7.2%	5	Q-Cells (China)	3.7%
2003	1	Vestas (Denmark)	21.7%	1	Sharp (Japan)	26.6%
	2	GE WIND (U.S.)	18%	2	Kyocera (Japan)	9.7%
	3	Enercon (Germany)	14.6%	3	Shell Solar Industries (Netherlands)	7.0%
	4	Gamesa (Spain)	11.5%	4	Mitsubishi Electric (Japan)	5.4%
	5	NEG Micon (Denmark)	10.2%	5	Sanyo Electric (Japan)	4.7%

(Source: Various sources)

Research in progress and going forward.

- Thinking of the roles of policies and institutions to overcome each identified barrier.
  - Capacity building program?
  - Business partner matching?
  - Financial arrangements? If so, in what way?

Research in progress and going forward.

- Reviewing the roles of existing institutions and organizations in technology transfer and innovation.
  - APP – Asia-Pacific Partnership on Clean Development & Climate
  - Renewable Energy Policy Network for the 21st Century
  - Zero Emissions Platform
  - Technology Breakthrough Program (Steel)
  - Cement Sustainability Initiative (Cement)
  - Others

We are planning a small workshop next year in 2012 or in 2013.

Thank you!

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