

## Technology Issues for Negotiations on the Post-2012 Climate Regime\*

Maricor D. MUZONES

### KEY MESSAGES

- A strengthened technology funding mechanism through scaling up of, and improvement in the access of funds. Developing country participants are of the view that new and additional funds for this mechanism should be secured from a combination of assessed contributions from Annex II Parties, and a levy on international transactions of carbon credits. Developed country participants on the other hand, have stressed the efficient use of funds –both existing and new. Effective governance of the proposed technology funding mechanism may be assured through a balanced representation of developed and developing country Parties, and a transparent operating procedure in coordinating all technology-related activities of developing countries.
- Participants broadly recognized a clearly defined role of governments as key catalyst of private investment and financial flows as main drivers of technology transfer of ESTs. Domestic policies will be critical in creating and sustaining enabling environments for the transfer and diffusion of key ESTs. The “right” policy mix and incentives to support each stage of the technology transfer process will vary per country keeping in mind the diversity in socio-economic and political condition, the sector involved, and the technology concerned.
- A more flexible IPR regime which reflects a more balancing-of-rights- approach supporting innovators on one hand, and facilitating the development and transfer of key climate-relevant technologies on the other, should be examined. At the same time, funding mechanisms that support EST transfer should look into strengthening national regulatory structures that will attract and channel investments into ESTs.
- Participants broadly agreed on the need for a set of uniform indicators for technology development and transfer. Key effective performance indicators of technology transfer through technology needs assessment (TNA) and actions undertaken by governments to enhance the enabling environments by recipient developing countries as well as actions taken by developed countries should be adopted, and, based on those indicators, performance should be measured, verified and reported in the National Communications of both developed and developing country Parties.

*\*This brief reflects the views of participants at the IGES consultations on the post - 2012 climate regime.*

## *Milestones of technology-related mandate under the UNFCCC and Agenda 21*

- **Agenda 21, Chapter 34** – Provides that the transfer of environmentally sound technologies (ESTs), cooperation and capacity-building as essential requirements to achieve sustainable development
- **UNFCCC, Article 4.5** – Provides the mandate for developed countries and other developed countries in Annex II to promote, facilitate and finance, as appropriate, the transfer of, or access to environmentally sound technologies (ESTs) and know-how particularly to developing country Parties; **Article 11** provides the basis for establishing a financial mechanism also to support technology transfer
- **Marrakech Accord, Decision 4/CP.7**- Adopts the technology transfer (TT) framework with 5 key areas of work; establishes the Expert Group on Technology Transfer (EGTT) which plays a catalytic role in facilitating the implementation of current activities under the TT framework; as the operational entity of the financial mechanism of the Convention, the Global Environmental Facility (GEF) was directed to provide financial support to implement the TT framework;
- **Kyoto Protocol, Article 10 (c)** – Calls all Parties to cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, the transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries; “steps” include the formulation of policies and programs for the effective transfer of ESTs that are publicly owned or in the public domain and the creation of an enabling environment for the private sector
- **Bali Action Plan, Article 1 (d)** – Reiterates that an enhanced action on technology development, deployment, diffusion and transfer of ESTs must be undertaken if deep cuts in global greenhouse gas emissions is to be achieved

## **1. Introduction**

This brief intends to present three (3) key technology issues for consideration in the negotiations of the post-2012 climate regime. Part of the views reflected here were from discussions held during the IGES Asia-Pacific round of consultations that were conducted from 2005 to 2008. This brief shall attempt to explore areas where agreements can be forged to assist the discussions and climate negotiations on technology as it moves towards Copenhagen in 2009.

The central role of technology in addressing climate change is without doubt one of the areas which has received consensus and reiteration in the continuing climate change debate. The Intergovernmental Panel on Climate Change (IPCC) has noted that with appropriate policies and incentives in place, stabilisation levels of greenhouse gases can be achieved by deployment of a portfolio of technologies that are either currently commercially available or expected to be commercialized in coming decades. Additionally, the transfer of environmentally-sound technologies (ESTs) has been identified as an essential requirement for sustainable development.

The urgent need to accelerate the development, deployment, adoption, diffusion and transfer of ESTs has found renewed support under Article 1(d) of the 2007 Bali Action Plan (BAP). “Enhanced action on mitigation and adaptation (M & A)” include the effective means to remove obstacles to, and provision of financial and other incentives for, scaling up the development and transfer of technology to developing country Parties.

While without doubt the Marrakech Accord in 2001 has ushered some progress in operationalising Article 4.5 of the Convention, ESTs particularly in developing countries have yet to make an impact in addressing both climate change and sustainable development goals. Various stakeholders share some common as well as diverging views on how the multitude array of technology-related challenges under the climate regime can be addressed.

## 2. Key issues, stakeholder perspectives and the way forward

### 2.1 Technology financing- Lack of clear agreements on required financial resources directed to the development, transfer and dissemination of ESTs, as well as on quantitative and specific technology needs of countries. There is also a need for effective institutional mechanisms within the Convention that coordinate or promote technology-related activities.

The UNFCCC (2007) estimates that global additional investment and financial flows of USD 40 billion a year will be necessary between now and 2050 to significantly reduce greenhouse gas emissions (GHGs) and de-carbonize the power sector. Asia, where rapid economic growth is further expected to continue, will be particularly in need of ESTs that will be critical in reducing if not totally arresting its growing greenhouse gas emissions.

Nearly USD 30 billion was invested globally in clean energy in 2004, and by 2005 had risen to about USD 49 billion. This amount almost doubled in 2006 which was estimated at USD 83 billion. By 2007, it reached USD 148 billion, of which around USD 108 billion went into asset financing, most of it for new power generation projects (GEF Report to the UNFCCC 2008). Yet these investments are insufficient if not small, compared to the huge requirements needed to reduce GHG emissions, particularly for developing countries, which received only about 20 percent of the global investment in renewable energy in 2007. Of this

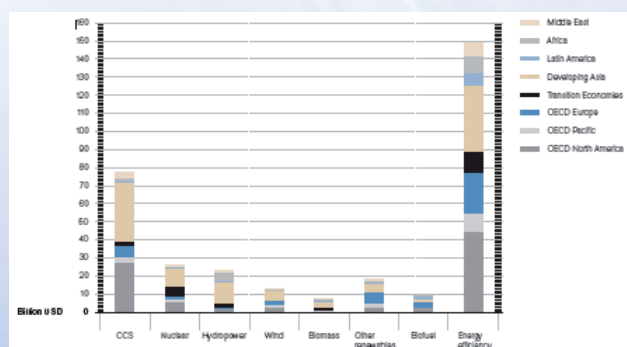


Figure 1. Annual additional investment by technology and by region under the mitigation scenario in 2030

Source: UNFCCC, *Investment and Financial Flows to Address Climate Change* (2007)

share, about half went to China alone, followed by India, and then Brazil (Cosbey et. al 2008).

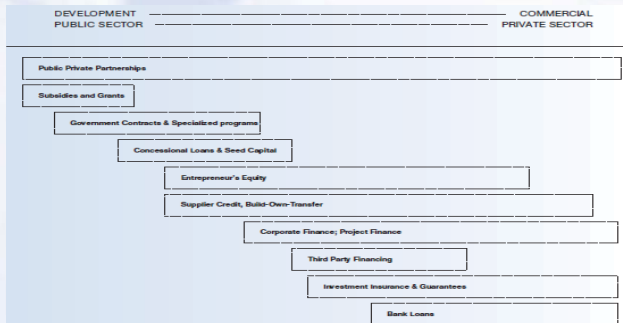
The International Energy Agency (IEA) in 2007 notes that to meet the rapid economic growth in urban areas, an estimated USD 22 trillion in new energy investment is needed between 2005 and 2030. Half of this amount will be required in developing countries. Not only does energy account for about 80 percent of the global carbon dioxide emissions but is undisputedly also a key component in achieving development goals. Deployment and diffusion of the much-needed technologies will be most critical in energy-intensive sectors such as energy, industry, transport, agriculture and forestry, and waste management.

Figure 1 presents a UNFCCC estimate of the annual additional investment by technology and by region in 2030 showing that a substantial share will need to be invested in developing countries for each of the technologies presented.

The Official Development Assistance (ODA) as one source of public finance, comprises only less than 1 percent of global investments (UNFCCC 2007b). Yet its role, particularly in Least Developed Countries (LDCs) and small developing countries with very limited private sector investment and infrastructures, is very important. But let alone, public finance cannot deliver the huge required resources to effectively facilitate technology transfer.

Mobilizing finance and investment flows into adoption of ESTs is a critical part of the climate change response. Public and private finance therefore, will have to work together to be able to respond to the huge technological financing requirements. Figure 2 illustrates the financing continuum showing some innovative financial instruments that can be utilized in supporting technology transfer of ESTs. Public finance though very limited in scale (about 14 percent of global financial flows) (UNFCCC 2007c), enable governments to provide guarantees in high-risk investment areas, thus encouraging private interests to channel resources into climate-relevant or low carbon technologies.





**Figure 2. The Financing Continuum**

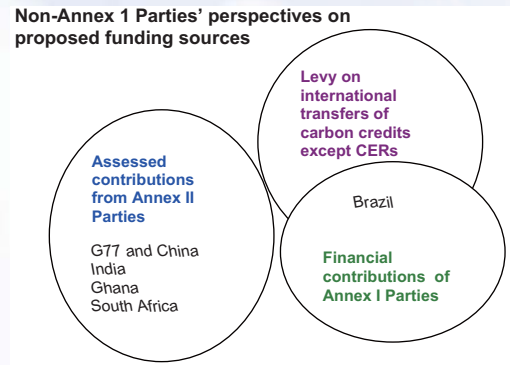
Source: UNFCCC, *Innovative Options for Financing the Development and Transfer of technologies* (2007)

### Stakeholder perspectives

#### a) Proposed technology funding mechanism within the UNFCCC

Most developing countries have advocated for the creation of a Technology Funding Mechanism under the Climate Change Convention. Developing country Parties which include the G77 and China, Ghana, Brazil and India are among the countries which have staunchly called for the creation of this mechanism. Brazil proposes that funds for this purpose may be secured from introducing a 2 percent levy on all international transfers of all carbon credits except Certified Emission Reductions (CERs) and by allowing financial contributions as part of the legally-binding commitments of Annex 1 Parties. This view somehow finds support in the position taken by the Republic of Korea (ROK) when it advocated that recognition of carbon credit for the verifiable mitigation from nationally-appropriate mitigation actions (NAMAs) is a possible sustainable source of funding for technology transfer.

The majority of developing country Party submissions like Ghana have taken the view that funds for this mechanism should be secured from assessed contributions from Annex II countries pursuant to its commitments under Article 4.3 of the Convention. In addition, South Africa and Brazil also lend support to the G77 and China proposal and further reiterates Article 4.7 of the Convention, i.e. the extent of developing country action is dependent on the provision of finance, technology and capacity building by developed countries.



**Figure 3. Perspectives on the proposed technology funding mechanism within the UNFCCC**

Source: *Country Submissions to the UNFCCC* (2008)

Among the developed country Parties, France on behalf of the European Community supports the view of many developing country Parties that there should be an effective institutional and organizational arrangement to coordinate activities related to technology. It also lends support to the general view that there is a need to scale up and mobilise financial investment flows to facilitate technology transfer, as well as to optimise existing ones.

Australia's perspective on this issue suggests three elements for consideration in the architecture of any financial mechanism related to technology. This includes (1) an objective criteria to guide contributions from Parties and non-State actors; (2) criteria for prioritising allocation of financial support for clean development; and (3) expansion of coverage of carbon markets. Most developed country Parties have emphasized the critical role that governments must play in providing an enabling environment for both public and private investments.

#### b) Role of governments

Enactment of domestic legislation to address gaps and provision of incentives that will send a clear and stable policy signal to direct private investments to ESTs will also be crucial in sustaining investor confidence at each stage of the technology transfer process. All participants have agreed that governments must act as a key catalyst in ensuring the creation of an enabling environment for different key sectors at the domestic level.

In India for example, the passage of the 2003 Electricity Act paved the way for putting in place effective policy tools such as the renewables purchase obligation and preferential tariff of renewables. The passage of India's 2003 Act have led to a significant increase in private investments in renewables thereby increasing the country's capacity in power generation and a larger share of renewables in India's energy technology portfolio, particularly of wind and hydro. This covers R & D of key technologies that are found to be most relevant and in the case of Asia, must be those technologies which have been identified largely through the TNA process.

### Way forward-Some thoughts

To achieve consensus in Copenhagen on the issues relating to technology financing, both developed and developing country Parties should agree on the following:

- a strengthened institutional mechanism that will effectively govern and coordinate all technology-related and financing activities that will take into consideration various stakeholders' participation, a balanced representation from both developed and developing country Parties, transparency in procedure, as well as learning experience of current institutions and their numerous past and current initiatives; a strengthened mechanism must ensure the adequacy, predictability and sustainability of technology funding and be ready to provide support at all stages of the technology transfer process;
- a scaled up finance from new and additional funds to accelerate the deployment of commercially-available low or no-carbon emitting technologies, and the demonstration of R&D level technologies that are within the public and private domain;
- achieving deep cuts of emissions by learning from the experience of the Montreal Protocol that technology and financing are most crucial components in achieving the goals of the Convention;
- governments as key catalyst of mobilising private finance should be assisted by the Convention in putting in place enabling environments through domestic policies and incentives particularly in key sectors such as energy, industry, transport, agriculture and waste; a clear, coordi-

nated and stable policy signal from both the international community and national governments will be crucial in directing private investment flows into low or no-carbon emitting technologies;

### 2.2 Role of IPR on ESTs - Need for further analysis and shared understanding on potential impacts of intellectual property rights (IPR) in the transfer and diffusion of ESTs to developing countries

IPR may be a potential barrier to the transfer of key ESTs under the climate change regime. Developing country-participants are primarily concerned about the prohibitive cost of procuring low carbon technologies strongly associated with patents. Moreover, under earlier environmental agreements such as the Montreal protocol, private firms and even public institutions of industrialized countries refused to license such ESTs like the Hydrofluorocarbons (HFC)134a, fuel cell and intensified gasification cycle due to competition from local manufacturers in South Korea and India (IPCC 2000).

Nevertheless, facilitating the licensing agreements of key technologies to local manufacturers in developing countries will be crucial particularly during the internalisation stage of technological development when local firms learn through imitation under a flexible IPR regime (Hutchison, 2006). In principle, multilateral environmental agreements call for a balance between the right of innovators and the right to develop ESTs. Agenda 21 and the UNFCCC both recognize the need to diffuse technologies to developing countries while maintaining patent protection in the development and transfer of ESTs.

Admittedly, while China (Suntech) and India (Tata-BP Solar) have succeeded in gaining entry into the solar PV and wind industry, Barton (2008) notes that the impact of IP will vary according to the sector while noting that what are usually patented are specific improvements or features. This has been noted earlier by Hutchison (2006) in holding that the research and development capacities in most developing countries are still very limited and tend to build on innovation. As net importers of ESTs or key low carbon technologies therefore, developing countries do not stand to benefit from a strong patent protection.

In the case of a refusal to license, it is true that the current IPR regime under Article 40(2) allows governments of WTO-

members to enact legislations or measures to prevent the abuse of IPR by right holders or the resort to such practices. Governments therefore, through domestic legislation, can provide that a refusal to deal to a competitor on commercial terms which in effect unreasonably restrains trade or hinders international transfer of technology will be deemed as an abuse and a ground for compulsory licensing.

The current IPR regime-the WTO Agreement on Trade-Related Aspects on Intellectual Property (TRIPs) for example, declares in Article 7 (Objectives) that “the protection and enforcement of IPR should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge...xxx”. While the TRIPs in principle is supportive of the transfer and dissemination of ESTs, in practice the current IPR regime is perceived to fall short of that intention.

Hutchison has correctly pointed out that that TRIPs agreement sets out strong minimum standards of intellectual property protection such as the 20-year duration of protection from date of filing (Article 33). The issue now is whether or not such strong minimum standards facilitate the diffusion of key ESTs or low carbon technologies that are intended to benefit developing countries.

### Stakeholder perspectives

Most developing countries are of the view and continue to reiterate the creation of a technology funding mechanism to either facilitate in the acquisition of ESTs or in buying down these technologies which are met with IPR restrictions in developing country Parties (Figure 4). Additionally, other developing country participants have called for the re-structuring of the current IPR regime (1995 WTO TRIPs Agreement) by either shortening the 20-year duration of patent protection in the case of key ESTs, or in moving for the relaxation of IPR standards.

Others have been arguing for a relaxation of IPR rules in the treatment of ESTs as a “public good” along the lines of HIV/AIDs medicine. Still others are of the view that compulsory licensing may already be invoked under the current IPR regime in the event of a refusal to license of identified key climate change relevant technologies. But what may qualify as key ESTs or key climate change relevant tech-

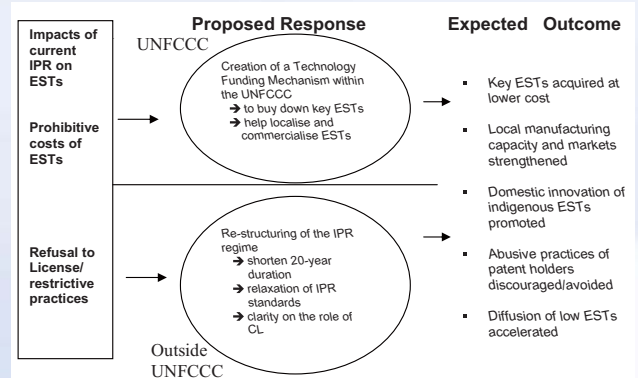


Figure 4. Developing country perspectives on IPR

nologies needs agreement.

Some developed country Parties are of the view that the current IPR regime is acting as an incentive to knowledge generation and private investment flows. Many of the developing country Parties have stressed however, that the current IPR regime either hinders or is not enough to facilitate the transfer of the much-needed technology to address climate change in developing countries. The role of compulsory licensing under the existing TRIPs Agreement as an option to procure technologies which are met with IPR restrictions must be explored.

### Way forward-Some thoughts

To achieve consensus in Copenhagen on the issue relating to intellectual property rights, developed and developing country Parties must:

- cooperate in identifying the key technologies required in each developing country Party and ascertain the role of and potential impacts of IPR in the development and transfer of such technologies; that should IPR prove to be a barrier, Parties should be more open in examining how a flexible IPR regime can facilitate the adoption and dissemination in developing countries without jeopardising the right of innovators;
- recognise that availability and affordability of low or no-carbon emitting technologies will be key in significantly reducing greenhouse gas emissions in developing coun-



tries where mitigation potential is highest; funding and support mechanisms for transfer of ESTs should be able to give support to governments in strengthening national regulatory structures;

- enhance support for South-South technology transfer while facilitating North-South EST transfer, and strengthen international and regional collaboration in the development of technologies.

### **2.3 Monitoring the effective implementation of technology transfer - Lack of uniformly adopted key indicators for monitoring the transfer of low carbon technologies to developing countries**

Technology transfer is a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, NGOs and research/education institutions (IPCC 2000). As it is, the process is complicated but key stages have been identified which include identification of needs, choice of technology, assessment of conditions of transfer, agreement, implementation, evaluation, adjustment to local conditions, and replication.

Adopted in COP 7 of the UNFCCC, this framework for technology transfer involves five (5) key areas (technology needs assessment, technology information, enabling environments, capacity building, and mechanisms. Funding to support each area has also been requested from the GEF. To this end, under the new terms of reference of the EGTT, it was tasked to identify and test performance benchmarks or indicators to effectively monitor the implementation of technology transfer. With the work of the EGTT reconstituted for another five years in Bali, both developed and developing country Parties are called upon to assist the EGTT in identifying the criteria for indicator development and identification.

### **Stakeholder perspectives**

Characterising technology transfer is a difficult task due to the diversity and complexity of the process. Estimating the transfer involves not only the “hardware” such as equipment, but the “software” component which includes education, training and know-how making this task all the more

complicated. Investment and financial flows are generally used as indicators to measure technology transfer (UNFCCC, 2008b).

The EGTT report has pointed that performance indicators should measure behavioural change and should avoid duplication. In the case of candidate performance indicators for monitoring the magnitude and impact of future climate change technology investment flows, the first interim report of the EGTT has categorised indicators according to input indicator (IPI), output indicators (OPI), outcome indicators (OCI), and impact indicators.

For example, in evaluating the item “donor”, total ODA funding or total ODA personnel can be an IPI, total and percentage of ODA funding to climate technologies (total and by technology type) as OPI, and total leveraged investment in climate technologies (by technology type, countries/regions, stage of tech transfer, over time) as an OCI. Additionally, in identifying impact indicators to monitor and to evaluate the effectiveness of the implementation of the TT framework, the three (3) pillars of sustainable development (environment, social and economical) plus the institutional dimension should be reflected (UNFCCC 2008b).

The EGTT adds that selection of final indicators will have to consider the following: “uniformity”- where countries across region will interpret it the same way; data availability, time constraints, and cost-benefit considerations (with attention to paid arrangements for data collection and monitoring and evaluation capacity that matches the demand for the development and use of indicators.

Finally, the EGTT has reiterated its call for the participation of the so-called “constituent groups” in defining indicators, which means all parties to the Convention. Participation and understanding of indicators is crucial because they will be the users of such indicators for future decision-making.

### **Way forward-Some thoughts**

To achieve consensus in Copenhagen on the issue relating to the monitoring of the effective implementation of technology transfer in developing countries, all Parties to the Convention- both developed and developing countries, must:

- adopt a uniform set of key performance indicators. Examples of such indicators include the required key technologies identified by recipient developing countries, and the kind and number of actions undertaken to enhance the enabling environments to promote investment.

## References

- Barton, J.H., and G.E. Osborne. 2007. *Intellectual Property and Access to Clean Energy Technologies in Developing Countries – An Analysis of Solar Photovoltaic, Biofuel and Wind Technologies*. ICTSD Trade and Sustainable Energy Series Issue Paper No. 2. Geneva: International Centre for Trade and Sustainable Development. ([http://ictsd.net/downloads/2008/11/intellectual-property-and-access-to-clean-energy-technologies-in-developing-countries\\_barton\\_ictsd-2007.pdf](http://ictsd.net/downloads/2008/11/intellectual-property-and-access-to-clean-energy-technologies-in-developing-countries_barton_ictsd-2007.pdf))
- Cosbey, A. J. Ellis, M. Malik, and H. Mann. 2008. *Clean Energy Investment*. International Institute for Sustainable Development Background Paper, Trade and Climate Change Seminar, 18-20 June 2008, Copenhagen, Denmark. ([http://www.iisd.org/pdf/2008/cph\\_trade\\_climate\\_investment.pdf](http://www.iisd.org/pdf/2008/cph_trade_climate_investment.pdf))
- Hutchison, C. 2006. Does TRIPs Facilitate or Impede Climate Change Technology Transfer into Developing Countries? *University of Ottawa Law and Technology Journal* 3, no. 2: 517-537.
- IPCC (Intergovernmental Panel on Climate Change). 2000. *Methodological and Technological Issues in Technology Transfer - A Special Report of the Intergovernmental Panel on Climate Change*, edited by B. Metz, O.R. Davidson, J.-W. Martens, S.N.M. van Rooijen, and L. van Wie McGrory. Cambridge: Cambridge University Press. [http://www.grida.rp/publications/other/ipcc\\_sr/?src=/Climate/ipcc/tectran/index.htm](http://www.grida.rp/publications/other/ipcc_sr/?src=/Climate/ipcc/tectran/index.htm)
- United Nations Division for Sustainable Development. 1992. *Agenda 21*. (<http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm>)
- UNFCCC (United Nations Framework Convention on Climate Change). 2007a. Decisions adopted by the Conference of the Parties, 1/CP.13, Bali Action Plan (FCCC/CP/2007/6/Add.1) (<http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf>)
- UNFCCC (United Nations Framework Convention on Climate Change). 2007b. *Innovative Options for Financing the Development and Transfer of Technologies*. Bonn: UNFCCC. ([http://unfccc.int/resource/docs/publications/innovation\\_eng.pdf](http://unfccc.int/resource/docs/publications/innovation_eng.pdf))
- UNFCCC (United Nations Framework Convention on Climate Change). 2007c. *Investment and Financial Flows to Address Climate Change*. Bonn: UNFCCC. ([http://unfccc.int/files/cooperation\\_and\\_support/financial\\_mechanism/application/pdf/background\\_paper.pdf](http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/background_paper.pdf))
- UNFCCC (United Nations Framework Convention on Climate Change). 2008a. *Report of the Global Environmental Facility on a Strategic Programme to Scale Up the Level of Investment for Technology Transfer (FCCC/SBI/2008/5)*. <http://unfccc.int/resource/docs/2008/sbi/eng/05.pdf>
- UNFCCC (United Nations Framework Convention on Climate Change). 2008b. Report of the Expert Group on Technology Transfer (EGTT) for 2008 (FCCC/SB/2008/INF.5). <http://unfccc.int/resource/docs/2008/sb/eng/inf05.pdf>
- WTO (World Trade Organization). 1995. *Agreement on Trade-Related Aspects of Intellectual Property Rights*. ([http://www.wto.org/english/tratop\\_e/trips\\_e/t\\_agm0\\_e.htm](http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm))

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\*e-mail: [muzones@iges.or.jp](mailto:muzones@iges.or.jp)

## CONTACT

**IGES**

Institute for Global Environmental Strategies

2108-11 Kamiyamaguchi, Hayama, Kanagawa, Japan 240-0115

TEL: 81-46-855-3700 FAX: 81-46-855-3809

URL: <http://www.iges.or.jp>